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Environmental Technology Market Turkey

Environmental policies, strategies and programmes



Executive Summary 2008

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1. SCOPE AND GOALS OF THE STUDY

Since 2005 Turkey has been in a negotiation process with the European Union and within the country there is a high interest to accede to the European Union respectively to **advance the cooperation with the EU**. A further approach of Turkey to the EU will also implicate an increased implementation of EU environmental technical standards resulting in a corresponding demand on environmental technologies. Irrespective of an accession to the EU, Turkey as a threshold country is confronted with a range of environmental topics being put on the spot in the coming years. This concerns above all the construction of new power plant capacities, raising energy and commodity prices, the protection of potable water resources as well as safeguarding the quality of the bathing water and an attractive landscape for tourism.

The country has a population of 74 million, features a stable economic growth and thus represents an enormous market for Austrian environmental technology. Beyond it, due to the immigration of Turkish foreign workers to Austria in the 1960s and 1970s, there are intensive **economic and cultural relationships between Austria and Turkey**. The existing bilingualism of many Austrians with Turkish migration background creates excellent conditions in order to overcome cultural and lingual barriers when carrying out environmental technology projects in Turkey. At administration level a co-operation already exists between Austria and Turkey in terms of an EU-twinning project in which the Federal Environmental Agency as well as the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management are involved.

The aim of this study is a better assessment of the potential of this market for Austrian companies by presenting a detailed analysis of national environmental policies as well as of the corresponding volumes of investment. Small and medium enterprises often do not dispose of the means for an ongoing market observation thus this study can be regarded as a guide and assistance when **assessing the future market development** in the environmental sector.

Due to the scale of the subject area – starting with energy and climate policy and ranging from waste materials, water and sewage to air pollution control – this report can only give a **review about country policies and market potentials** in the environmental technology sector. Presenting the relevant national documents in a list together with indexed key words, contacts and reference sources, the reader obtains a guidance when searching for detailed information.

The actual figures of planed investments concerning environmental infrastructure, as described within the study, will vary strongly in regard to further political developments between the EU and Turkey. None the less, from a current view, Turkey will implement most of the environmental infrastructure-measures due to the need for action, even without joining the EU.

2. SUMMARY

2.1 Environmental Policy framework in Turkey

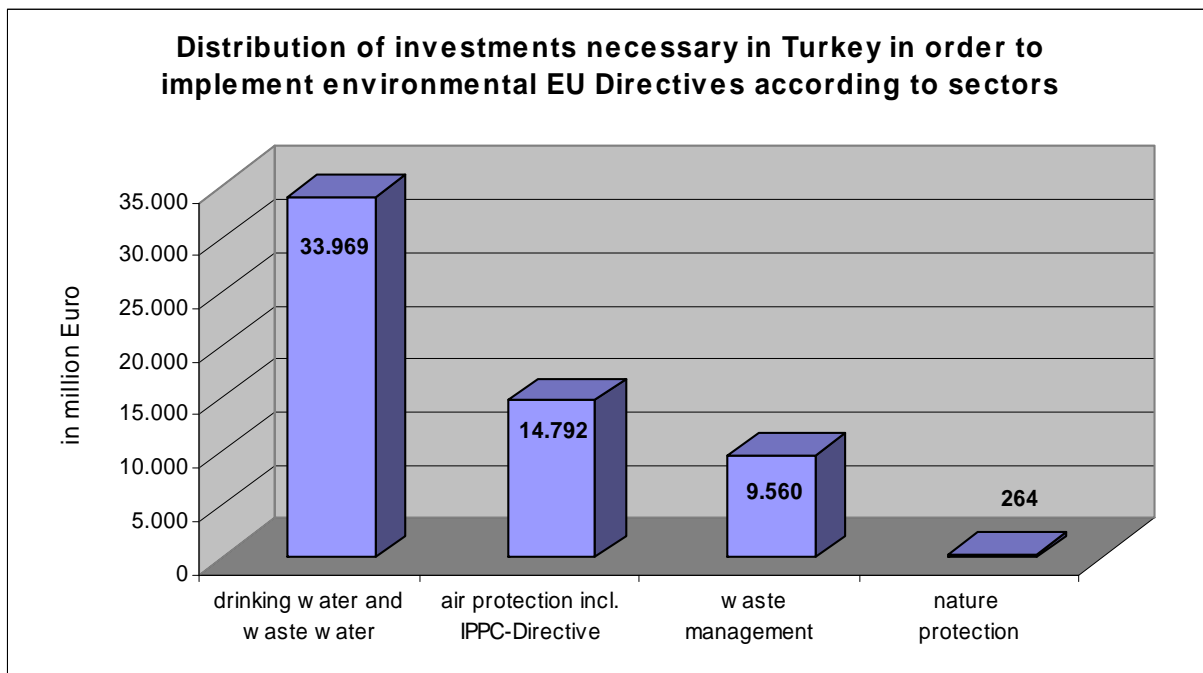
Turkey with its 74 million inhabitants, an increasing number of population and economic growth being far beyond EU average, turns out to be a **relevant economic and political “player”** in Europe.

The environmental situation played a subordinate role since political questions such as democratisation of the country after the military coup in 1980 as well as economic issues had been in the foreground. Thus in many areas the **extension of the environmental infrastructure** still remains **at the beginning of its development**.

The strongest activities in realising environmental projects in Turkey can be found in those areas where **protecting the environment is tied to existential needs** of the population. These are above all:

- Waste water treatment in connection with saving drinking water reserves
- Waste water treatment in connection with preservation of bathing water quality for tourism
- Renewable energies and energy efficiency in connection with the security of supply, the desire for reducing the dependence on imports, and the price increase of fossil energies
- Land use, agricultural irrigation in connection with water resources and use of wind power
- Waste management including recycling in connection with preservation of an attractive landscape for tourism
- Waste management in connection with the protection of drinking water resources (dumping grounds)
- Air pollution control relating to health problems in metropolitan areas
- environmentally friendly transport systems in connection with limited space in cities and traffic jams

Another incentive for the expansion of the environmental infrastructure in Turkey is motivated by the desire for an accession to the EU. In order to implement all environmental EU Directives Turkey needs to invest around 58 bn Euro. The major part with more than half of total investment concerns the topic drinking water and waste water with about 34 bn Euro. Additional heavy investments are required for the sector air protection, including implementing the IPPC-Directive, covering about 15 bn Euro as well as for the sector waste management with 9.5 bn Euro.



Source: EU INTEGRATED ENVIRONMENTAL APPROXIMATION STRATEGY (2007 – 2023), Ministry of Environment and Forestry, 2006, p. 58

Since the „road map“ for an accession of Turkey to the EU is not yet determined, the calculations on investment sums and targets are still subjected to major uncertainties. With a continuous accession process it is assumed in the accession strategies that the extension of the environmental infrastructure and thus **approximation to EU environmental standards** will take place **until year 2023**.

It is assumed that many environmental projects in the area of waste water, waste management and transport will be implemented **even without “external pressure” by the EU-legislation** due to limited resources of the country (e.g. water, land) and economic considerations. This concerns especially the extension of renewable energy-resources, energy efficiency as well as material recycling of waste.

2.2 Renewable Energies and Energy Efficiency

The largest potential for environmental technologies in Turkey can be found in the area of renewable energy and energy efficiency. Actually, Turkey is able to cover only 28% of its energy demand from domestic sources. At the same time prognoses state an annual increase in consumption of primary energies with 6.2% p.a. and of electricity with 8.1% p.a. This seems fairly realistic insofar since the actual per capita requirement of energy of Turkey with 15,000 kWh/cap.a only represents one third compared to OECD-average and due to the strong economic growth of Turkey an increased demand for energy-intensive consumer products (e.g. cars, air conditioning, heating, household appliances) can be expected. Thus, for the next years Turkey has to reconsider its strategy concerning electrical power supply especially as for the construction of new power plants.

The **economic development potential for hydroelectric power** in Turkey represents around 28,000 MW. This corresponds with an additional produced amount of electricity of 100,000 GWh/a and a volume of investment of 114 bn Euro. In this field there exists a big market potential for Austrian companies, which present a long-term experience not only with building under construction but as well modernising and improvement of performance of existing power plants. Up to now the construction of hydroelectric power plants in Turkey was limited mainly to large projects. There remain still enormous potentials in the area of medium-size power plants and small hydroelectric power plants. Concerning small hydroelectric power plants social and economic impacts due to construction would be comparatively low too, and Austrian companies can offer a more than 100-year-old experience both in construction and operation (e.g. automation of plants).

The **potential of wind power** in Turkey is very high as well, and numerous project applications for the construction of wind parks are already existing. The economic potential is estimated at 48,000 MW, corresponding to a volume of investment of about 57 bn Euro. Although Austria itself does not produce entire wind power plants, it is analogue to the automobile industry an important supplier of components such as wind power generators or special synthetics for the construction of wings. Already today, Austrian wind-power-operators are active throughout Europe whereas affiliate companies have been created in these countries. Austrian wind power companies represent established experience in planning, construction and operation of plants especially in mountainous regions.

Climatic preconditions for the use of **solar energy** in Turkey are considerably more favourable than in central Europe. Annual solar radiation is about 30% higher than in Austria and seasonal dissemination more constant. Although the thermal use of solar energy in Turkey already is established in the private domain, the density of collectors with 0.13 m²/cap is considerably lower than in Austria with 0.4 m²/cap. In order to obtain the same density of collector surface as in Austria, another 29 million m² would have to be installed, corresponding to a volume of investment of 16 b. Euro.

Altogether the economic thermal potential of solar energy is estimated 131,000 GWh/a by the *Electrical Power Resources Survey and Development Administration* (EIE) corresponding to 300 million m² collector surface. So **investments up to 165 bn Euro** would be made. Austrian companies are heaving a technological lead over the development of high-grade collectors for the generation of heat with higher levels of Temperature (up to 180° C) whereby apart from the use in private households an enormous business market emerges. Especially in the prosperous tourism regions on the West and South Coast of Turkey there are huge market potential for Austrian providers of solar energy.

Potentials for Investment for Renewable Energies in Turkey		
Sectors	bn Euro	Remarks
Hydroelectric power	114	Economical development potential of 28,600 MW, corresponding 100,000 GWh/a
Wind power	57	Economical development potential of 48,000 MW with wind speed >7m/s
Thermal use of solar energy	165	Economical development potential 131,000 GWh/a, corresponding to approx. 300 mio m ² collector sfc.
Biogas	4	Agricultural residual material and dung, when used for electricity generation, 1,000 MW _{el} , 7,000 GWh/a electricity
Total	340	

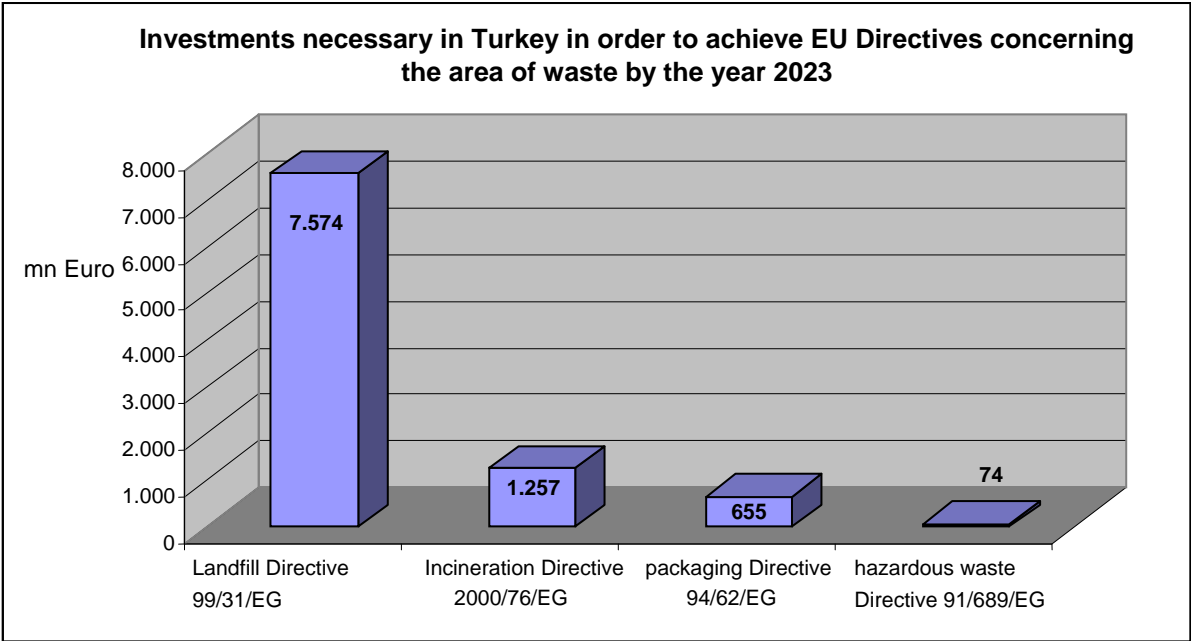
The **potential for geothermal power** in Turkey is estimated at 31,500 MW_{th} and 500 MW_{el}. Most sources of geothermal power in Turkey are of too low level of temperature in order to be used for the generation of electricity with the use of conventional technologies. However, they can be used for space heating and hot water preparation as well as for low temperature thermal application in the industry. In 2006 geothermal power systems on the scale of altogether 82 MW_{el} have been in operation or under construction. Actually, 2,843 MW are estimated being economically useable.

Biomass in Turkey actually is mostly used in private households in the form of firewood for heating. Hitherto unutilised potentials of biomass are located in the use of harvest residues in agriculture and in biogenic waste material from the food industry. The Total potential of biomass in Turkey ranges up to 23,000 GWh/a, by the use of dung another 2.8-3.9 bn m³ biogas can be generated. Due to the low need of heating in many regions of Turkey, the waste-heat of power-generation with biogas could only be used partly. Thus the utilisation of gas-scrubbing-technology for biogas as developed in Austria has a particular high market opportunity in Turkey.

At present **Combined Heat and Power-solutions (CHP)** in Turkey for the generation of electricity is used only at a range of 4.4%, compared to Austria with its 16% of CHP. By the use of modern cooling technologies such as absorption refrigeration with waste heat cooling and air-conditioning can be realised. Therewith a new market for CHP in Turkey arises by using waste heat in winter for heating and in summer for cooling. Here, those Austrian concepts developed in connection with the use of district-heating for cooling and refrigeration, respectively solar cooling have a high market potential.

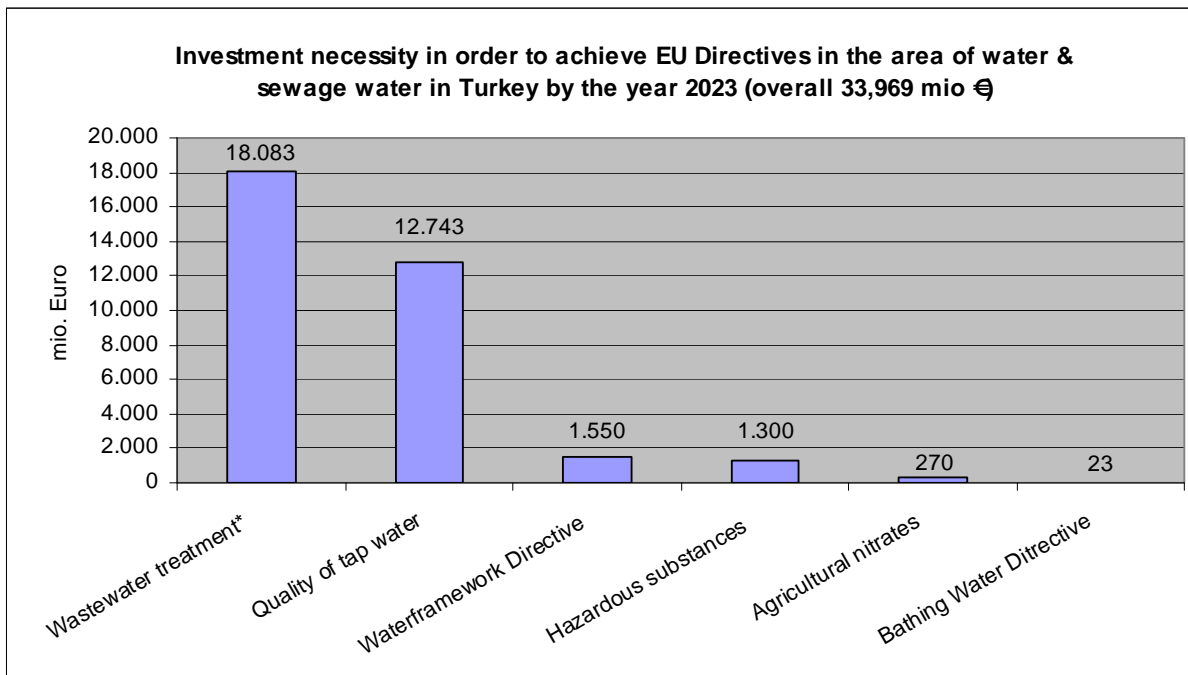
2.3 Waste management

Waste management in Turkey actually is characterised by dumping in unsecured landfills. Disposable data concerning waste accumulation and recycling are showing strong seasonal and regional differences. In Turkey as well as in many threshold countries, an extensive informal market for recycling is existing, where mostly individuals are collecting and selling the recyclable fraction such as PET-bottles, metals, glass and paper. In tourism regions the amount of waste is varying to 600% between summer and winter months. In general, the share of bio-waste in Turkey is higher than in Central Europe. In order to fulfil EU Directives in the area of waste, around 9.5 bn Euro have to be invested in Turkey, thereof the biggest part in **implementing the Landfill- Directive**.



2.4 Water management

Water management has a particularly high significance, since in many parts of the country available water resources per capita are far lower than e.g. in Central Europe. In large cities with >100,000 inhabitants around two thirds of sewage water are cleaned by organic wastewater treatment plants, in settlements with less than 100,000 inhabitants only 14% of waste water is treated this way. For the implementation of the EU Directive on water and sewage water, investments up to 34 bn Euro are necessary. The major part of 18 bn Euro can be found in the area of wastewater treatment. In place investments above all for the construction and modernisation of wastewater treatment plants, the extension and restoration of the sewage network as well as the treatment of sewage sludge will be necessary.



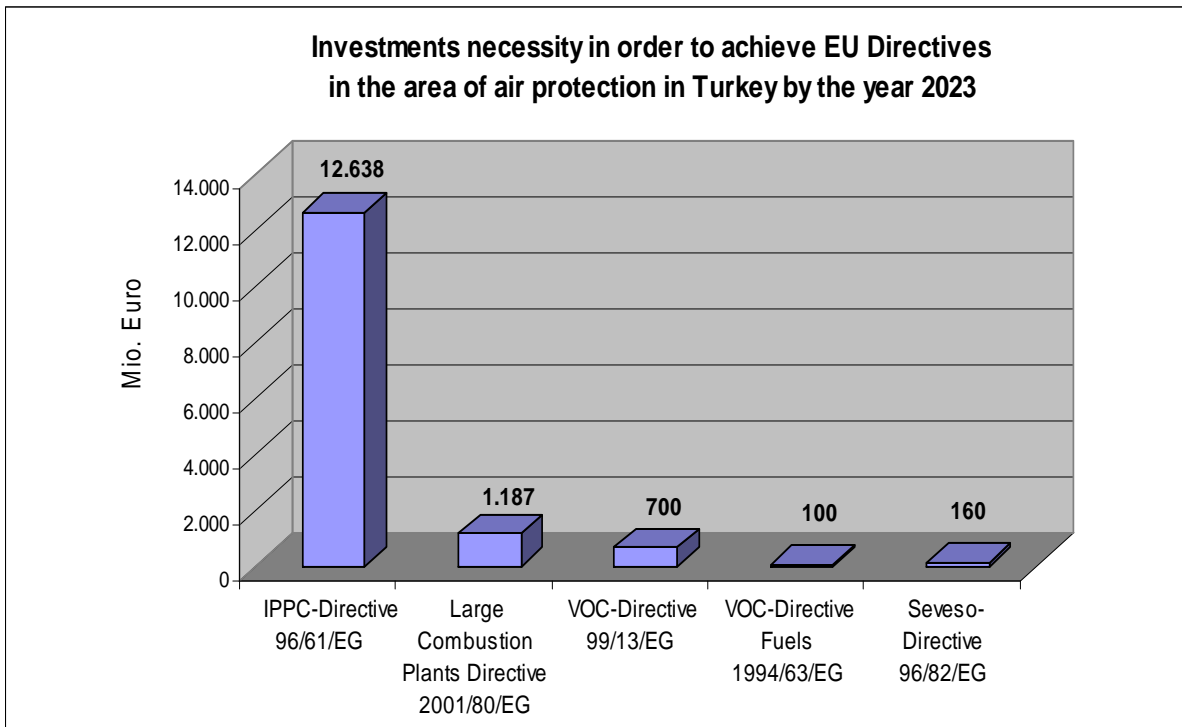
*including municipal waste water treatment+ treatment of sewage sludge

2.5 Air protection

Concerning **air protection** there are considerable problems in Turkey due to the heavy use of coal especially of the sulphurous lignite, both in the energy and industrial sector as well as in the domestic domain. A further urgent issue are numerous fuming and smoking landfills with smouldering fires (partly due to self-ignition) leading to a tremendous formation of toxic substances.

High market potentials can be found in the area of flue gas scrubbing at power plants and industrial plants as well as at fuel conversion from coal to gas, biomass or solar energy. If the replacement of coal as fuel is an inherent part of a project, the switching to renewable energies can be realised more easily and economically, since the replacement of the firing plant (heater) has to be carried out anyway.

For the implementation of the EU Directives in the area of air protection, including the IPPC-Directive, altogether around 15 bn Euro are needed in Turkey.



2.6 Transport

The transport sector in Turkey actually still is characterised by a low level of motorisation of 155 motor vehicles per mill inhabitants (compared to 545 motor vehicles on 1000 inhabitants in Austria), however, individual traffic is increasing rapidly. Due to frequent traffic jams there is a massive need for environmentally friendly and efficient public transport systems such as low-floor trams, liquid gas busses, rapid train railway systems and undergrounds in metropolitan areas. Since Austrian process engineering companies are already exporting such innovative transportation systems worldwide, there is a huge market potential for urban transportation systems and also for modern technologies in the area of conventional rail.