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Turkish Solar Energy Industry Association

Solar+Storage Market

Review of Turkiye

SOLAR STORAGE

next generation

INSTALLED SOLAR POWER CAPACITY IN TURKEY 2014-2024

- 2014 – 40 MW
- 2015 – 249 MW
- 2016 – 833 MW
- 2017 – 3.124 MW
- 2018 – 5.063 MW
- 2019 – 5.995 MW
- 2020 – 6.667 MW
- 2021 – 7.815 MW
- 2022 – 9.450 MW
- 2023 – 11.300 MW
- 2024 – 12.450 MW

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2023* TURKIYE W&PV Installed Power

PV	Wind
12 GWe	12 GWe

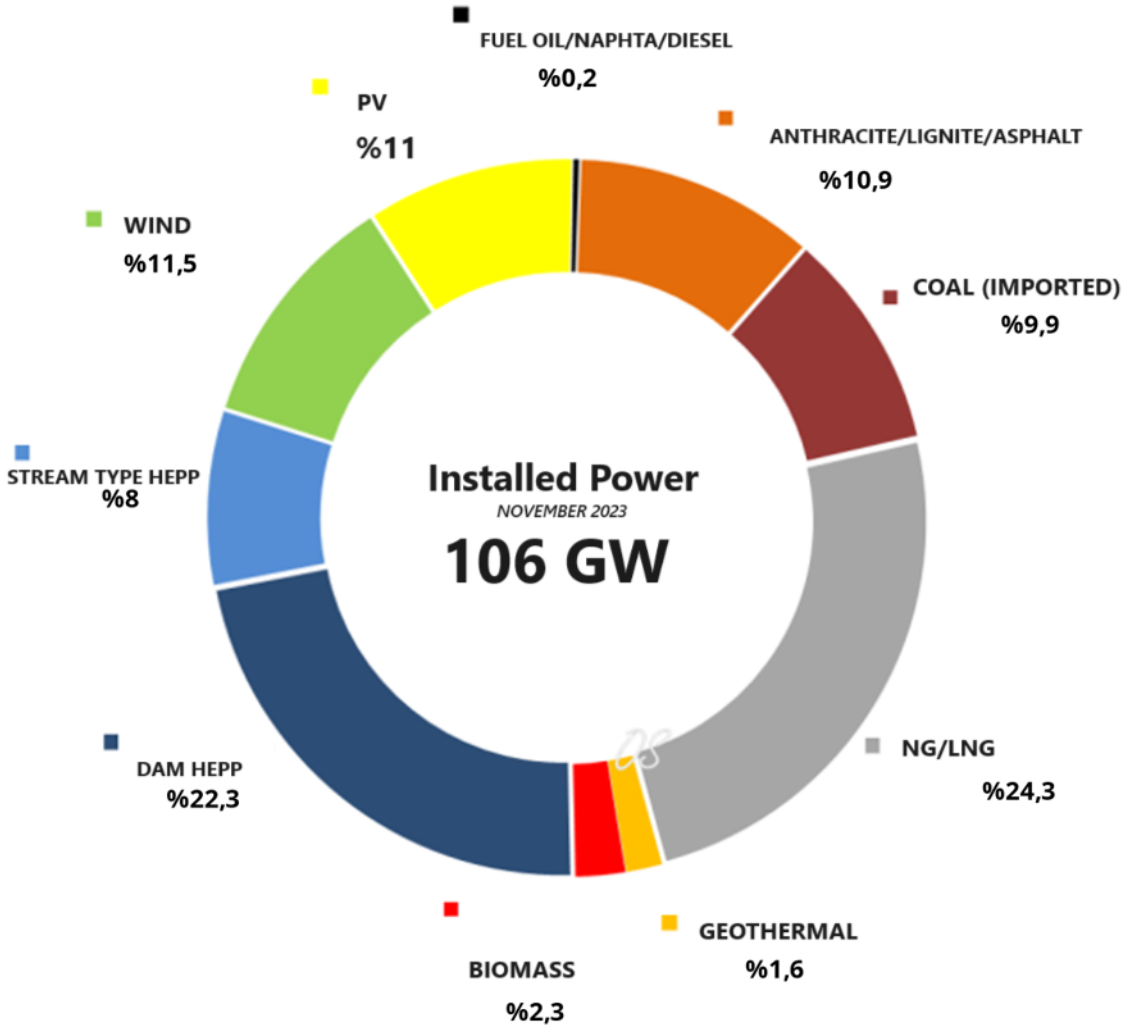
Total
24 GWe

*Kaynak: Teiaş March 2023

BREAKDOWN OF TOTAL INSTALLED POWER

PV+W / Total Power

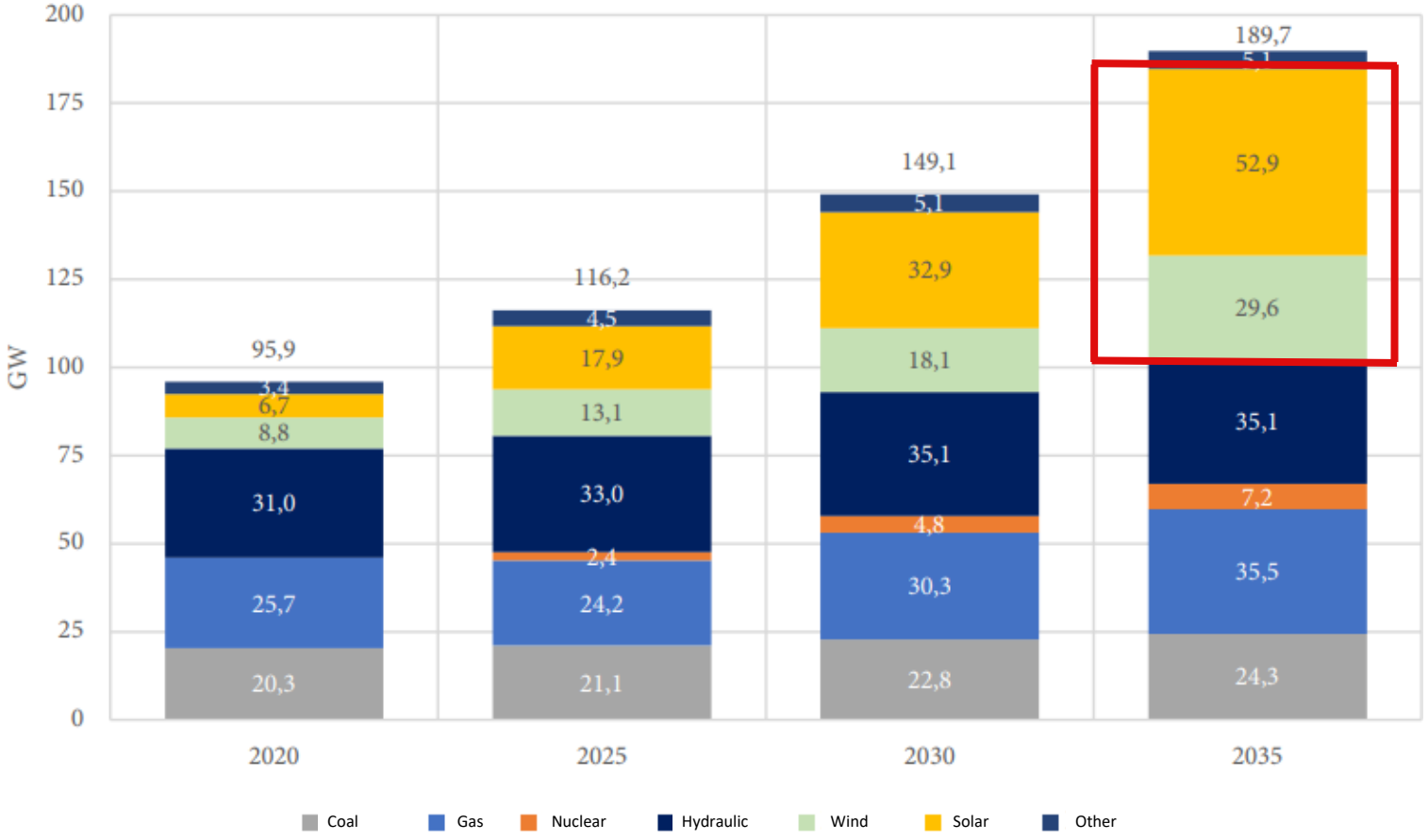
%11 + %11



*Reference: Teiaş March 2023 Data

2035 MoE Target FROM NATIONAL ACTION PLAN

TABLE 10. INSTALLED POWER BASED ON ENERGY SOURCE



Reference: Ministry of Energy and Natural Sources's National Energy Report-2022

Based on 2030 National Energy Plan;

PV	Wind
33 GWe (x3,5 Growth)	18 GWe (x1,5 Growth)

TOTAL INSTALLED POWER	PV&W / TOTAL INSTALLED
51 GWe	%33

Reference: T.C MENR-National Energy Plan of Turkiye

Based on 2035 National Energy Plan;

PV

53 GW

(x6 Growth)

Wind

30 GW

(x2 Growth)

TOTAL INSTALLED POWER

83 GW

PV & Wind TOTAL INSTALLED

%44

Reference: T.C MENR-National Energy Plan of Turkiye

RES Investor Support Mechanism

Law 3468/2006

In 2006 the law 3468/2006 was issued, then more than 7940 application for PV were submitted.

At the time, the feed-in tariff for grid-connected plants varied between 40 and 50 €ct/kWh, while for the off-grid plants between 50 and 55 €ct/kWh.

Guaranteed remuneration period was 10 years with additional 10 years under another tariff, determined after the expiration of the initial period.

YEKDEM

YEKDEM: Renewable Energy Resources Support Mechanism.

There were serious investments in renewable energy resources with unlimited capacity. Serious incentives are given to investors to make these investments. YEKDEM is the institution that undertakes these incentives in our country.

RES Investor Support Mechanism

Law 4414/2016

The law aims to establish an efficient RES support scheme promoting market integration and deployment while minimizing costs.
It introduces auctions to determine support levels, driven by the goal of reducing RES deployment expenses amid economic challenges.

YEKA

- The features and critical elements allocated for renewable energy proposals are special comprehensive areas determined by the Law.
- The difference of the YEKA concept from other licensed or unlicensed investments of the market is that it provides high size/volume installed power according to the domestic equipment production requirement.

PV PROJECT TYPES

1. LICENCED PV PROJECTS

Total Licenced PV Installed = 1.600 MWe

1- First Licence PV Auction:

- 600 MW capacity,
- Up to 4 year evaluation period
- In total 49 projects with 582,9 MW capacity was allocated
- Total deployed capacity: **517,3 MWe** (October 2022)

2- YEKA PV 1 (Capacity Auction)

- PPA price: **6,99 $ Cent/kWh**
- PPA Term: 15 Years
- **500 MWp/yr** capacity PV module production facility was established.
- **1.000 MWe / 1.350 MWp** capacity PV power plant was installed. The site was commissioned in 2023.

3- YEKA PV3 (Auctions)

- **1.000 MW capacity for connection** is allowed
- The auctions were made as each one **10 MW, 15 MW ve 20MW** for 36 city and **74 region in total**
- Bottom price was **18,2 kuruş /kWh**, and the average price was **21,5 kuruş/kWh.(Av= 2,2 usdcent/kWh**

4- YEKA PV 4

- **300 MW for boron region** and **700 MW** Erzin and Viranşehir, 1000 MW new connection capacity was determined.
- The average price was **39,73 krş/kWh** in the auction of the boron region was made, this value for Erzin ve Viranşehir regions was **55,38 krş/kWh**.
- **The auctions included 15 different regions, each with a connection capacity ranging from 50 MW and 100 MW.**

5- YEKA PV 5

- **To be tendered possible in 2024**

PV PROJECT TYPES

2. UNLICENCED PV PROJECTS

Total Unlicenced PV Installed = 10.400 MWe

C&I Rooftop PV Projects:

- 2.400 MWe Capacity,
- 10 Years YEKDEM Monthly Net Metering PPA

Ground Mounted PV Projects untill 2019:

- 7.000 MWe Capacity,
- 10 Years YEKDEM Hourly Net Metering PPA

Ground Mounted PV Projects after 2019:

- 1.000 MWe Capacity,
- 10 Years YEKDEM Hourly Net Metering PPA
- Far Connection Points Allowed
- 2xConnection Agreement Power for Industry Allowed
- Region Independent Netmetering Allowed

2035 ESS IN TURKIYE

W&PV TOTAL INSTALLED	ESS
83 GW	7,5 GW / 30 GWh**

ESS / W&PV TOTAL INSTALLED POWER RATIO
%9 / %18

- Based on MENR'nin report 2h storage is expected.

** The energy capacity is calculated based on 2h storage, BOL and internal energy lost

2053 CARBON NOTR ROAD MAP

Increase in industrial and transportation emissions from 2020 to 2030.

Up to 20% energy savings from heating demand after building renovation

36% less coal-based electricity and 29.4 GW solar, 23.5 GW wind

23% savings by energy efficiency. 20% blend the pipeline gas with e-fuel in.
Biomass in industrial boilers.

To switch EV, hybrid or fcell vehicles: passenger cars (72%), trucks (28%), buses (46%)

To encourage renovation works in all buildings. 46% of district heating come from heat pump

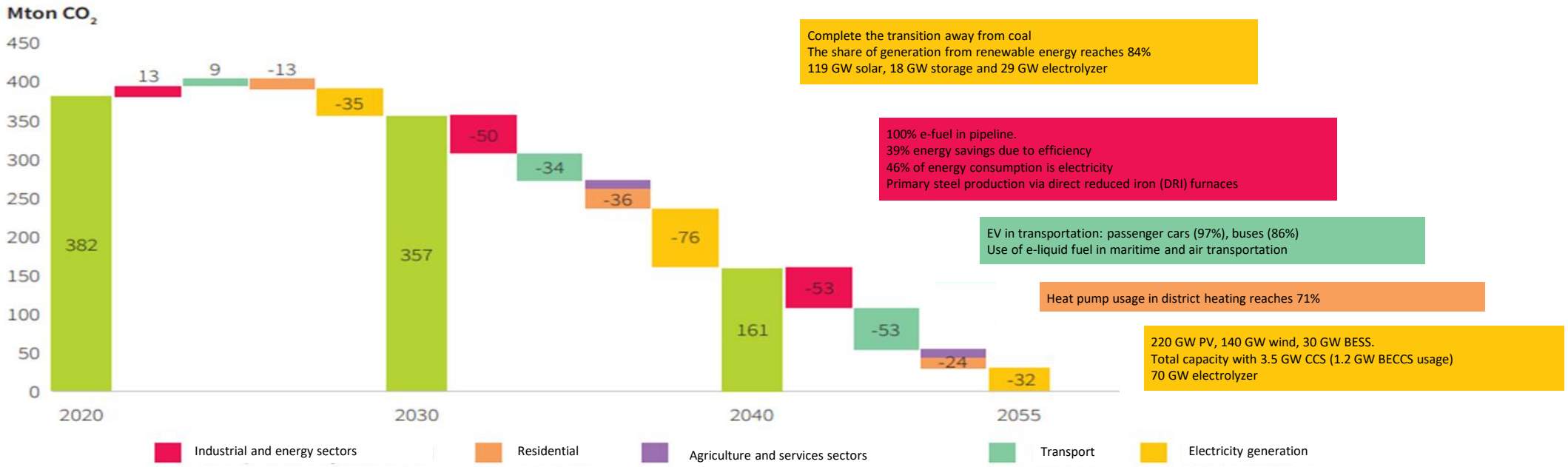
Complete the transition away from coal
The share of generation from renewable energy reaches 84%
119 GW solar, 18 GW storage and 29 GW electrolyzer

100% e-fuel in pipeline.
39% energy savings due to efficiency
46% of energy consumption is electricity
Primary steel production via direct reduced iron (DRI) furnaces

EV in transportation: passenger cars (97%), buses (86%)
Use of e-liquid fuel in maritime and air transportation

Heat pump usage in district heating reaches 71%

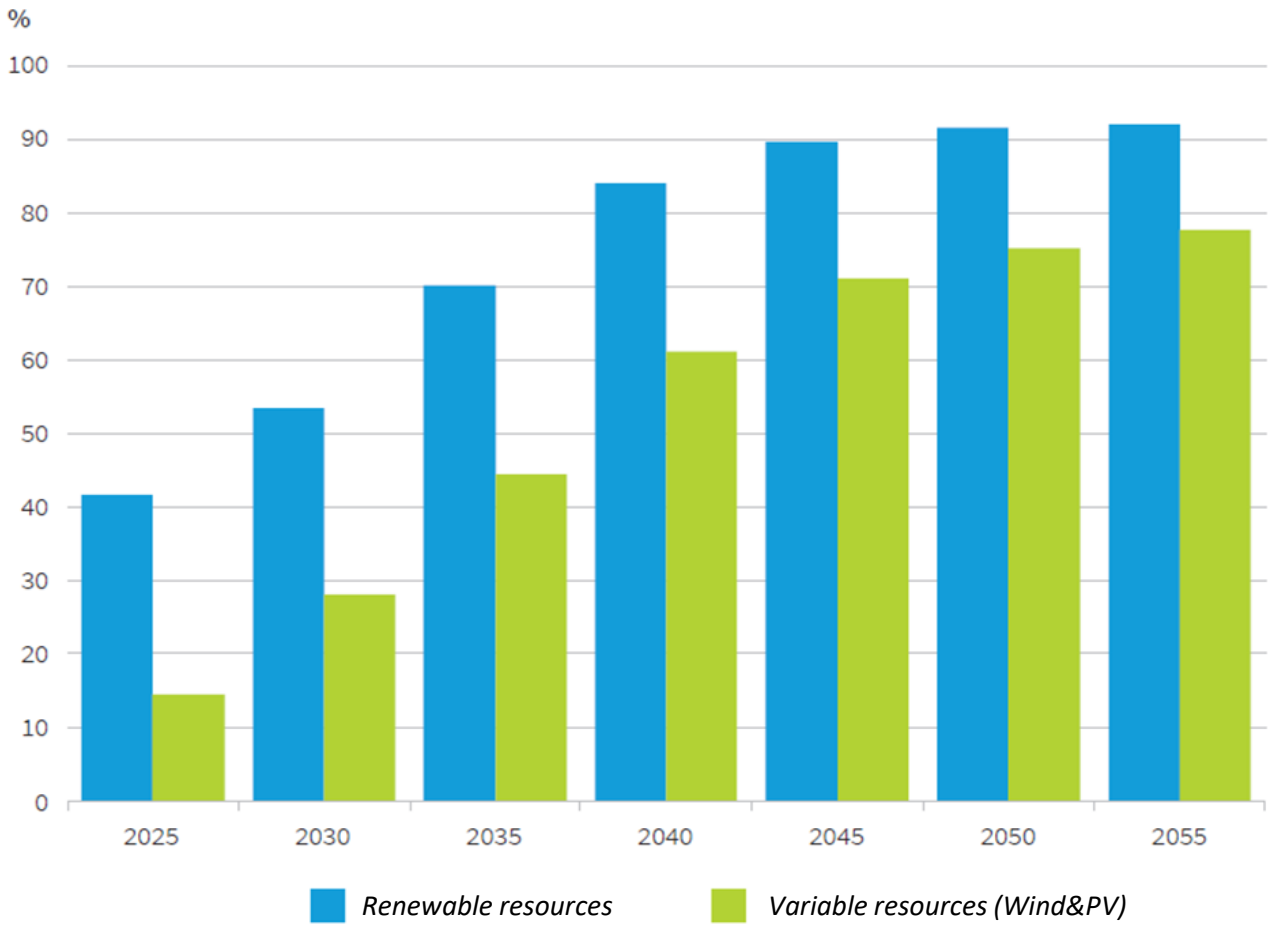
220 GW PV, 140 GW wind, 30 GW BESS.
Total capacity with 3.5 GW CCS (1.2 GW BECCS usage)
70 GW electrolyzer



Reference: SHURA Energy Transition Hub Net Zero '53: The Road Map for Electric Sector of Turkiye

PV&W CAPACITY FORECAST FOR CARBON NOTR 2053

Shares of variable renewable energy sources in total renewable energy-based production.



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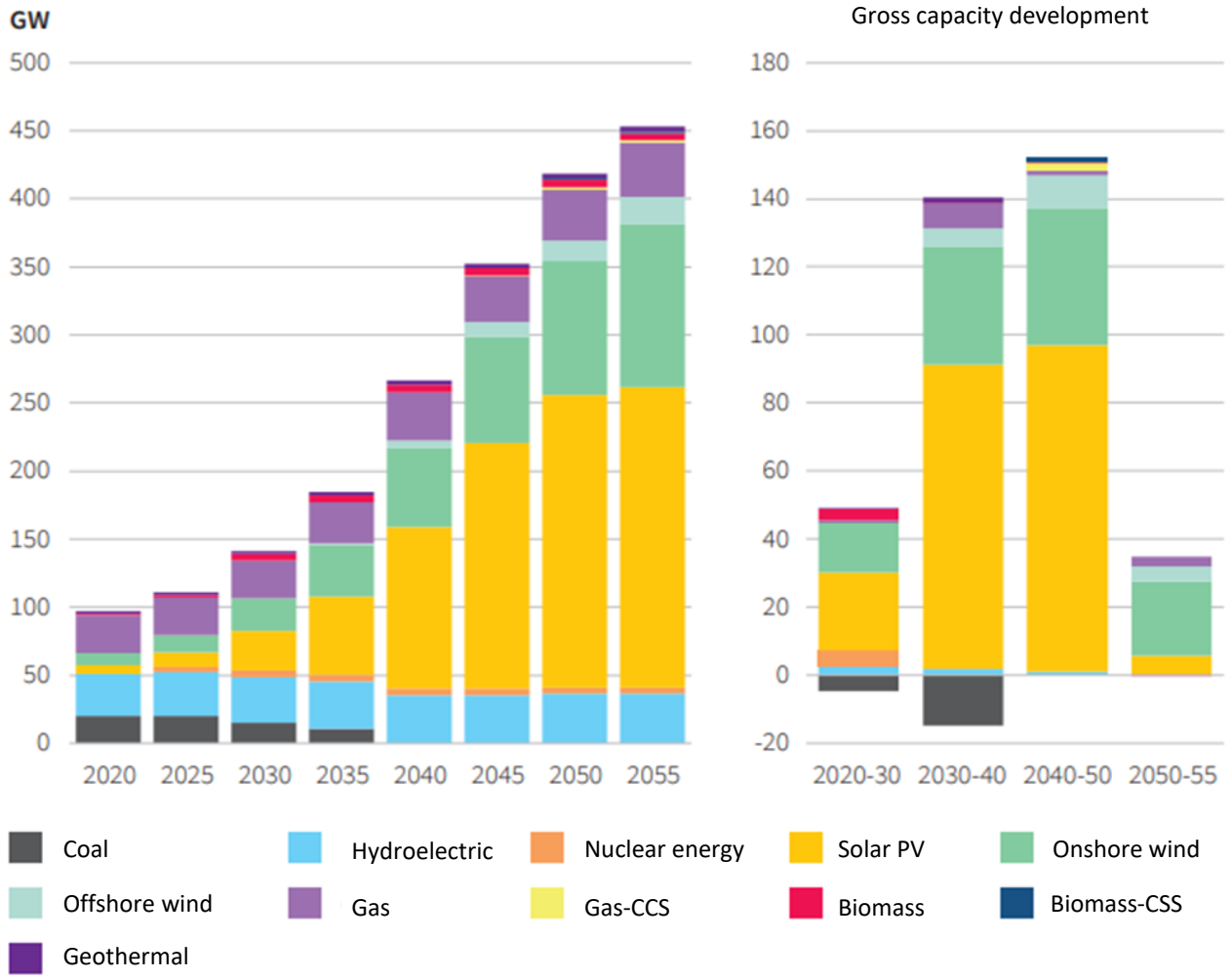
PV&W CAPACITY FORECAST FOR CARBON NOTR 2053



Reference: SHURA Energy Transition Hub Net Zero '53: The Road Map for Electric Sector of Turkiye

THE TIME-LINE OF REGULATIONS OF TURKIYE BATTERY ENERGY STORAGE TECHNOLOGIES

2017

The Ancillary Service Regulation of Energy Market has been published

2019

Electricity Generation and ESS Admission Regulation

2020

The Regulation Of Energy Storage In The Electricity Market

2021

The Regulation of Energy Storage Services Electricity Market (09.05)

Technical Criteria of Connecting and Ancillary Services for ESS (21.09)

Test Procedures of ESS for accessing Ancillary Services (16.11)

2022

Thorough Update In the Scope of ESS/W+PV Regulation (19/11/2022)

ESS+W&PV APPLICATION

253 GW

Wind + ESS

113 GW

PV + ESS

140 GW

PRE-LICENCED

403 Project / 26,5 GW

403 PROJECT WITH 26,5GW CAPACITY IS ALLOCATED WITHIN THE SCOPE OF THE DISTRIBUTION COMPANIES

WITH SUBSIDIARY INDUSTRY AND TECH INVESTMENTS, $45B INVESTMENT IS EXPECTED TO IMPACT MARKET

*Referece: Hürriyet Newspaper

CHALLENGES:

- Finans
- Grid Restrictions
- Long Development Process Specially for ground mounted projects (Almost 2 years)
- Difficulties in obtaining construction permit
- Problems in Coordination of related authorities.

OPPORTUNITIES:

- Av 5% of Annual GDP Growth
- Aggressive Targets of the authority by 2035
- Olenty of sunny days (Av 2.000 hrs/yr)
- Self consumption oriented Market having completed almost all regulations
- Solar is only 5% of total production
- Local Manufacturing of almost 90% of Solar Equipments and Services
- No land and roof restrictions

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Thank you!

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