INETTT
International
Network of
Energy Transition
Think Tanks

SHURA
Enerji Dönüşümü Merkezi

Net Zero by 2053: A Roadmap for the Turkish Electricity Sector

Net-Zero Scenarios and How to Get Them Right
INETTT Side Event at COP 27
Sharm El-Sheikh, 9 November 2022

Alkım Bağ GÜLLÜ, Director – SHURA Energy Transition Center

INTRODUCTION

- Turkiye is among the countries that affected the most from CBAM as roughly half of its exports are going to EU
- In June 2021, Ministry of Trade issued the **"Green Deal Action Plan"** which contains a total of **32 targets and 81 actions under 9 main chapters**, with the goal of contributing to **Turkiye's transition to a sustainable circular economy, along with the integration with European Green Deal and strategies to comply with the Fit for 55 goal.**
- On 7 October 2021, **Türkiye ratified Paris Agreement**, and committed **to a net zero carbon emissions target by 2053**.
- The Turkish administration has not published a strategy/policy document yet; however, the governmental institutions continue working
  - Ministry of Environment organized a well attended **Climate Summit** , resulting in 217 decisions under different chapters such as transportation, agriculture, industry, energy, science & tech, local governments, green finance
  - Ministry of Environment is also working on a **Climate Law, Emission Trading Sytem, and a revised INDC target expected to be declared in COP27**
  - Ministry of Energy is working on a **long-term energy policy for Turkey to reach net zero**

SHURA Net Zero Study
Net Zero by 2053: A Roadmap for the Turkish Electricity Sector (Quantitative Assessment)

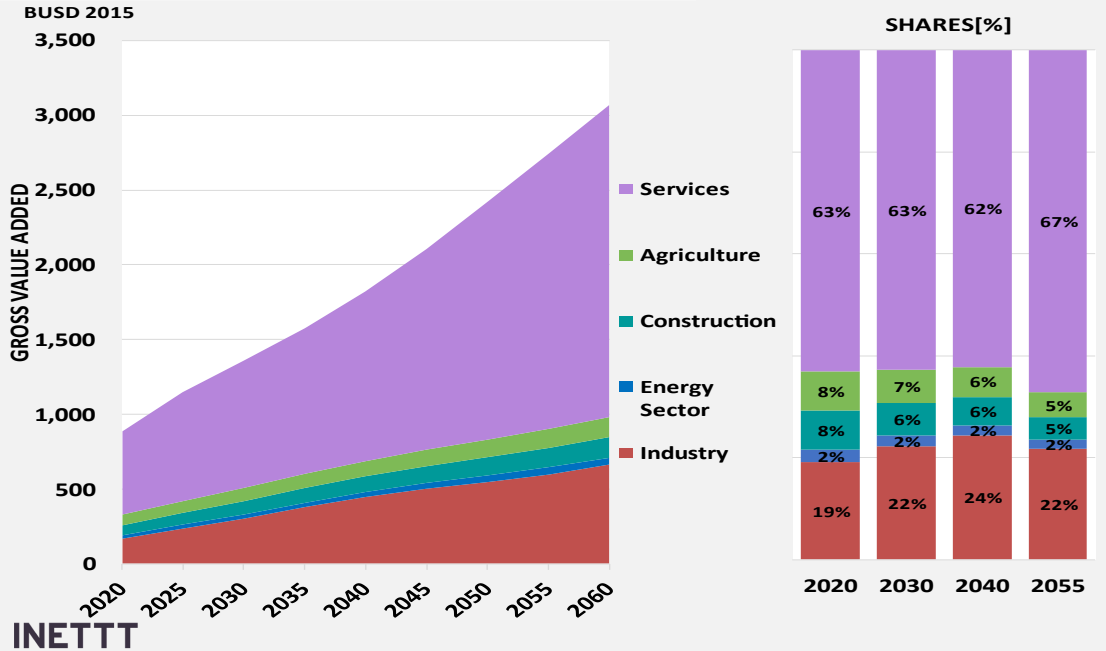
- Project started in June 2022 and will be completed in December 2022
- Consultant: E3 Modelling based in Athens, Greece
- Simulations are conducted using the **CompactPRIMES** model, which is designed to model medium-term and long-term single-country projections.
- The objective is **assessing possible pathways for the Turkish electricity sector to achieve net-zero greenhouse gas emissions by 2053, considering developments in renewable energy, energy efficiency and electrification pillars of energy transition**
- The project will focus on the role of the electricity sector and its transformation, **taking into account important parameters of economic development, sectoral demand and electrification in energy, industry, buildings, and transport**
- The study will be conducted through quantitative modelling work based on inputs and assumptions in **5-year intermediary time steps**
- SHURA will support this modelling study by policy, socioeconomic analysis and just transition studies regarding Turkiye's net zero roadmap

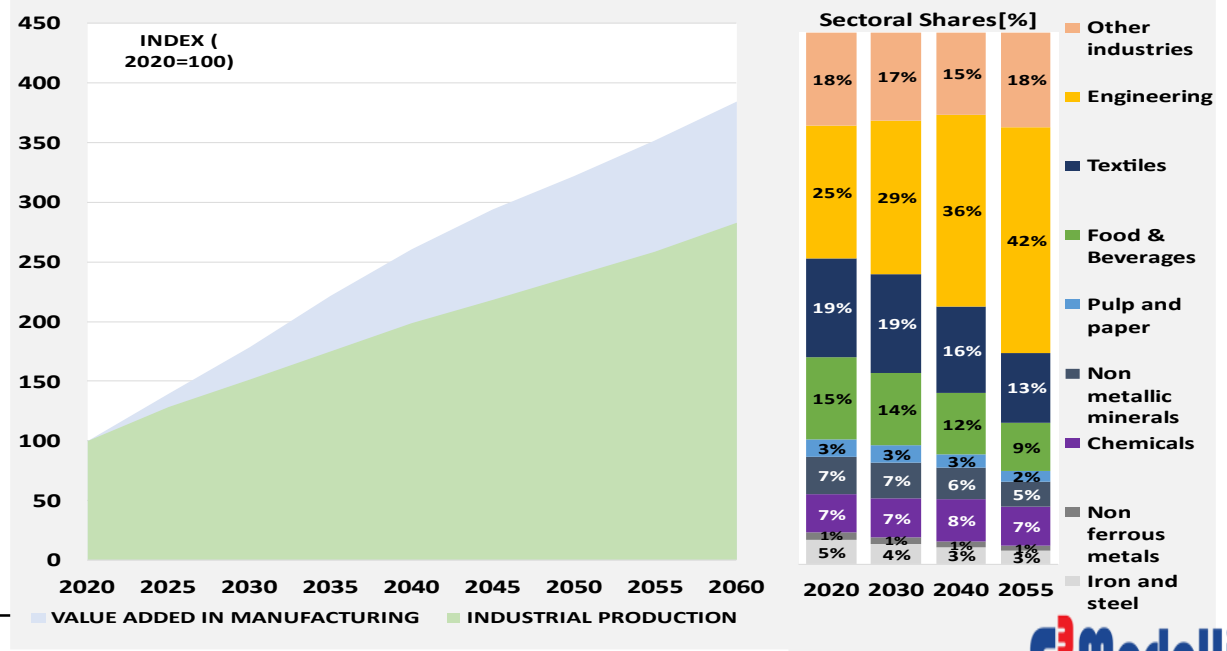
Transformation

SHURA Net Zero Study
DRAFT RESULTS – End Use Sectoral Activity

Manufacturing will shift towards higher value added and less carbon/energy intensive industries, along with increased levels of electrification result in overall energy efficiency

- The **engineering sector will be the primary driver of industrial growth**. , especially automotive, machinery, electrical appliances, renewable energy equipment, aviation industry, electronics, advanced green materials production
- **Iron/steel manufacturing** will shift from long products to **flat products together with increased electrification in flat product manufacturing**.
- **Construction** sector will **grow in line with population** growth. **Production of construction materials**, including iron and steel, will **primarily target the domestic market.**
- **Production of chemicals/petrochemicals** will grow driven by **import substitution and alternative green products**.





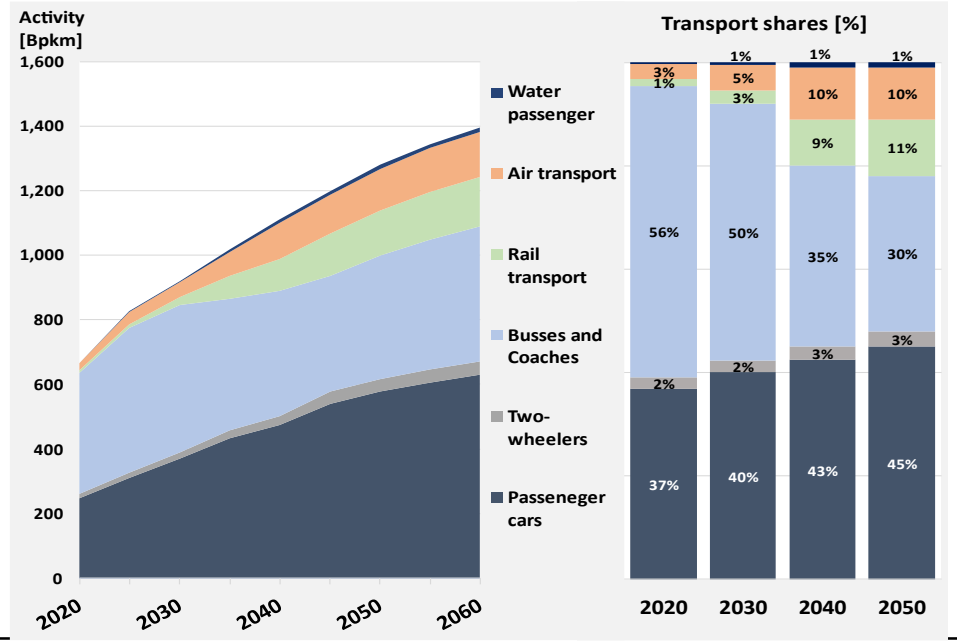
INETTT
International Network of Energy Transition Think Tanks

E3Modelling Energy Economy Environment

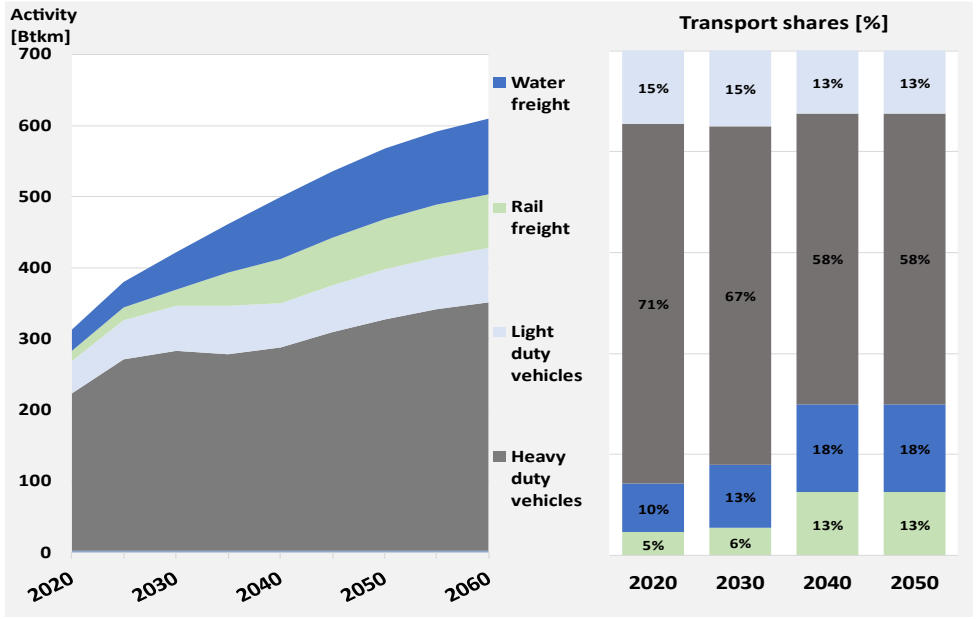
SHURA Net Zero Study
DRAFT RESULTS – Transport Activity

Transport activity will grow in line with population growth, economic growth and per capita income while reducing carbon intensity

- Share of **passenger cars and air travel** is expected to **increase** with increased welfare.
- **Modal shift in passenger transport from buses to railways** will facilitate decarbonisation.
- **Freight transport will grow in line with economic growth**. **Modal shift from heavy duty vehicles** toward **water and rail transport will lower energy intensity** and facilitate decarbonisation.
- The **resulting modal mix** will facilitate **increased electrification of transport and allow for alternative green fuels and hydrogen where electrification is not feasible**.



Activity in passenger transport



Activity in freight transport

DRAFT RESULTS – Energy and Electricity Demand Projections

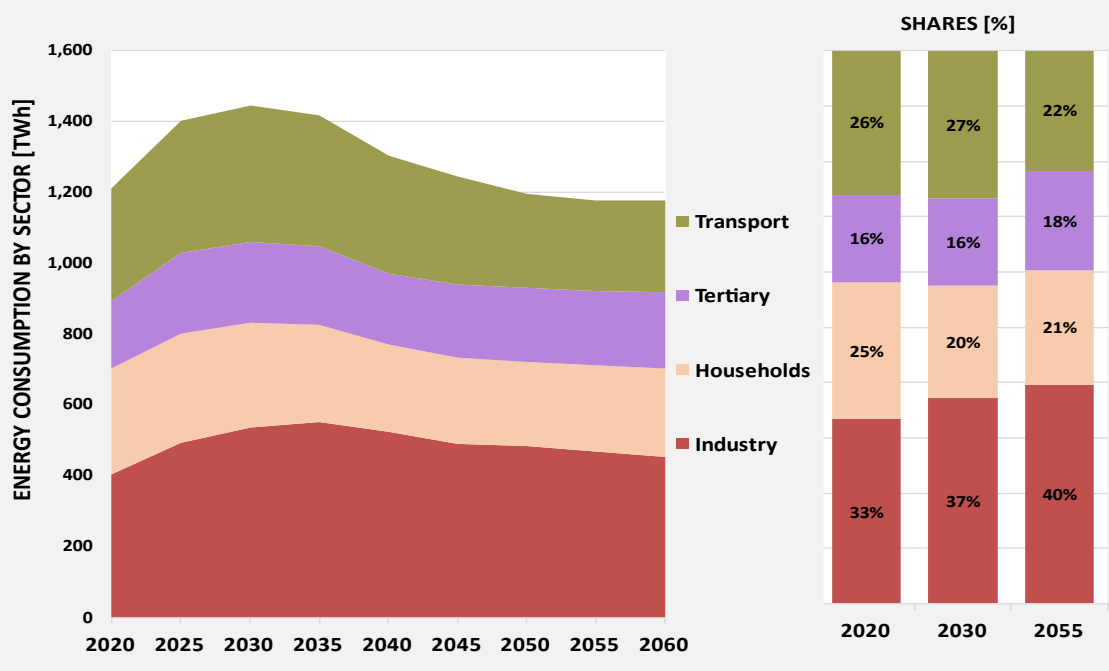
Despite increases in economic activity, energy efficiency and electrification drive the reduction of final energy consumption

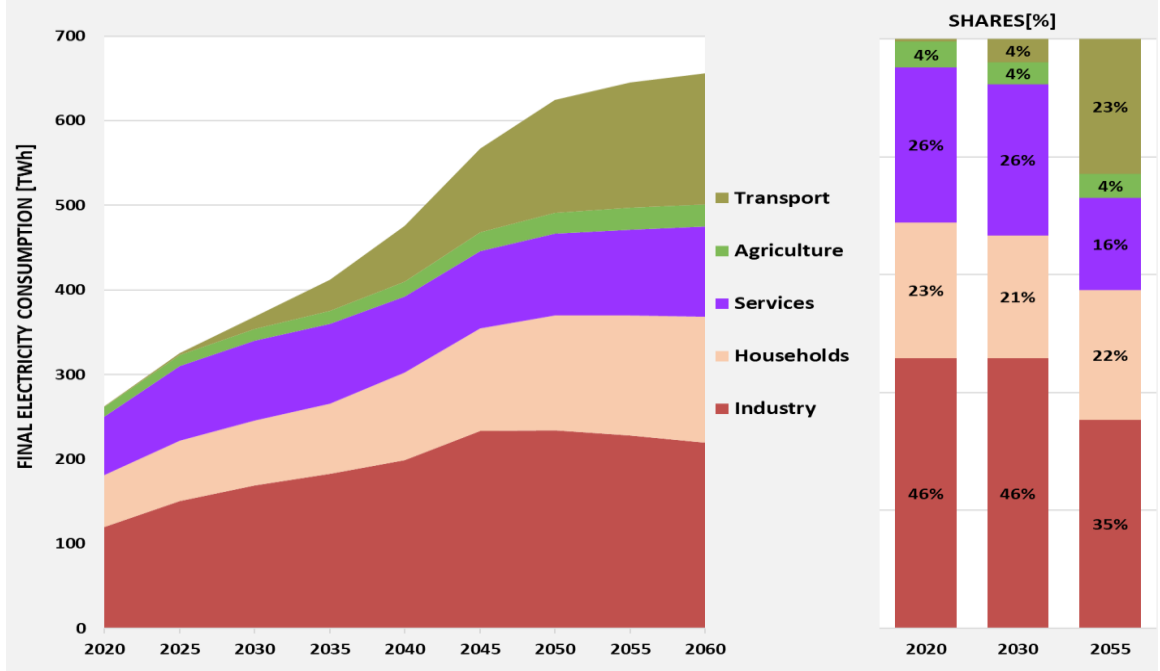
Total Final Energy Demand – End Use Consumption:

- Despite **increases in economic activity, energy efficiency and electrification** drive the **reduction of final energy consumption. In 2053, energy consumption is reduced back to 2020 levels.**

Electricity Demand by Sector:

- **Total end-use electricity consumption increases by 2.5 times in 2053** led mainly **by transport, industry** and **residential** sectors
- The **share of final electricity consumption in final energy demand reaches 55%, as a result of the electrification of end-uses.**





INETTT
International Network of Energy Transition Think Tanks

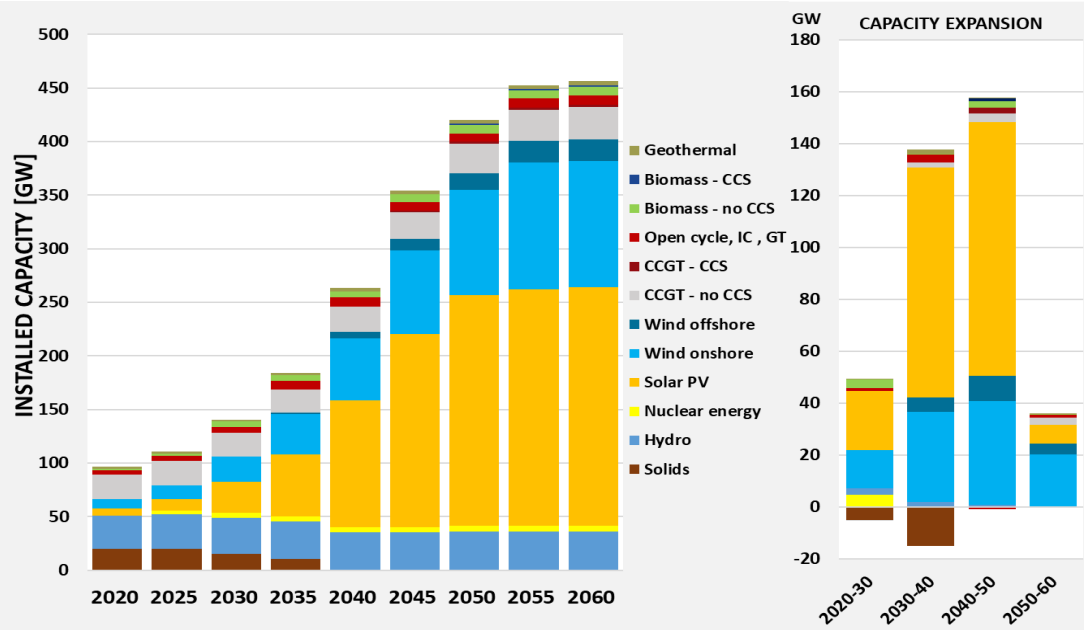
E3Modelling Energy Economy Environment

DRAFT RESULTS – Supply Mix and Electricity Generation Projections

It is feasible to transform the power system and net-zero emission goal can be achieved through the use of renewables by 2053 in Türkiye

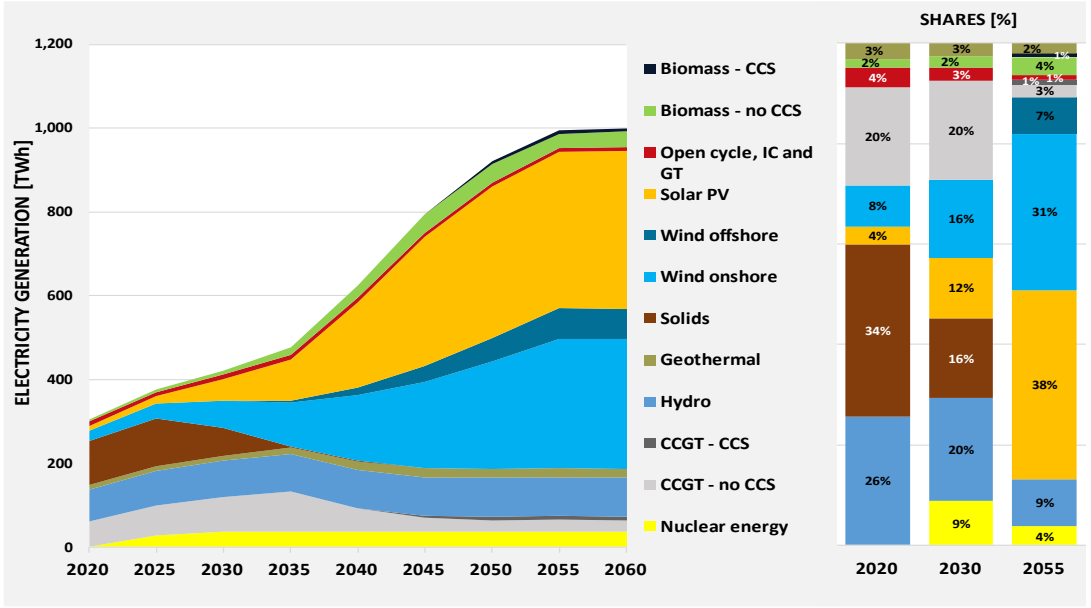
Gross Installed Capacities (GWe):

- **Solar and wind energy** installed capacities reach over **200 GW and 130 GW respectively by 2053**
- **Coal phase out by 2035**
- **CCGT plants** remain in the system **as reserve power plants (operating with e-fuel mix** in the long-run)



Electricity Generation by Technology:

- By **2053 over 90% of electricity** is generated **by renewables** (38% from wind and 38% from solar)
- **Electrification and e-fuel demand increases substantially after 2030** to meet net zero targets



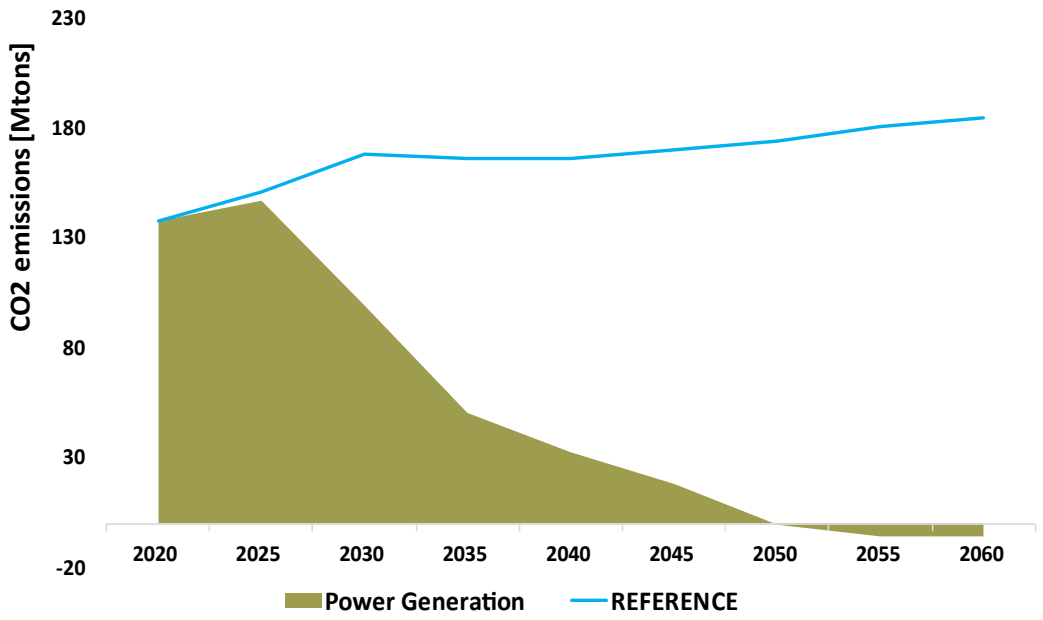
INETTT
International Network of Energy Transition Think Tanks

E3Modelling Energy Economy Environment

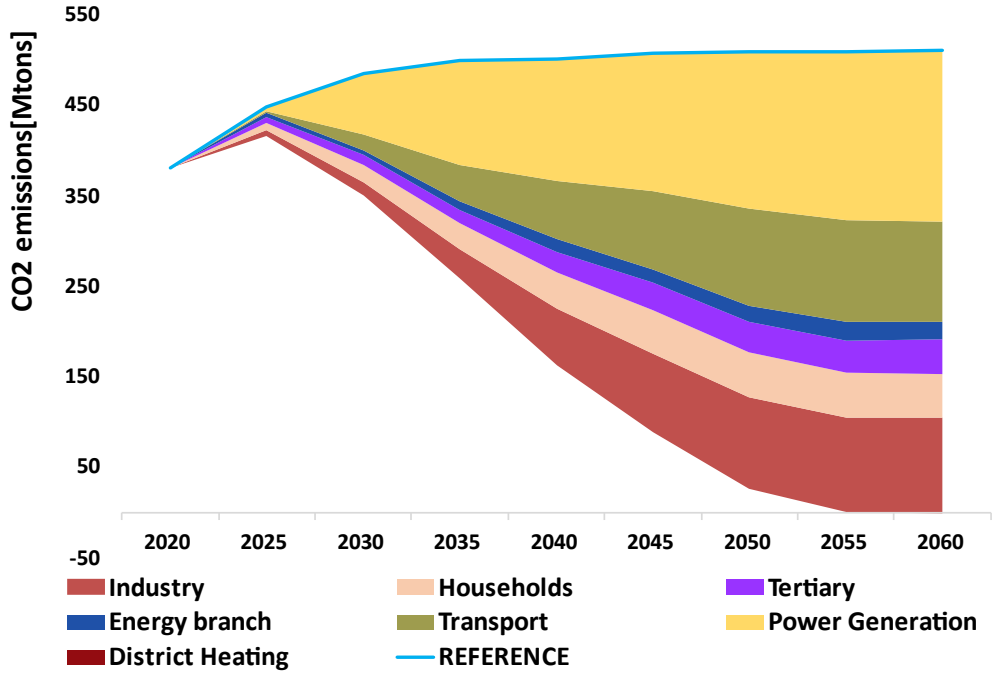
DRAFT RESULTS – Projected CO^2 Emissions

After a peak in 2025, CO2 emissions are reduced by ~65% in 2035 due to coal phase out

Power sector



Overall system emissions



- As renewable power plants substitute natural gas, **CO2 emissions continue to decrease, albeit at a lower rate until 2050, where the power sector approaches zero emissions.**
- CO2 emissions from **power sector** reach **negative levels by 2055**, through the use of BECCS (biomass with carbon capture and storage).
- **Between 2050 and 2055, power sector's negative emissions compensate for the residual emissions from transport and industrial sectors, reaching net zero for the energy system as a whole.**

CHALLENGES & OPPORTUNITIES

- The **global energy crisis** and the ongoing war between Russia and Ukraine is underlining the importance of energy supply security and stability in energy prices. Though it is perceived as a challenge against energy transition; actually it is an opportunity at the same time with transition resulting in supply security and lower energy prices.

- **Net Zero Strategy needs to be consistent and mutually reinforcing with the climate, industry, transport, energy, and financing policies.** Coordination and collaboration will be essential to reach the target.

- **Transition needs investments**. By creating a Green Finance strategy, Turkey can reach the resources it needs by turning to low-carbon and high-value-added production along with energy transition.

- **Necessary actions should be taken to ensure a just transition**

- **Importance of fast action to reach net zero**: Necessary actions need to be taken immediately, otherwise reaching net-zero emissions will be more challenging

THANK YOU!

SHURA Energy Transition Center

- A **transparent** platform working for Turkey's energy transition, with Turkey's priorities
- stimulating discussion on Turkey's energy sector
- **among all interested stakeholders**
- providing fact-based, unbiased and independent research and analysis,
- covering technology, economics and policies
- contributing to the debate on Turkey's energy transition

Agora Energiewende

European Climate Foundation

İPM | IPC İSTANBUL POLİTİKALAR MERKEZİ SABANCI ÜNİVERSİTESİ KAMPUSU ISTANBUL POLICY CENTER AT SABANCI UNIVERSITY