6th AIEE Energy Symposium

Energy industry challenges to a low-carbon economy, the RES and gas role in the transition

Ahmet Türkoğlu
EXIST CEO

15 December 2021
Virtual conference
**His Lights Stayed on During Texas’ Storm. Now He Owes $16,752.**

After a public outcry from people like Scott Willoughby, whose exorbitant electric bill is soon due, Gov. Greg Abbott said lawmakers should ensure Texans “do not get stuck with skyrocketing energy bills” caused by the storm.

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### Gas & Electricity Price Changes from 2019 - 2021

<table>
<thead>
<tr>
<th></th>
<th>BG</th>
<th>DE</th>
<th>EL</th>
<th>FR</th>
<th>IT</th>
<th>SK</th>
<th>TR</th>
<th>EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale Gas</td>
<td>592%</td>
<td>559%</td>
<td>11%</td>
<td>562%</td>
<td>406%</td>
<td>37%</td>
<td>116%</td>
<td>429%</td>
</tr>
<tr>
<td>Retail Gas</td>
<td>38%</td>
<td>5%</td>
<td>28%</td>
<td>25%</td>
<td>14%</td>
<td>-8%</td>
<td>37%</td>
<td>14%</td>
</tr>
<tr>
<td>Wholesale Electric</td>
<td>306%</td>
<td>259%</td>
<td>121%</td>
<td>281%</td>
<td>210%</td>
<td>206%</td>
<td>33%</td>
<td>230%</td>
</tr>
<tr>
<td>Retail Electricity</td>
<td>21%</td>
<td>5%</td>
<td>19%</td>
<td>5%</td>
<td>-2%</td>
<td>9%</td>
<td>42%</td>
<td>7%</td>
</tr>
</tbody>
</table>

*Source: https://www.nytimes.com/2021/02/20/us/texas-storm-electric-bills.html*

OFGEM, EU Commission – Latest Possible Values (2021 – First 10 Months)
EXIST

Electricity - Gas

Painted area show distribution of DAM Prices

Source: ACER, Argus
Illustration of the current electricity wholesale pricing method and a possible alternative

**PAY AS CLEAR**
- Bid price
- Marginal remuneration

**POSSIBLE ALTERNATIVE PRICING METHOD**
- Bid price
- Average remuneration

**Bid stack**
- 100 GW: Gas 70€
- 80 GW: Coal 55€
- 60 GW: Hydro 15€
- 40 GW: Wind ~0€
- 20 GW: Solar ~0€

If the demand is 100 GW, the market clears at 70€
If the demand is 80 GW, the market clears at 55€

Producers bid true costs and get the market clearing price.

*Source: ACER*
Coupling of the energy system sectors

- Zonal approach being questioned due to increased congestion levels and slow progress in grid extension
- Further electrification of many sectors (industry, transport, heating, etc.)
- Digitalisation, technological innovation, large-scale roll-outs (e.g. offshore wind/off-shore BZs), energy system integration
- Increased potential of demand-side flexibility, storage, etc.

Decarbonisation targets will require high shares of renewable energy.

Renewable and low-carbon gases at large scale will require an evolution of the current market design.

RES projects with high up-front capital costs but very low marginal running costs

Subsidy schemes are widely used and distort the markets

Source: ACER based on the IEA
Outlook for global electricity generation and associated flexibility needs towards a 2050 net zero trajectory

Source: Net Zero by 2050: a Pathway for the Electricity Sector, IEA May 2021

CCUS : Carbon Capture, Utilization, and Storage
Turkey ratifies Paris Climate Agreement

- The Paris Agreement has entered into force for Turkey on Nov. 10, 2021 and Turkey will reach net zero emissions by 2053.
Installed Capacity & Generation

*2021 contains the data until 14 December 2021
Total Installed Capacity & Renewables Share


*2021 contains the data until 14 December 2021
EU Top 5 Country Renewables Installed Capacity 2000 - 2020

Source: IRENA (2021), Renewable Capacity Statistics 2021; & IRENA (2020)
## Energy Sector Goals – Turkey / The Eleventh Development Plan (2019-2023)

### Energy Sector Goals

<table>
<thead>
<tr>
<th></th>
<th>2018*</th>
<th>2023</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Energy Demand (kTOE)</td>
<td>147,955</td>
<td>174,279</td>
<td>18%</td>
</tr>
<tr>
<td>Electrical Energy Demand (TWh)</td>
<td>303,3</td>
<td>375,8</td>
<td>24%</td>
</tr>
<tr>
<td>Primary Energy Consumption Per Capita (TOE/Person)</td>
<td>1,81</td>
<td>2,01</td>
<td>11%</td>
</tr>
<tr>
<td>Electrical Energy Consumption Per Capita (kWh/Person)</td>
<td>3.698</td>
<td>4.324</td>
<td>17%</td>
</tr>
<tr>
<td>Share of Natural Gas in Electricity Production (%)</td>
<td>29,85</td>
<td>20,7</td>
<td>-31%</td>
</tr>
<tr>
<td>Share of Renewable Resources in Electricity Generation (%)</td>
<td>32,5</td>
<td>38,8</td>
<td>19%</td>
</tr>
<tr>
<td>Amount of Electricity Produced from Domestic Sources (TWh)</td>
<td>150</td>
<td>219,5</td>
<td>46%</td>
</tr>
<tr>
<td>Installed Power Capacity (MW)</td>
<td>88,551</td>
<td>109,474</td>
<td>24%</td>
</tr>
</tbody>
</table>

Source: The Eleventh Development Plan (2019-2023)
Transmission Network Natural Gas Input Capacity Projection 2023

<table>
<thead>
<tr>
<th>Million m³/day</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPELINE</td>
<td>164.9</td>
<td>164.9</td>
<td>164.9</td>
</tr>
<tr>
<td>LNG</td>
<td>130.6</td>
<td>150.6</td>
<td>150.6</td>
</tr>
<tr>
<td>STORAGE</td>
<td>45</td>
<td>115</td>
<td>155</td>
</tr>
<tr>
<td>TOTAL</td>
<td>340.5</td>
<td>430.5</td>
<td>470.5</td>
</tr>
</tbody>
</table>
Source: Montel Eurospot – Some Values may have numeric differences and some volumes are missing with respect to lack of data.

Power Futures Market launched on Oct. 1 2021

In addition to the existing Natural Gas Spot market, Turkey’s Natural Gas Futures Market launched on Oct. 1 2021
THANK YOU

Ahmet Türkoğlu
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