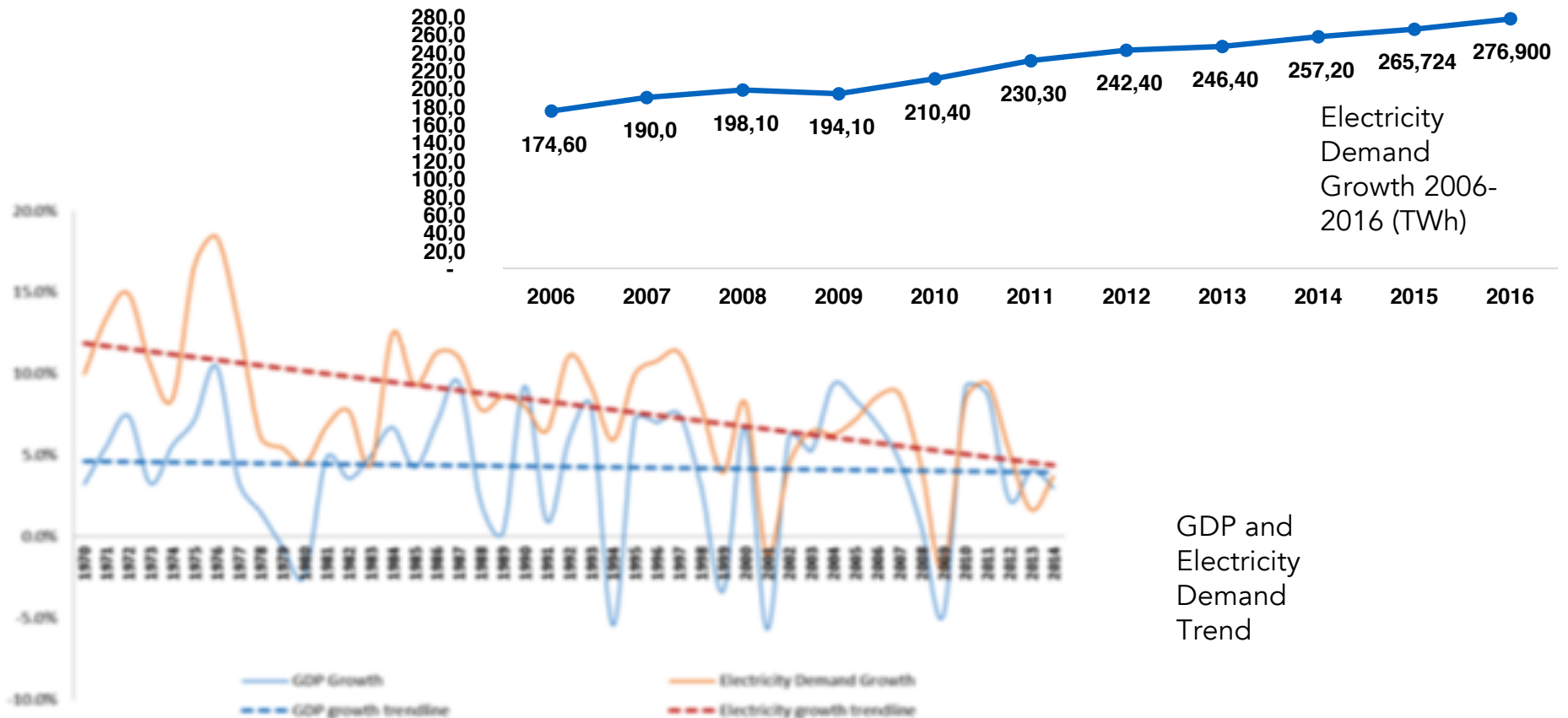




Electricity Grid Evolution in EU pre-access Countries: the Turkish case

Gaia Moretti

- Turkey achieved 230 per cent increase in GDP between 1990 and 2012.
- Population has increased more than 30 per cent since 1990.
- According to MENR (2014) Turkey's primary energy demand increases by 6-7 percent every year.
- The electricity demand of the last 10 years was 4.7%.
- At present, domestic resources provide approximately 26 % of the total energy demand

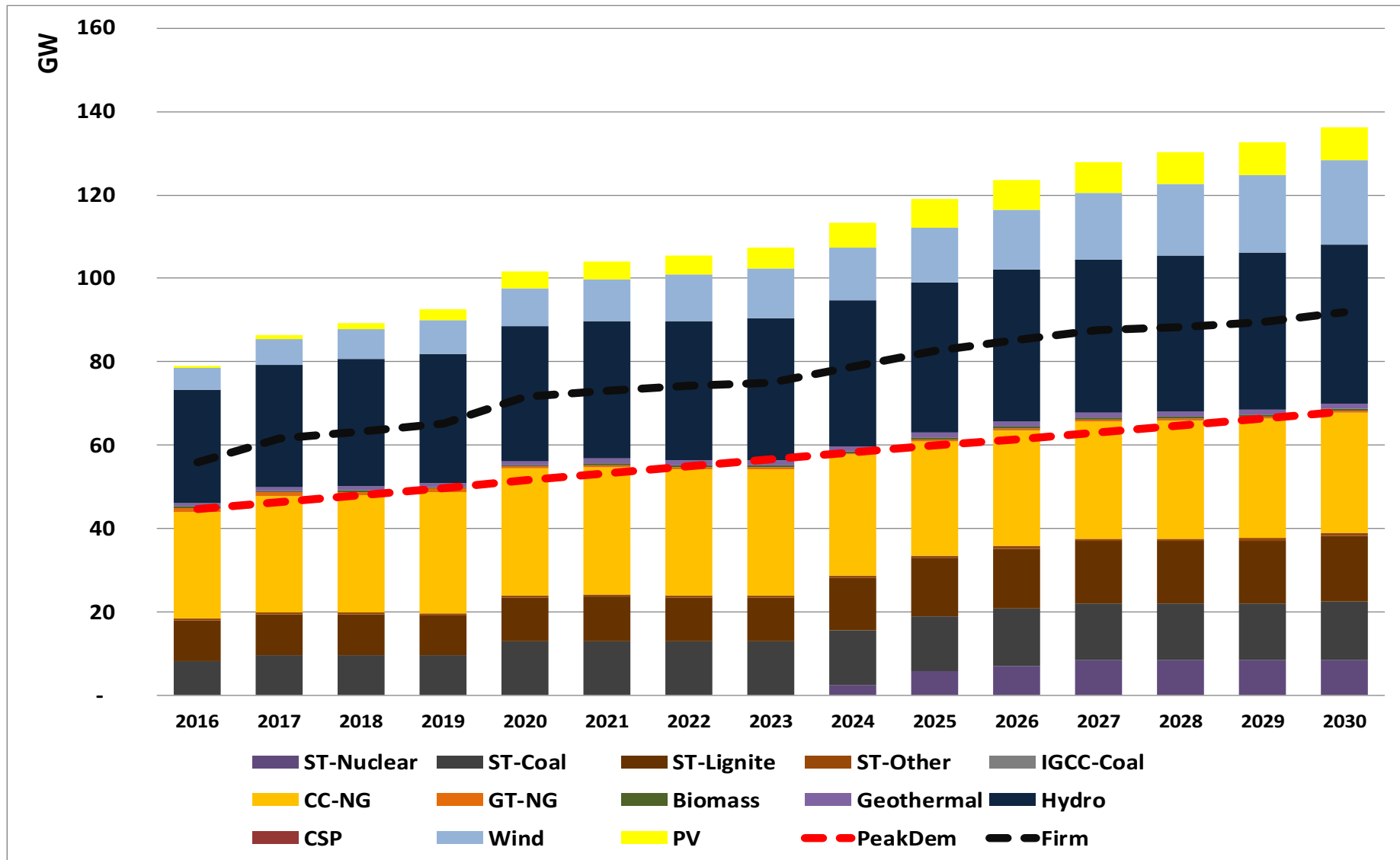


The Turkish supply and grid, have been suffering a large transformation in order to keep up with the demand growth.

The Turkish regulatory framework has been completely changed allowing for private participation and opening to a market environment.

The Turkish legislation has started to focus on energy efficiency and renewable generation.

Turkey aims to contribute to the collective efforts to combat climate change in line with its national circumstances and capabilities, and it is a signatory of COP 21 agreements, having submitted its INDC on 30 September 2015.



Capacity Development (GW) from 2016-2030

Installed Capacity Development (2016 - 2030) in MW

Source	2016	2020	2023	2025	2030
Lignite and Local Coal	10,516	10,260	10,260	14,000	15,673
Imported Coal	7,528	13,083	13,083	13,083	14,117
Natural Gas	26,381	30,807	30,807	27,842	29,415
Fuel Oil, Diesel and Others	485	492	492	492	674
Nuclear	-	-	-	5,900	8,400
Total Thermal	44,909	54,643	54,643	61,318	68,279
Geothermal	849	1,221	1,250	1,250	1,250
Biomass	406	410	430	450	500
Wind	5,312	9,128	12,000	13,000	20,168
Solar	605	4,085	5,000	7,000	8,000
Hydro	26,994	32,365	34,000	36,000	38,035
Total RES	34,167	47,208	52,680	57,700	67,953
TOTAL	79,076	101,851	107,323	119,018	136,232

*Elaboration from IPA12CS02 Simulation, based on TEIAS and MEdTso scenario.**

*in November 2017, Minister Albayrak has announced that by the end of 2017 "Turkey will produce more than 80 million tons of domestically produced coal" in order to improve the national electricity production and decrease the use of the imported coal.

Existing National Strategy

- ❖ REAP – National Renewable Energy Action Plan developed in 2014
- ❖ Aligned with the 2009/28/EC directive
- ❖ 2023: 30% RES in the electricity generation mix; 10% transportation requirements met by RES
- ❖ Energy intensity: reducing the amount of energy consumed per GDP unit by at least 20%

IPA program has supported the whole strategy
accompanying the Country in the pre-accession phase

Currently, three main different promotion mechanisms exist for Renewable Energies:

- **Full Feed in Tariff** both for licensed/unlicensed generation, valid for 10 years after commissioning.

Approved feed in tariffs are relatively high compared with other Countries

- **“Reduced” Feed in Tariff** for developments in areas in which the available transmission capacity is not enough to accommodate all the requests for connection, with bidders offering a reduction on the feed in tariffs to get the available transmission capacity offered by TEİAŞ at each of the designated areas

This mechanism was announced but not yet utilized

- **Auctions in YEKAs** – Special Energy Zones: a specific auction is carried out, in a predetermined zone, for obtaining a license to develop a technology specific renewable project. *First project launched under this scheme was the 1000 MW solar PV at Karapinar (Konya) with a fixed tariff lasting 15 years. AGGIUNGERE 1000 MW WIND super competitivo*

YEKA system is early adopted and development is still low:

positive potential seems to be very high

- **Distribution Planning** is carried out at each tariff review period, following the prescriptions of the **Technical Distribution Rules** – not a **Specific Distribution Code**.
 - The distribution system is planned without consideration to the Distributed Generation
 - The distribution system starts immediately after the MV switchyard of the HV/MV substations. As a result, the voltage regulation in the 34.5 kV network is not directly performed under the control of the Discos.

A significant “rethinking” of the design, operations and planning of both the MV and the LV networks is required to accept the penetration of a significant amount of RES.

A larger involvement of private investors requires a set of more clear, complete and defined rules: a **Separate Distribution Code** should be defined, including all the rules applicable to the generation connection and operation within the distribution system.

- As the HV Grid Code, the modifications to the Grid Code, approved in April 2017, solved the problem of the absence of regulation for Solar PV or other renewable sources.
- TEİAŞ - Turkish Electricity Transmission Company has developed a new version of this Code (the Amended Electricity Transmission Grid Regulation) much more complete and fully consistent with the ENTSO-E recommendations.
- However, in order to make it compatible with ENTSO-E recommendations, the code applies to practically all generators connected either to the transmission or the distribution system.

- Turkey complying with EU 2023 targets: 27% of final gross energy consumption supplied from RES
- 2030 dispatch and capacity level: 20.000 MW wind resources (14% dispatch) and 8000 MW solar resources (6% dispatch)
- From there onwards, Turkey will need an additional contribution of 95 TWh from RES to be added till 2050
 - NOT from hydro – to be exhausted in 2030
 - NOT from geothermal – world resource to be exhausted by 2030

Challenges:

- Distributed Generation
- Commissioning of nuclear plants
- Local coal deposits
- CCS
- Inclusion of other renewables (offshore wind, tidal energy)

1. Comprehensive Energy Plan for Turkey, based on existing REAP and EU guidelines, structured to overcome the detected barriers
2. Increased participation of distributed generation: different role of TSO/DSOs
3. New approach in transmission and distribution based on the Grid Follows principle: the power system shall be developed in a way that will allow to integrate the maximum of RES as per the Energy Plan without limitations due to the current physical status of the grid
4. Regulatory reform based on auctions and smart grid evolution

- Implementation of energy efficiency programs in-line with all other European countries so that the long-term demand forecasts are lower in the future and even capable of decreasing demand rather than slowing its growth.
- Adaptation of a legislation and promotion mechanisms to facilitate renewable integration at a large and small scale
- Adoption of a modernization plan of the whole system encompassing the large-scale integration of renewable and the adoption of storage, micro-grids, new planning methods, new roles for DSO, new support policies

Electricity Grid of the Future and New Electricity System

where the D3 strategy – Decarbonization, Digitization, Decentralization- is combined with a deeper electrification of the energy consumption.

Thank you!

g.moretti@ianusnet.it

www.ianusnet.it



@IANUSCD



Ianus Consulting and Development
