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RENEWABLE ENERGY IN EUROPEAN UNION: The Reveal of Development Plans for Environment

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CONTENTS

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EXECUTIVE SUMMARY

Among others, energy is the key sector at EU's development plans. Unlike any other topics the energy is related directly to the inner policies of member states of EU. Energy security and environmental concerns such as climate change, carbon emissions are interconnected in the sense of policy making.

After 1973 oil crisis, new energy policy strategies have been followed such as promotion of diversified and reliable external supplies and development of the various domestic energy sources. Research and development activities began on the integration of renewable energy resources at the last decades triggered by climate change and supply domination of Russia which also became a major problem for EU.

Analysis of current policies and strategies in the field of RES should begin from the two long term energy strategies for Europe: A Strategy for Competitive, Sustainable and Secure Energy: Energy 2020 and Energy Roadmap 2050.

Different bodies of EU prepared reports, action plans and strategies also aim to provide new industrial markets for EU as well as granting sustainable and secure energy. Ongoing strategies also affected the countries like Turkey (EU Candidate), new legislations are declared on renewable energy by the means of development plans.

EU Member states have committed themselves to reducing greenhouse gas emissions (GHG) by 20%, increasing the share of renewables in the EU's energy mix to 20%, and achieving the 20% energy efficiency target by 2020. The EU is currently on track to meet two of those targets, but will not meet its energy efficiency target unless further efforts are made.

On achieving its renewable energy share target, currently EU is moving in the right direction. Until 2010, share of renewables in EU reached 12.7%, exceeding its interim target of 10.7%. With about 7 years more, it is expected that share of renewable energy will meet 20% target

MS states which have been invested in research and development of renewable energy now also exports their pre-studied power generating technologies while a huge majority of the world have just begun to invest at research and development activities on renewable energy.

Turkey has drawn a "Roadmap 2023" resembling EU's strategic plans (Energy Package 2020, Roadmap 2050) but in spite of this, it is hard to say that Turkish Government has formed a well-structured renewable energy policy taking the very low share of renewables in Turkish energy mix into account.

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RENEWABLE ENERGY IN EUROPEAN UNION: The Reveal of Development Plans for Environment

1. Introduction

This paper is prepared to show how European Union's energy policies are evolved and how and why the renewable energy sources gain that much importance on these policies also discussing about the two important directives for EU's future energy plans if the major concern of these directives are environmental concerns or energy security.

Renewable energy can be defined in many ways. "Any energy resource that is naturally regenerated over a short time scale and derived directly from the sun (such as thermal, photochemical, and photoelectric), indirectly from the sun (such as wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy)"[i] is one of the most popular technical definitions of renewable energy. However, the most common definition is that renewable energy is from an energy resource that is replaced by a natural process at a rate that is equal to or faster than the rate at which that resource is being consumed. In the broad definition of energy, renewable energy sources should also be comprehended as the sources of electricity generation since heating is also a major branch for energy.

The renewable energy sources have become more important than ever due to the rapid increase of oil and natural gas prices in the last years and corresponding political situation of the world. Nowadays, new energy investments are directed towards clean energy. Accordingly, the EU has adopted an energy policy aiming to maximize the use of renewable energy sources to reduce the dependence on fuel from non-member countries, to minimize emissions from carbon sources, and to decouple energy costs from oil prices. In addition, the policy of EU focuses on limitation of energy demand by efficient usage of energy in energy sector and also in end-use. Energy policies were not the core point of EU yet at the last decade the renewable energy sources became a master strategy. Following chapters give the background information about energy and renewable policies of EU at past and present as well as the strategies and action plans to be kept.

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2. Energy Policies in EU and Integration of the Renewables

After the Second World War, economic integration in Europe started with coal and steel union between France and Germany. These countries had to set up supranational organization to avoid any war in Europe. Moreover, rules and regulations on energy resources are set by agreements also prepared the ground for further energy policies in Europe. Initially, the events made developing energy policies in the European Community difficult to achieve between the years of 1945 and 1970. Therefore, member countries interfered with the energy market to create state controlled energy markets. Furthermore, there was no any direct regulation on energy policies in the Treaty of Rome so Community was far away from establishing a shared energy policy.

In 1973, oil crisis[ii] ended extensive usage of oil consumption in most of the European countries. The Council of the European Communities decided to found a Special Energy Committee for counter effects of the oil crisis. Its responsibility was to arrange draft documents related to energy policy and control their operations in the community. After a year, the European Commission (Commission) reported a document for a new energy policy strategy in Community.[iii] Then, the Council implemented a resolution related to this new energy policy strategy for the Community[iv] by means of the following:

- development of nuclear power production
- the hydrocarbon and solid fuel resources in the Community
- diversified and reliable external supplies
- a research and technological development effort ensuring the required development of the various energy sources. [v]

Before 1980's, renewable energy resources (RES) did not constitute an important place in the policy of the Community but some member countries began to identify RES as an alternative energy for non-renewable energy resources. At the Community level, the oil crisis of 1973 also did not cause to any policy alteration to use of RES. Until the oil crisis, energy concerns were just an exclusive national competence. Nevertheless, the oil crisis was first

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incentive to get together for evolution of RES in the Community. Although there was not any common energy policy in the Community, some member states (MS) looked for the alternative resources for fossil fuels in order to sustain their deployable energy resources. Together with this, some MS invested in research and development programs to promote the use of RES for national development programs. The first attempts did not have anything to do with minimizing the negative effects of the energy sector on the environment and were focused solely on ensuring energy security.

As early as 1997, the well-established and forward-looking EU RES policy started with the first White Paper on RES.[vi] Then, two important directives 2001[vii] and in 2003 [viii] emerged. Finally, the Climate and Energy Package includes the 2009 RES Directive[ix] followed these previous directives, which is currently in implemented. A forward-looking policy in the EU is important for creating a ground for the global challenges of the 21st century like climate change or rapidly rising energy demand. [x]

The Commission argues that the EU has the powers and tools for implementation of an energy policy towards:

- Securing Europe‘s energy supplies;
- ensuring that energy prices do not make Europe less competitive;
- protecting the environment and in particular combating climate change;
- improving energy grids. [xi]

3. EU Energy Security, Climate Change and Role of Renewables

The issue of energy security is one of the primary motive led EU countries to cooperate each other in the energy problem. So, Europe region has internal and external reasons for securing its energy supply.[xii]

Rising energy prices and decreasing energy production within Europe (-14% 1999-2009, so growing energy dependency), fragmented internal market and also political unrest in energy supplied countries with increasing global demand, Russia’s use of its energy resources as a political tool creates another threat for crisis. Thus, Europe has forced to work on a comprehensive energy policy to secure the development of MS.[xiii]

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The EU's overall energy dependency is estimated at 53.9%, its dependency on oil supplies at 83.5%, and on gas 64.2%. These figures indicate Europe's heavy reliance on external supplies, and especially that the share of oil and gas in the overall European energy mix amounts to more than 60% even in 2010. [xiv]

This ratio indicates the high level of dependency on supplies from third countries Europe is subjected to reductions or termination of supplies, as well as price increases. The 1973 oil embargo emphasized three main requirements of the EU MS, to develop energy security. Firstly, there is increased energy policy cooperation among European countries and the energy exporters. Secondly, institutional system for coordination in the any possible energy supply disruptions was vital. Thirdly, strategies to prevent high level of energy dependency should be developed and to escape from becoming the victim of future attempts by energy exporting nations which use energy as a political or economic threat. [xv] The EU tried to develop its internal energy policies but in international level, it does not have any working agreements to secure energy policies and Russia is still the main energy supplier of oil and gas to European markets.[xvi] The Russo-Ukrainian gas crisis of 2006-2009 only reinforces the conviction that alternative ways of securing Europe's energy supplies need to be developed.

The EU's energy policies are exclusive because energy security and climate change issues were contradictory at the second half of the 20th century. In 2007, the International Panel on Climate Change (IPCC) asserts the linkage between the increased temperature and rising level of greenhouse gases. Moreover, 80% of European emissions come from energy sector and effective change in this problem can be stabilized global warming within the level of +2°C. [xvii] This would require the reduction of emissions by 25–40 % by 2020 and 80–95 % by 2050 in comparison to 1990 levels. [xviii]

The factors mentioned above pushed the EU to work on policy encouraging the energy efficiency and development of RES for reducing greenhouse gases.

The Climate and Energy Package adopted in 2009 [xix] is the strategy, which has the purpose to reduce rate of climate change and change the European energy mix.

Until 2020, a binding target of 20% usage of RES in the EU energy mix is planned to raise its portion of domestic energy production but prevent any additional contribution to

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increase in greenhouse gas emissions. So, this policy will decrease the EU's energy import dependency in the long term. Nevertheless, the promotion of RES usage is not the only alternative to heavy fuels. EU also expands the energy efficiency policies (also part of the package) and develops innovative technologies such as carbon capture and storage (CCS). [xx] Despite the fact that there are serious contradictions among the countries; it should also be known that nuclear energy is one of the strong alternative to fossil fuels in Europe.

Analysis of current policies and strategies in the field of RES should begin from the two long term energy strategies for Europe: A Strategy for Competitive, Sustainable and Secure Energy: Energy 2020. [xxi] and Energy Roadmap 2050 [xxii]

4. 2020 Energy Target of EU and its Progress

The climate and energy package is a set of binding legislation, which aims to ensure the European Union meets its ambitious climate and energy targets for 2020. *(See Table 1)* These targets, known as the "20-20-20" targets, set three key objectives for 2020 (EU Climate Action, n.d.):

1. A 20% reduction in EU greenhouse gas emissions from 1990 levels;
2. Raising the share of EU energy consumption produced from renewable resources to 20%;
3. A 20% improvement in the EU's energy efficiency.

MS have committed themselves to reducing greenhouse gas emissions (GHG) by 20%, increasing the share of renewables in the EU's energy mix to 20%, and achieving the 20% energy efficiency target by 2020. The EU is currently on track to meet two of those targets, but will not meet its energy efficiency target unless further efforts are made.

<u>20% reduction in Greenhouse Gas</u>

The Climate and Energy Package set a 20% GHG emission reduction target for EU-28 by 2020 compared to 1990, which is equivalent to -14% compared to 2005. This is also the basis For the EU's international obligation under the 2nd commitment period under the Kyoto Protocol from 2013-2020. [xxiii]

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Share of Renewable Energy to 20%

On achieving its renewable energy share target, currently EU is moving in the right direction. Until 2010, share of renewables in EU reached 12.7%, exceeding its interim target of 10.7%. With about 7 years more, it is expected that share of renewable energy will meet 20% target (European Commission, 2013b). The most objective measure is to judge Member States against their first interim target, calculated as the average of their 2011/2012 shares. Whilst on average such progress to 2010 is good, this does not reflect the policy and economic uncertainties that renewable energy producers appear to face currently.

20% Improvement in energy efficiency

Substantial steps have been taken towards this objective – notably in the appliances and buildings markets. Nonetheless, recent Commission estimates suggest that the EU is on course to achieve only half of the 20% objective. The EU needs to act now to get on track to achieve its target.

EU Heads of State on 4 Feb 2011 committed to "Take determined action to tap the considerable potential for higher energy savings of buildings, transport and products and processes." European Commission adopts new Energy Efficiency Plan with additional measures in order to reach 20% target by 2020 such as: [xxiv]

-Public sector to give the good example: binding targets for refurbishing public buildings and highest energy-efficiency criteria for public procurement
-Industry: energy efficiency requirements for industrial equipment, energy audits, energy management systems
-Improve efficiency of power and heat generation
-Roll out smart power grids and smart meters

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Table 1: Final Energy from renewables of EU MS and individual targets

Table 1
Final energy from renewables (%)

Country	2008	2020
Austria	28.5	34
Bulgaria	9.4	16
Cyprus	4.1	13
Czech Republic	7.2	13
Denmark	18.8	30
Finland	30.5	38
France	11	23
Germany	8.9	18
Greece	8	18
Ireland	3.8	17
Italy	6.8	17
Lithuania	15.3	23
Luxembourg	2.1	11
Malta	0.2	10
Netherlands	3.2	14
Poland	7.9	15
Portugal	23.2	31
Slovakia	8.4	14
Slovenia	15.1	25
Spain	10.7	20
Sweden	44.4	49
UK	2.2	15

Source: REN 2010

5. Roadmap 2050: "Low Carbon Energy"

EU's not only put a short-term and mid-term policy guide for its energy and climate change policy, but also already heading forward to set up a roadmap to 2050 with the brand of "Low Carbon Energy". Ambitious target and hopes are put into the policy. Obviously this policy would be possible to achieve through the successful implementation of earlier policies.In developing this policy, EU officials believes that 80%-95% reduction in 2050 is feasible to achieve with currently available technologies, behavioral change only induced through prices, and if all economic sectors contribute to a varying degree and pace. It means that, to achieve the target, current technology is sufficient and further improvement of technology will fasten the process. To do so, EU is optimistic to meet reduction efficient pathway as of 25% reduction in 2020, 40% in 2030, and 60% in 2040. [xxv]

Both documents relate to energy policy as a whole and both provide for a transition to renewable energy sources and their dominance in the energy mix of Europe in the next decades. A requirement of the Energy 2020 strategy is that investments in the electricity generation sector result in almost two thirds of the electricity being produced originating from low carbon sources —by the early 2020's. From this angle, generating

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energy from renewable sources should be prioritized. According to the document, Europe has just taken the first step implementing the policy by introducing a legislative framework designed to promote the achievement of the 20% target for renewable energy in 2020. Ensuring that the legislation is fully implemented should be the next step, as investors need the confidence to invest in new production, transport and storage options for renewable sources.

The share of renewable energy rises substantially in all de-carbonization scenarios and the largest share of energy supply technologies in 2050 comes from renewables. [xxvi] The roadmap lists challenges that Europe will come across when switching to renewables, such as bringing down the costs of renewable energy, development of technologies, more efficient policies and support schemes and incentives. According to the document, storage technologies and improved infrastructure for integration across Europe remain critical. [xxvii]

6. Expanding Industrial Markets for Renewable Energy

One of the biggest acquisitions of the energy strategies over the past years has been the increased adoption of renewable power, led by a growing number of large-scale tech companies, manufacturers and retailers. The developed industrialized companies of European Union are now to gain a second reward with renewable energy policies.

MS and other countries affected by the EU's energy policies are all expanding energy industry markets and they would require more machines, turbines and generators in adaptation of renewable energy-electricity production.

MS states which have been invested in research and development of renewable energy now also exports their pre-studied power generating technologies while a huge majority of the world have just begun to invest at research and development activities on renewable energy.

Tech Companies of Germany and Denmark are the most innovative and successful worldwide. EU dominates the market along with China, Japan and USA. Furthermore companies like Siemens, Nordex, Coneregy have become the most popular turbine and generator exporters of the world. For this reason, one could argue that behind the

environmental concerns and over the security of energy, the competitive market strategy wins over the borders of European Union as well.

2023 Energy Roadmap of Turkey deserves a special attention here. Despite the fact that new legislations published for contribution of private equity to electricity power generation, it is hard to say that Turkish Government has formed a well-structured renewable energy policy.

In Turkey recent affords do not support renewable energy at the EU level. General governmental plans show that first it is important to supply the energy demand, then comes the importance of source, whether it is fossil or not (renewable). On the other hand, just like EU, the energy security is the serious problem of Turkey that the imports of oil and gas are mainly provided by Russia. Large-scale power plants requiring gas or high quality coal (high calorific value) which are the resources that Turkey has to import are still the dominant portion of energy supply.

Turkey has drawn a "Roadmap 2023" resembling EU's strategic plans (Energy Package 2020, Roadmap 2050). In fact it is very important how and where from the energy resources are supplied but it seems the importance of this issue is not well figured out at this roadmap of Turkey. Limited incentives for the renewable development are a clear example for this.

Compared to EU, Turkey has huge potential of renewable resources; yet uses its technical potential for hydropower at 30%, solar at 4.5%, biogas at 16.8%, wind at 62% and geothermal at 22.5%[xxviii] levels. In recent years new investments are observed especially at hydropower as contribution to renewable energy but wind does not have significant share at electricity production and still solar energy is not used in power generation. Actually the share of RES is very little if the hydropower is omitted.

On the other hand, renewable energy industry of Turkey is nothing but only assembling imported machineries, which are mostly from China and EU countries. Research and development activities for new renewable technologies and industries are still at the very beginning stage. But it is a good start that investors gains incentives if they use local Turkish technologies such as turbines and generators, which may lead to improvement at RES industry.

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7. Conclusion

In conclusion, energy policy has been shaped in the 1970's in European Union but the rapid expansion can be seen in the 21st century. RES had a crucial role in EU policy because of the increase in problems related to energy dependency and international concerns on climate change. The EU put itself as a world champion to struggle for climate change that leads to introduce green energy policy internally. The compliance process of such policies resulted with the development of RES as a separate aim of the EU.

To achieve long-term objective of low-carbon energy, EU should first consistent with its target in 2020 and also provide the right policy package for 2030. Currently, for emission reduction and renewable energy target, EU is heading in the right way. However, EU will have to work harder to meet their energy efficiency target, which if it is impossible to reach in 2020, the right measure has to be taken for 2030.

Nevertheless; since the term "renewable" evokes environmental concerning policies, RES are actually one of the most important energy security pillars. European Union faces two challenges about the natural gas issue: First, the European economies become more dependent on hydrocarbons and secondly the substantial increase in the European Union's gas supplies coming from Russia. To overcome these problems; renewable energy sources are not only but one of the most important alternatives at policy making.

Affected by the EU's energy policies on renewables; developing countries of EU and candidates like Turkey are also well growing markets which also establish the ground for market liberalization, leading to bonus reward of increased export figures at industrialized MS. Overall, the directives, actions, plans and energy policies of European Union are more likely to keen on the security aspects rather than environmental concerns or market liberalization. Reducing the harmful effects of climate change may be counted as a bonus acquisition but primarily a policy making trump over global energy suppliers and even on member states.

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ENDNOTES

[i] Definition of Renewable Energy, TREIA (Texas Renewable Energy Industries Association)

[ii] In 1973, members of Organization of Arab Petroleum Exporting Countries proclaimed an oil embargo, which caused immediate economic effects - the price of oil quadrupled. http://www.iea.org/media/1ieahistory.pdf

iii Communication and proposals from the Commission to the Council, Towards a new energy policy strategy for the Community, COM(74) 550 final/2 (26.06.1974).

iv Council Resolution of 17 December 1974 on a Community action program on the rational utilization of energy, OJ C 153 (9.07.1975), pp. 1-2.

v Council, 1974

vi Communication from the Commission, supra note 31.

vii Directive 2001/77/EC, supra note 35.

[viii] Directive 2003/30/EC supra note 36.

[ix] Directive 2009/28/EC (the RES Directive), supra note 5.

[x] F. Morata, I. Solorio Sandoval, supra note 3, p. 2.

[xi] The European Commission, The European Union Explained. Sustainable, secure and affordable energy for Europeans, http://europa.eu/pol/ener/flipbook/en/files/energy.pdf (visited on 30.04.2013).

[xii] P. Belkin, The European Union's Energy Security Challenges, CRS Report for the Congress, Congressional Research Service 2008, pp. 1-2.

[xiii] Behrens divides the risks to energy security between: physical, technical, economic, political and environmental. See: A. Behrens, The Role of Renewables in the Interaction between Climate Change Policy and Energy Security in Europe, Renewable Energy Policy and Law Review, 1/2010, p.7.

[xiv] Eurostat, Energy, transport and environment indicators, Eurostat Pocketbooks 2011 Edition, pp. 24-31.

[xv] P. Belkin, supra note 41, p. 3.

[xvi] Eurostat, supra note 44, p.38

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[xvii] This average is considered the level that would prevent dangerous anthropogenic (i.e., human) interference with the climate system, not causing irreversible environmental balance. IPCC Fourth Assessment Report: Climate Change 2007, http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_ synthesis_report.htm

xviii A. Behrens, supra note 42, pp. 5-6.

xix OJ L 140, 5.6.2009, See further: Chapter 6.

xx CCS Directive is also part of a Climate and Energy Package, see further: Chapter 6.

xxi Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy 2020. A strategy for competitive, sustainable and secure energy, Brussels, COM(2010)

xxii Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050, Brussels, COM(2011)

xxiii European Commission, 2013a

xxiv Zapfel, 2011

xxv Delbeke, 2013

[xxvi] The share of RES in electricity consumption reaches 64% in a High Energy Efficiency scenario and 97% in a High Renewables Scenario that includes significant electricity storage to accommodate varying RES supply even at times of low demand.

[xxvii] Energy Roadmap 2050, supra note 230, p. 10.

[xxviii] Türkiye'nin yenilenebilir enerji kaynakları ve hidroelektrik enerji potansiyeli, T.Görez.A.Alkan

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