TURKEY'S ENERGY INVESTMENTS – PROJECTS - POLICIES: AN OVERVIEW UNDER DECISION MAKING APPROACH

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INTRODUCTION

One of the never-ending discussion topics in today's modern time is doubtlessly energy supply. Energy gained even more value with the industrial revolution; nowadays it maintains its importance as an element of strategic balance. Although energy resources are not dispersed homogeneously of the earth's surface, global demand for energy supplies is constantly increasing that allows energy to be used as a strategic weapon. Countries, which are dependent on foreign energy, are on the target of this weapon. Unfortunately, Turkey is one of those countries.

By advances in technology, economical usage of alternative energy resources has been a glimmer of hope for energy-strapped countries. The overall interest for energy systems, producing energy just with the costs of installation and maintenance (without incurred resource costs), is increasing. Considering the fossil energy resource limits, the importance of renewable energy sources can be better understood.

Turkey is not rich in fossil energy resources but has high potential for renewable energy sources. On the other hand, it has a geopolitical location that serves as a bridge between producer and consumer countries in terms of fossil energy resource transmission. It currently hosts various in-use and ongoing oil and natural gas pipeline projects. Turkey holds a unique position between Europe and Asia that has been playing a critical role for centuries. It should eliminate dependency on foreign energy for several reasons, for instance, survival in energy sector, increasing the power in energy domain, becoming a regional dominator.

Turkey should establish stable policies and develop new investments and projects to provide the low-cost energy. That way, Turkey will have the chance to thrive, to reduce foreign dependence, to get rid of political pressure, and to protect its strategic importance. For these reasons, Turkey currently faces a multi-objective-decision-making-problem.

Cases that deal with many conflicting objectives to reach the most appropriate decision-making are described as multi objective decision problems. For the solution of these problems, at first, objectives are determined, and then alternatives that serve those objectives are evaluated. The conflicting objectives are balanced by a set of alternative solutions that maximize total benefits.

Assessing the energy investments, projects and policies with decision-making methodologies can be useful for revealing and interpreting the energy dynamics of Turkey.

ENERGY OBJECTIVES OF TURKEY

KYOTO PROTOCOL:

It is an international agreement that sets targets to industrialized countries to reduce emissions of gases causing global warming. On February 17, 2009, Turkey joined officially by signing this protocol and accepted the objectives. Protocol aims to keep a balance of the levels of greenhouse gas concentration in the atmosphere so that they will not affect the climate. In this context, it is crucial to take control of environmentally harmful gas emissions, to reduce them if possible, and to provide the energy needs from renewable energy sources in Turkey.

European Union:

Three main objectives guide the EU's energy policy. These objectives are to contribute to the competitiveness of the community, to ensure security of energy supply and to contribute to environmental protection on the sustainable development basis. In "Energy

2020 Strategy" that is a document published on 10 November 2010, the EU declared priorities as energy efficiency, integrated energy market, strengthened consumers, consumer rights to choose the supplier, being a leader in energy technology and innovation, strengthened external dimension of energy market. In this context, Turkey, which strives for being a member of the Union, should also adapt these priorities and objectives.

ENERGY CHAPTER:

The opening of the energy chapter for Turkey attempts to fulfill the necessary investments and regulations. In a part of the Turkey's 2015 Progress Report that deals with the energy, some issues are stated as urgent. These are creating a competitive market in natural gas sector working with the EU acquis, implementation of transparent and cost-based pricing system in gas and electricity market, creating a legal framework necessary for the planning and installation of nuclear plants and compliance with EU legislation in the field of nuclear energy.

ENERGY SUPPLY SECURITY:

Another important issue in energy is the supply security. Supply security is a multidimensional concept that includes obtaining low-cost energy, obtaining from sustainable and various sources, meeting variable demand structure and transportation safety. The importance of energy supply security is understood more clearly with the energy crisis. The fall of production, increasing costs, disruptions in energy transport and other negative experiences in crisis times have triggered the development of policy for security of supply. As it is known, the Russia-Ukraine crisis has revealed new energy transportation routes. Therefore, another objective is taking a position to ensure the security of energy supply.

ENERGY EFFICIENCY:

Rising energy problems have brought the necessity of efficient use of energy. Especially in developed countries, energy efficiency studies and policies are gaining importance. Energy efficiency is an issue of reduced energy without compromising the quality of life and production. Other main objective is to establish energy efficiency policies that contain many benefits such as reducing dependence to foreign countries, environmental protection, ensuring security of energy supplies and reducing energy costs.

RENEWABLE ENERGY:

Energy obtained from resources that are capable of refreshing their selves, is classified as renewable energy. Fossil energy resources will supposedly run out in near future and renewable energy sources will be crucial in the long term. Renewable energy has some features that make it very attractive. These are costless source, harmless to the environment, alternative sources of energy, and sustainability. Renewable energy resources are a useful alternative to high cost external energy supplies. In this field, Turkey should increase installed power and incentives, eliminate the infrastructure requirements and provide university- industry cooperation.

ENERGY HUB:

A large part of the reserves of fossil energy sources is located in the immediate vicinity of Turkey. This situation provides a significant advantage in the elimination of Turkey's energy needs and also gives a strategic mission in terms of these resources that can be transferred to international markets. Currently operating Baku-Tbilisi-Ceyhan and Kirkuk-Ceyhan/ Yumurtalık crude oil pipeline, Baku-Tbilisi-Erzurum and The Blue Stream gas pipeline and Trans-Anatolian (TANAP) gas pipeline projects illustrate the importance of the strategic position and mission of Turkey in the energy field. Turkey, while becoming an energy hub, is not contented with only carrying the energy, at the same time it should play a role in determination of energy prices. At this point, Turkey should create an efficient energy market, which includes all energy resources.

ALTERNATIVES

So far, we attempted to describe objectives

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in general framework. Hereafter, alternatives that relate to mentioned objectives are presented. Each alternative is thought to be associated with several objectives stated above.

NUCLEAR POWER PLANTS:

Turkey plans to establish two nuclear power plants. The total installed capacity of these nuclear plants is 9280 MW and total cost of these plants is about $ 40 billion. When they are active, they will generate 80 billion kWh equivalents to annually 16 billion cubic meters (7.2 billion dollars) natural gas imports. Nuclear power plants consisting of about 550 thousand pieces will make significant contributions to the domestic industry. The most intense period of construction is planned operational with about 10,000 workers. The contribution to employment is also obvious. In the light of this information, Turkey's nuclear power plant projects are offering a direct contribution to the objectives within the context of energy supply security, and indirect contribution to the objectives under the EU Energy Chapter.

RENEWABLE ENERGY ACTION PLAN:

According to the electric data of 2013, 29% of the production provided from renewable sources, out of which 25% is obtained from hydropower and the remaining 4% is obtained from the other renewable energy resources. Since 2010, strategies that followed in order to increase the share of renewable energy have been useful. In the scope of the Renewable Energy Action Plan, a large number of policies developed at the micro and macro scale. These policies can be grouped under legal, technical and financial titles such as fixed price guarantee system, investment incentives program, financial guarantees for renewable energy projects and promoting land-use fee. Some of them are applied and some of them are in the planning stage. In this direction, Renewable Energy Action Plan provides a direct contribution to objectives of Kyoto Protocol, energy supply security and renewable energy; and indirect contribution to the objectives of energy hub.

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PETROLEUM AND NATURAL GAS PIPELINES

SAMSUN-CEYHAN OIL PIPELINE:

About 3.7% of the world's daily oil consumption is transported through the Turkish Straits. Traffic of oil and petroleum products were 60 million tons in 1996, exceeded 150 million tons in 2008. Samsun-Ceyhan Oil Pipeline, which would by-pass the straits, and has a vital importance to prevent the dangerous and heavy traffic through the straits. As the ending points of this pipeline, Samsun and Ceyhan have significant specifications. Samsun is close to the other terminals in the Eastern Black Sea that reduces oil transportation to minimum. The presence of the Ceyhan terminal will reduce the need for new construction and investments. Moreover, the project stands out as the most suitable project for the environment. With this project, Ceyhan will be an important energy hub and will turn into the biggest oil terminal in the Mediterranean. In this direction, the Samsun-Ceyhan Oil Pipeline provides a direct contribution to the objectives of Turkey's being an energy hub and Kyoto protocol.

TRANS-ANATOLIAN PIPELINE (TANAP):

The objective of TANAP is to transport the natural gas, which is produced in the Caspian Sea, firstly to Turkey and then to Europe. TANAP is going to achieve a connection between the South Caucasus Pipeline (SCP) and the Trans-Adriatic Pipeline (TAP). Thus, the production costs will decrease because TANAP will be built along Southern Gas Corridor in the Eastern parts of Turkey. TANAP provides a direct contribution to the objectives of EU, energy supply security, and energy hub.

ARAB GAS PIPELINE:

It is a pipeline planned to carry Egyptian gas to Europe. A part of The Arab Gas Pipeline is completed and currently providing Egyptian gas to Jordan, Syria and Lebanon. Türkoğlu-Kilis Pipeline, which links Arab Gas Pipeline to Turkey's natural gas transmission system, is under construction. This project has

vital importance for the diversity of Turkey's energy supplies. Arab Gas Pipeline provides direct contribution to objectives of EU, energy supply security, and energy hub.

ENERGY MARKET:

On March 12, 2015, Energy Market Management Company (EPİAŞ) was established as the successor of the official energy market. The main objective is to operate energy markets efficiently and in a more transparent and reliable way. In this context, EPİAŞ provides a direct contribution to the objectives of energy chapter and energy hub.

NATIONAL ENERGY EFFICIENCY ACTION PLAN:

In order to improve the energy awareness in the society, to utilize the renewable energy resources and to increase the energy efficiency and support, "Energy Efficiency Law" was enacted in 2007. The Energy Efficiency Strategy Document published in 2012 puts this law into practice. In this document, actions are grouped under six categories as follows:

1. To reduce energy losses and energy intensity in industry and services sector
2. To expand eco-friendly buildings
3. To provide market transformation of the energy efficient products
4. To improve efficiency of electricity generation, transmission and distribution; reduce energy losses and harmful environmental emissions
5. To reduce fossil fuel consumption, increase the share of public transport in transportation, avoid unnecessary fuel consumption in city transportation
6. To promote effective and efficient energy use in public institutions

National Energy Efficiency Action Plan provides a direct contribution to objectives of energy efficiency, Kyoto Protocol and energy supply security.

RESEARCH & DEVELOPMENT:

R&D projects provide direct contributions to the objectives of renewable energy and to those of EU. Turkey carries out numerous research and development projects in the energy field. Some of them are listed below.

1. Development of the National Wind Energy System (MİLRES): The main objective of the project is to build infrastructure for the establishment of the original and world-class competitive wind industry which has a design and a technology that belong to Turkey.
2. Development of the National Solar Power Plant (MİLGES): It is an R&D project aiming to produce locally necessary components for the production of electricity based on solar energy.
3. Development of the National Hydroelectric Power System (MİLHES): Project aims to develop the local power components to use efficiently the existing hydroelectric potential of Turkey.

CONCLUSION

Energy problems are multi-objective and multi-criteria decision problems. An alternative may help to achieve more than one objective. For example, TANAP provides direct contribution to Turkey's energy supply security, EU, and energy hub objectives. Similarly, each objective can be matched with alternative that contribute to itself.

Following strategies should be adapted as state policies rather than governmental ones. In this direction, energy strategies should be addressed in a long-term planning. The main objective is to eliminate the energy dependence of Turkey. Another important objective is to protect and improve Turkey's regional strategic position and to be a powerful player on the regional energy market. To be successful, Turkey should sort the objectives in terms of importance, economics and applicability. This sorting varies according to decision-makers' evaluation criteria and relative importance.

At the assessment stage, periodic costs, savings, contribution to energy efficiency, contribution to security of energy supply and

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contribution to strategic position of alternatives can be determined as the criteria. The important point is the determination of critical factors and weights of these factors. Because of environmental concerns, technological structure and political balance change depending on time, the necessity of updating the critical factors and weights should always be kept in mind.

It is seen that Turkey has many objectives and alternatives in the energy field. Unfortunately, it is impossible to implement all the alternatives for satisfying all the objectives at desired level. Therefore, the questions of what objective should be satisfied with what alternative and in what priority the objectives should be assessed arise. Analytical decision-making methodologies can make it easier. At this point, academia-public or private energy sector collaboration is an important tool to establish future energy policies.

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