

Chapter 18

Sustainable Development and Turkey's Biomass Energy Potential

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ABSTRACT

Although energy is indispensable for the provision of basic human needs and economic growth, it simultaneously threatens the basic elements of life when its production and usage is based on fossil fuels. Scientific evidence proves that high carbon emission is the main reason behind climate change. Therefore, producing energy from more sustainable type of energies has great importance not only to ensure preservation of a clean and livable environment for future generations, but also to reduce high dependence on fossil fuels for the production of energy. The latter issue is particularly important for emerging nations such as Turkey, which do not possess large fossil fuel reserves. Currently, Turkey is in a position to meet less than one third of its energy need domestically. Increasing the share of energy produced from biomass would help to create a low-carbon economy and cleaner environment, and increase the security of the energy supply and reduce dependence on imported oil and gas. The present study focuses on the level of Turkey's biomass energy potential and the way in which to make efficient use of this potential. The chapter forwards two main questions: (1) To what extent can the quality of environment be improved via biomass energy? (2) What changes occur in economic variables such as foreign trade, employment, and balance of payments when fossil fuel is substituted with biomass energy?

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1. THE ENERGY SITUATION IN TURKEY: AN INTRODUCTION*

Fossil fuels¹ are the energy source of our time. According to UNEP (2012, p. 1), 80 per cent of current global energy needs, or 66 per cent of power supply, are fossil fuel-based. However, energy from fossil fuels has major negative impacts on the environment and on human health. Global energy systems currently represent some 60 per cent of total current greenhouse gas (GHG) emissions. Hence, an energy policy for a sustainable future will need to be based on high levels of energy efficiency and greater use of renewable energy. Turkey is the sixth largest economy in Europe and has been growing quite rapidly, particularly in recent years. Historical trends suggest that with sustained economic growth, energy consumption and, in particular, electricity consumption will increase at pace similar to Gross Domestic Product (GDP). In the coming decade, primary energy consumption is estimated to increase by around four per cent per annum. Electricity consumption to 2020 is estimated to increase in the range of 6.7 per cent (low) to 7.5 per cent (high). The capital investment required to meet this growth in energy consumption, over the period 2010 to 2030, is estimated at between US\$225-280 billion (WEC, 2012, p. 13).

The characteristics of the Turkish Energy Sector can be summarized as follows:

- A high increase in absolute energy consumption.
- High dependence on imported energy.
- Energy intensive industrial consumption.

Turkey is a very vulnerable country in terms of energy as the overwhelming share of Turkey's energy requirement is met by fossil fuels, and 90 per cent of such energy has to be imported. As a result, Turkey is exposed to energy security challenges such as fuel supply disruption and fuel price

volatility. This situation provides a backdrop for the development of renewable energy which offers the benefit of reducing greenhouse gas emissions, while also reducing the soaring dependence on imported energy that is predominantly in the form of oil and natural gas. Turkey's energy policy requires a radical change not only because of its energy dependency, but also because of worsening environmental pollution. Turkey's greenhouse gas emissions were about 114 per cent higher in 2010 compared to 1990. Thus, renewable energy resources are becoming more important because of increasingly restrictive environmental constraints.

As a source of renewable energy, biomass is a very versatile material, and is therefore the chosen focus of this chapter. Unlike other natural resources such as petroleum, coal, and nuclear fuels, biofuels are a renewable energy source based on the carbon cycle. Therefore, the use of biomass fuels can contribute to waste management improving fuel security and helping to prevent or reduce climate change, although alone they are not a comprehensive solution to these problems. The current study focuses on the level of Turkey's biomass energy potential and the ways to make sufficient use of this potential.

Considering the above factors, this chapter seeks to contribute to the understanding of how various climate policy interactions can affect the use of biomass for energy. In particular, the work seeks to assess how the combination of national and international climate policy instruments impact biomass use. The chapter is structured as follows: The next section will look at the issue of energy from a sustainable development perspective; the following section will identify the advantages and disadvantages of biomass energy; section 4 will investigate biofuel energy potentials of Turkey; section 5 will contain a discussion of different policy instruments for biofuel energy promotion and provide policy suggestions, and the final section concludes the chapter.

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