3 Asia
3.5 Western Asia

3.5.7 Turkey
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Key facts

| Population | 79,749,461<sup>4</sup> |
| Area       | 783,562 km<sup>2</sup> |
| Climate    | Temperate; hot, dry summers with mild, wet winters; harsher in interior. |
| Topography | High central plateau (Anatolia); narrow coastal plain; several mountain ranges. |
| Rain pattern | Annual average precipitation: 643 mm, unevenly distributed. It varies from less than 250 mm in the inland areas of central Anatolia to more than 3,000 mm in the northeastern Black Sea coastal region. Autumn marks the start of the rainy season, which continues until late spring on the western and south-eastern coasts. The Black Sea coast receives rain throughout the year. |

Electricity sector overview

Turkey’s electrification rate in 2002 was 95 per cent. Its electricity consumption in 2010 was 180.21 TWh. Between 2015 and 2020, electricity demand is predicted to go up to 410 TWh and 571 TWh, respectively.<sup>2,3</sup>

The Turkish Electricity Market Law no. 4628 was published in March 2001 and has led to the establishment of the Electricity Market Regulatory Authority. Thus, the private sector has been able to obtain a licence granted from this authority to own, build and operate power plants.

Hydropower development in Turkey has been carried out for about a century for different purposes, namely electricity generation, land irrigation, water supply for domestic and industrial utilization and flood control in the surrounding area. Hydropower accounts for more than 26 per cent of electricity generation (figure 1).

In view of the considerable variation in seasonal, annual and regional runoff, it is absolutely necessary for the major rivers in Turkey to have water storage facilities and to allow the use of the water when it is necessary. Consequently, priority has always been given to the construction of water-storage facilities. Significant progress has taken place in the construction of dams throughout the 55 years that have elapsed since the establishment of the State Hydraulic Works.<sup>4</sup>

Small hydropower sector overview and potential

Development of small hydropower began in 1902 in Turkey. Since then, private entrepreneurs and some government organizations and municipalities in rural areas have installed many decentralized small hydropower plants.

Turkey has a mountainous landscape with an average elevation of 1,132 metres. This topography favours the formation of high gradient mountain streams with suitable locations for small hydropower development.<sup>6</sup> The low costs of investment offer attractive opportunities for either domestic or foreign entrepreneurs interested in small hydropower plants.

Since 1990, the amount of small hydropower plants and their capacity have increased more than doubled. The bulk of all small hydropower plants (85 per cent) have been constructed in the last two decades. Around 20 per cent of generating capacity is in private hands. According to their gross head, the percentage of small hydropower plants is as follows: 5 per cent have medium head (5 to 15m) and 95 per cent high head (more than 15m).<sup>7</sup>

By the end of 2002, the total number of small hydropower stations in operation throughout the country was 59 with a total installed capacity 175.5 MW (figure 2), covering less than 2 per cent of the total hydropower potential (13,700MW) in Turkey.<sup>8 9 10 11 12</sup>

Figure 2 Small hydropower capacities in Turkey

In addition to the large hydropower projects with installed capacities greater than 10 MW, it is estimated that there still is considerable small hydropower potential in Turkey.<sup>12</sup> This estimation is provided in table 1.

Among the 25 hydrological basins in Turkey, the Eastern Black Sea Basin has great advantages in terms of small hydropower potential as the annual average...
precipitation is the highest in the country (2,329 mm in Rize Province). Furthermore, the basin covers sharp valleys and there are a lot of steep streams with considerable discharges and heads.\textsuperscript{13 14}

### Small hydropower potential in Turkey

<table>
<thead>
<tr>
<th>Potential</th>
<th>Generation (GWh/year)</th>
<th>Generation (Percentage)</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross theoretical</td>
<td>50 000</td>
<td>100</td>
<td>16 500</td>
</tr>
<tr>
<td>Technical feasible</td>
<td>30 000</td>
<td>60</td>
<td>10 000</td>
</tr>
<tr>
<td>Economically feasible</td>
<td>20 000</td>
<td>40</td>
<td>6 500</td>
</tr>
<tr>
<td>Economically feasible potential that has been developed</td>
<td>664</td>
<td>3.3</td>
<td>175</td>
</tr>
<tr>
<td>Remaining economically feasible potential</td>
<td>19 336</td>
<td>96.7</td>
<td>6 325</td>
</tr>
<tr>
<td>Remaining economically feasible potential taking into account environmental constraints (e.g. rivers exempted from damming)</td>
<td>\textasciitilde19 300</td>
<td>96.7</td>
<td>6 325</td>
</tr>
</tbody>
</table>

Source: Balat\textsuperscript{1}

With regard to local small hydropower capacities, there are local consulting and engineering companies which provide multi-disciplinary engineering services, locally and internationally. Increasing demand for power-generating turbines and other equipment will benefit the industrial sector and reduce import demand.

### Renewable energy policy

With the publishing of Renewable Energy Law No. 5346 in May 2005, the Turkish Government has assured to buy electricity from legal entities with a feed-in tariff of 5.5 euro cents/kWh for 10 years. Besides, 85 per cent discount is applied for forest and land acquisition to build small hydropower plants. Furthermore, law No. 5784 published in July 2008 was expected to attract entrepreneurs to invest in mini- and micro-hydropower plants. After the emergence of this law, the status of legal entity is no longer a prerequisite for applying a licence to generate electricity from renewable energy, if the plant capacity does not exceed 500 kW. Also, the Government guarantees the purchase of the excess electricity.\textsuperscript{6}

### Legislation on small hydropower

In Turkey, Environmental Impact Assessment (EIA) reports were not required for hydropower plants with installed capacity below 50 MW before 17 July 2008. However, a regulation on the same date stated that hydropower plants having an installed capacity between 0.5 MW and 25 MW are required to undertake an EIA.\textsuperscript{6}

### Barriers to small hydropower development

Renewable Energy Law No. 5346 applies to small hydropower or hydropower production facilities having a reservoir area less than 15 km$^2$ and makes no limitation regarding installed capacity. This makes the interest of private sector move towards large hydropower system for the potentially higher profits.\textsuperscript{5}

### References


