

TURKEY ENERGY OUTLOOK | 2020

“ENERGY MARKETS, INVESTMENTS AND TECHNOLOGIES”

3-Country Business Webinar

17 March 2021

Sabancı
Universitesi

IICEC

SABANCI UNIVERSITY
ISTANBUL INTERNATIONAL
CENTER FOR ENERGY AND CLIMATE

Turkey Energy Outlook (TEO) supports a stronger energy future for Turkey with solid recommendations.

WHY THE TEO?



A long-term perspective in a dynamic energy landscape with uncertainties



Policy and technology pathways for a stronger energy future



An independent, participative and exemplary study



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HOW THE TEO WAS DEVELOPED?

- ✓ Building upon energy policy objectives
- ✓ A holistic energy model developed by IICEC
- ✓ Scenario-based approach out to 2040 with a detailed bottom-up accounting of the Turkish energy sector
- ✓ Reflecting different implications of energy policy choices, market progress and technological developments
- ✓ Supported by independent research, quantitative analyses and insights
- ✓ Stakeholder engagement built upon the Government-Industry-Academia *success triangle*



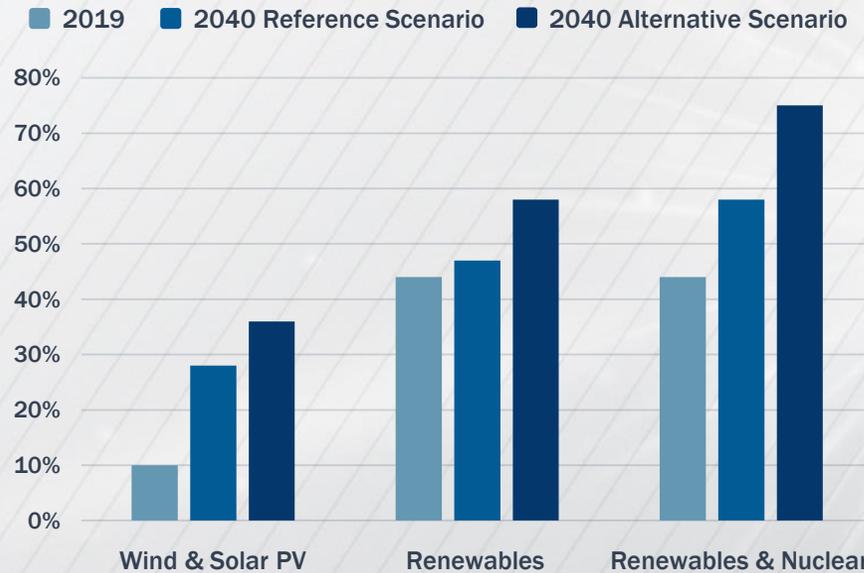
Two TEO Scenarios demonstrate energy policy and technology pathways out to 2040.



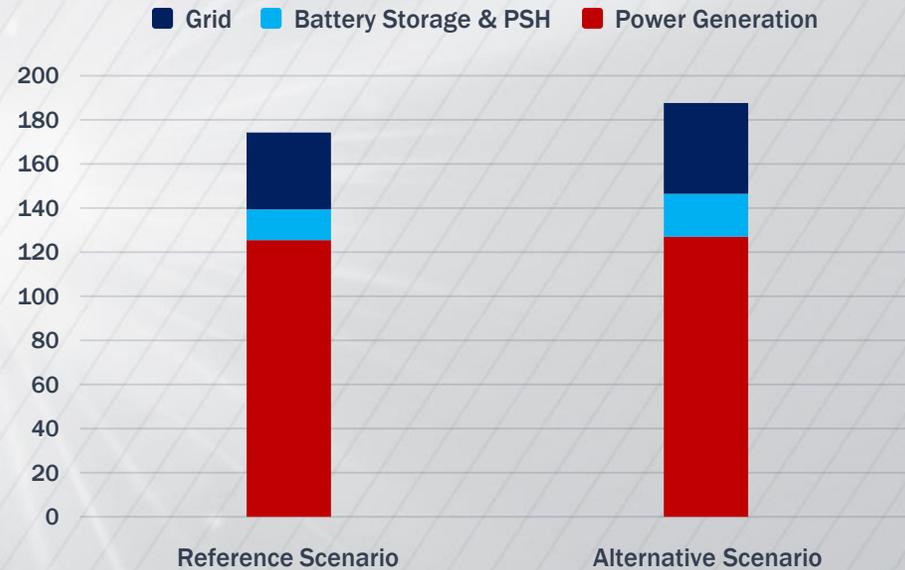
The TEO Scenarios provide an up-to-date and holistic approach reflecting the impact of the recent gas discovery on energy balances and also taking into account the current and possible future impacts of the Covid-19.

Turkey's power system moves towards a more localized structure with investment allocation shifting more to the grids.

Changing Shares of Power Generation Technologies (%)



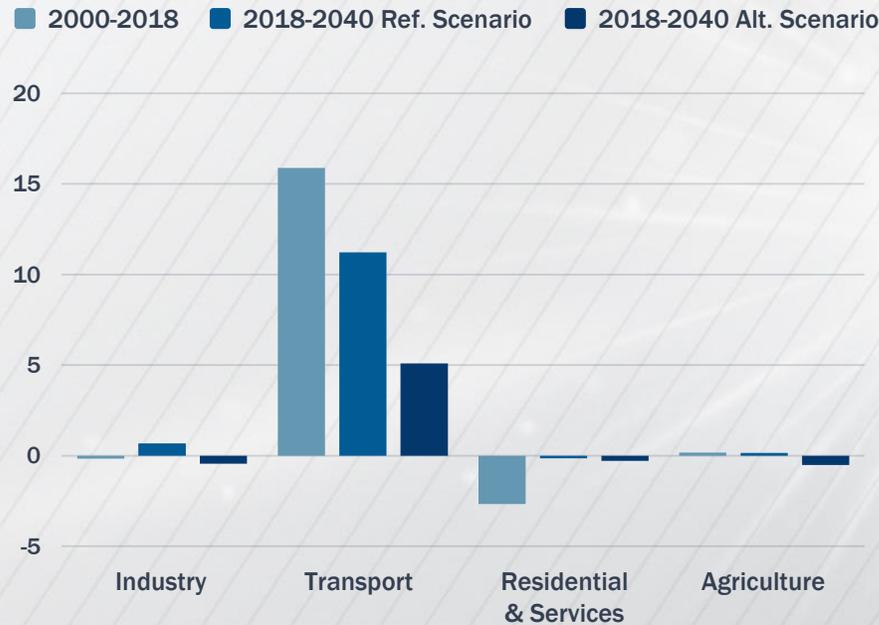
Power Sector Investment by Sector and Scenario (2019-2040, 2019\$ billion)



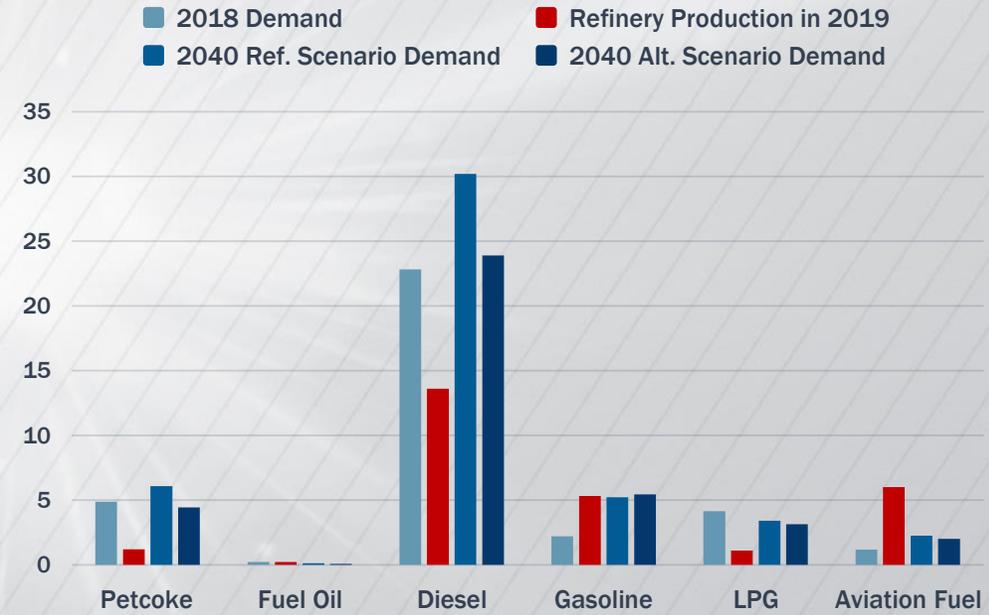
Sustained investments are needed for a more localized and sustainable power mix backed by increasingly robust power grids to accommodate more variable supply and demand features with enhanced flexibility.

Transport is yet an oil story but Turkey has opportunities to lower oil demand growth and imports with policy and technology choices.

Change in Oil Demand by Sector and Scenario (mtoe)



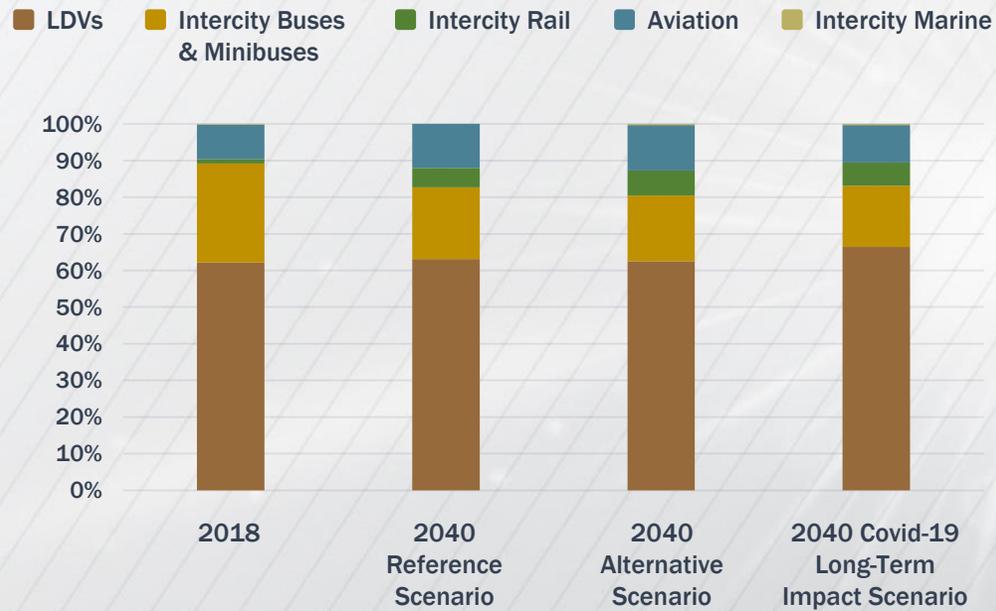
Product Demand by Scenario vs. Refinery Production in 2019 (million tons)



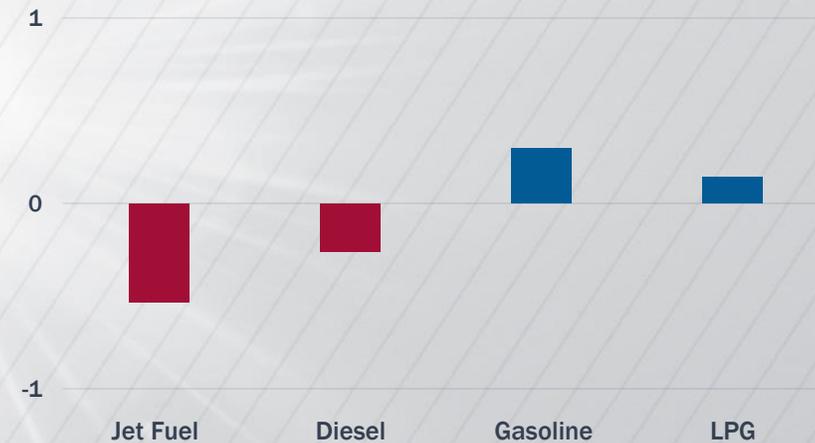
Modal shifts from road to rail and marine, fleet renewal policies, electricity and natural gas vehicles, fuel taxation and urban transport planning can help achieve a better matching of refinery and import slates.

Many uncertainties remain for Covid-19 implications; we may see permanent impacts on travel activity and choices.

Modal Shares in Intercity Passenger Travel by Scenario (%)



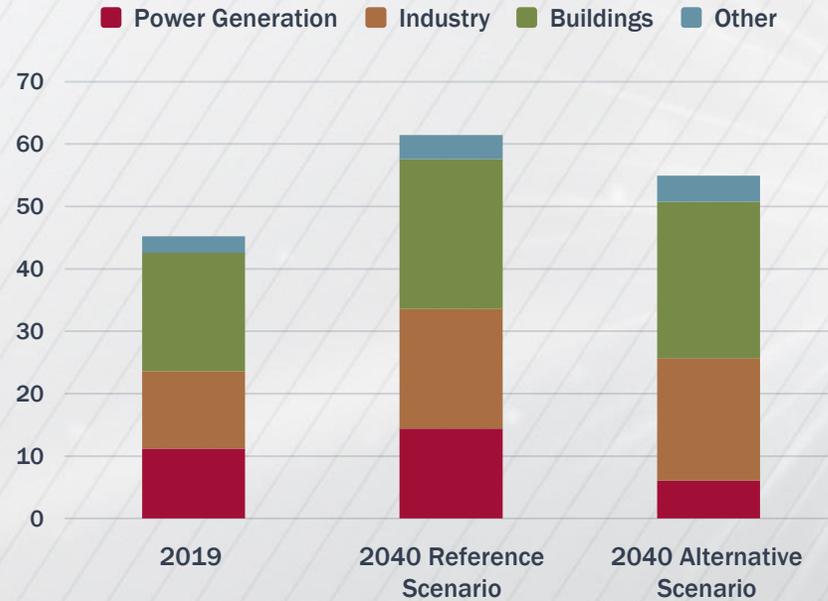
Transport Oil Demand Change in the Long-Term Covid-19 Scenario over the Alternative Scenario (2040, mtoe)



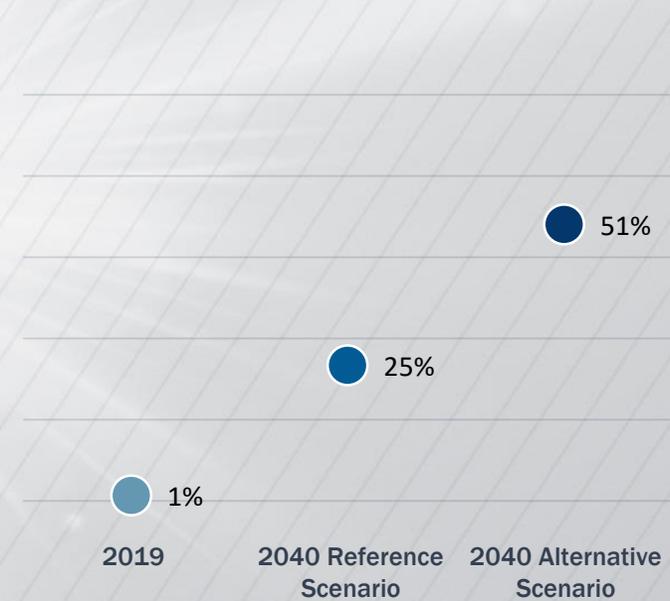
Behavior changes could affect high occupancy modes of passenger travel; however, total oil products demand by 2040 is not anticipated to be greatly affected.

Gasification continues in all non-power sectors backed by increasing domestic gas production with multiple benefits.

Natural Gas Demand by Sector and Scenario (bcm/yr.)



Self Sufficiency in Natural Gas Supply (%)

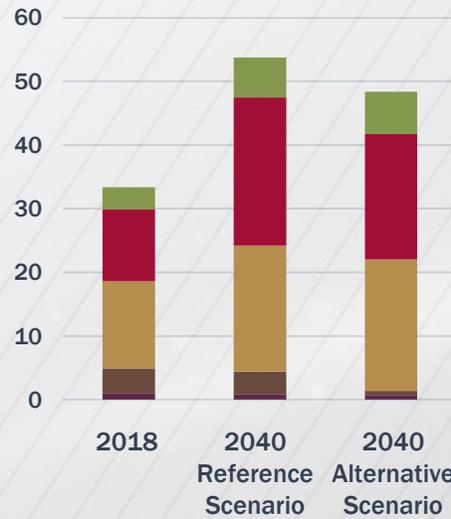


Global and regional gas market dynamics, Turkey's enhancing infrastructure, expiry calendar of existing import contracts and the recent gas discovery will all be supportive for a more competitive gas market.

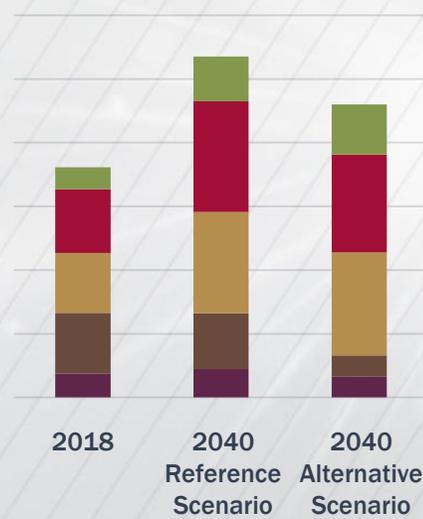
Energy efficiency and fuel shifts drive a more sustainable and technology-driven growth of energy demand services.

Oil Coal Natural Gas Power Renewables

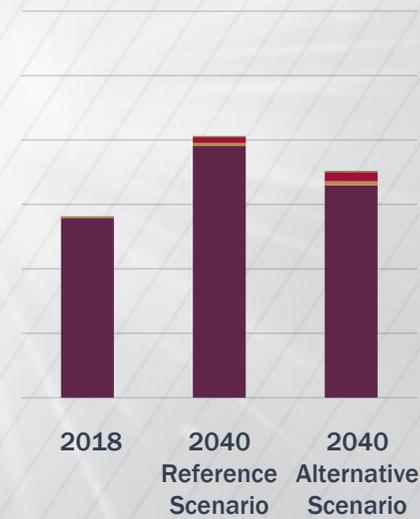
Buildings Energy Demand by Source and Scenario (mtoe)



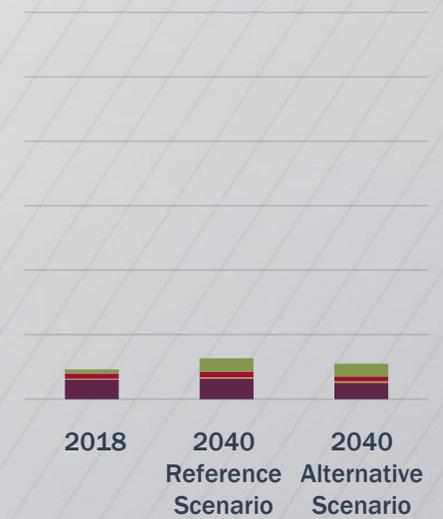
Industry Energy Demand by Source and Scenario (mtoe)



Transport Energy Demand by Source and Scenario (mtoe)



Agriculture Energy Demand by Source and Scenario (mtoe)

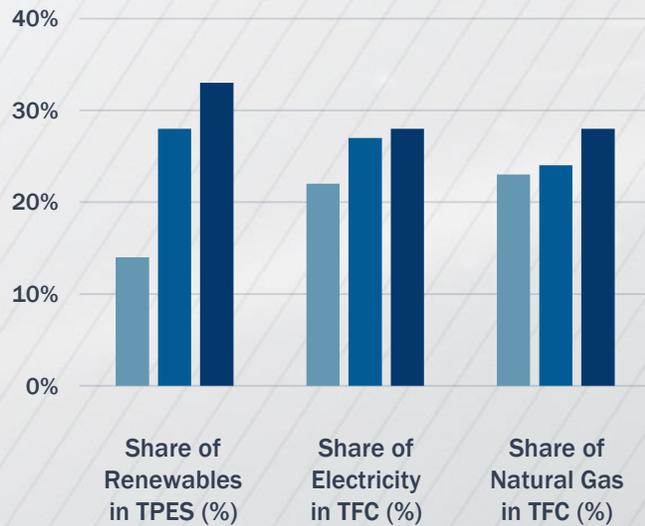


Energy efficiency measures and fuel shifts supported by technology and digitalization can further be leveraged by innovative business and financing models in all end-user sectors.

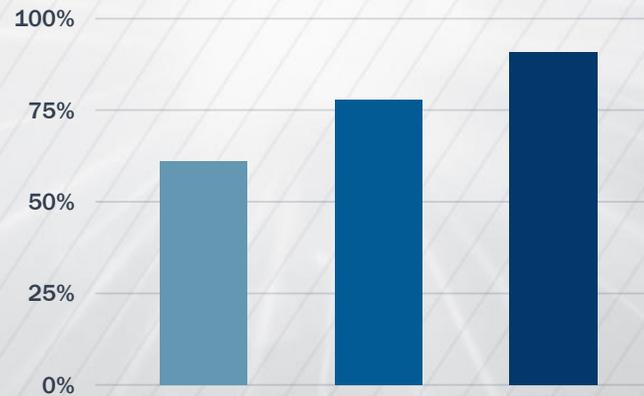
The TEO Alternative Scenario presents wide benefits for supporting efficient growth of developing Turkish energy economy.

■ 2019 ■ 2040 Reference Scenario ■ 2040 Alternative Scenario

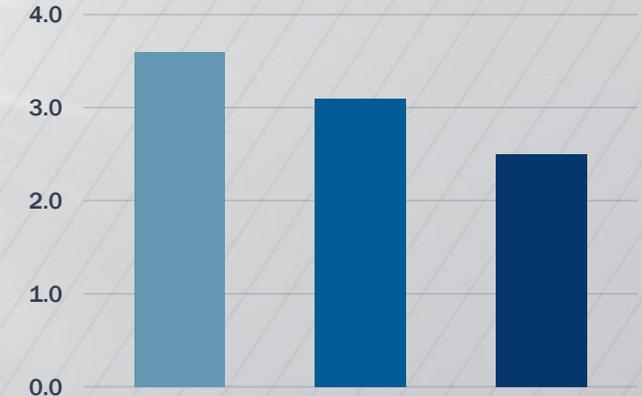
Key Metrics on Primary Energy Supply and Final Energy Demand Mix (%)



Share of Local Resources and Nuclear in Total Power Generation (%)



Energy Related GHG Emission Intensity (tons of CO₂-eq/toe)



The primary energy supply and power generation mix both transform into a more sustainable structure limiting energy imports and carbon footprint.

R&D and innovation progress can enable energy technology localization and prospects for domestic manufacturing.

The TEO discusses promising energy technology choices for Turkey to develop a domestic manufacturing industry while advancing through **energy transition**

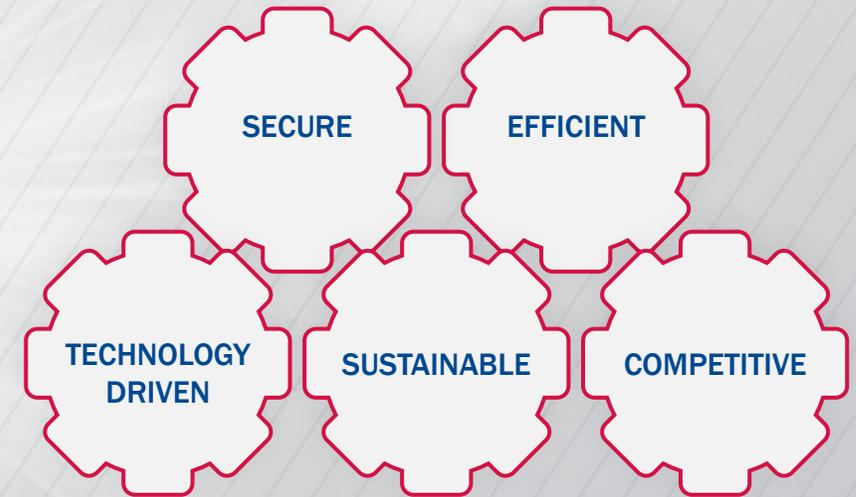
- ✔ Renewables and energy storage
- ✔ Nuclear power including the SMRs
- ✔ Electric vehicles
- ✔ Carbon capture from air
- ✔ Hydrogen production from local coal via CCUS
- ✔ Hydrogen in transportation and industrial sectors
- ✔ Advanced data analytics and digitalization



Turkey can become a clean energy technology developer and exporter rather than importing these technologies while, at the same time, advancing towards near-zero emissions pathway post 2040.

Mobilizing the necessary investments along the whole energy value chain is critical to achieve multiple benefits.

- Robust growth fundamentals in modern energy services,
 - The transition towards more competitive energy markets,
 - The significant potential in renewable energy, energy efficiency and other clean energy areas,
 - E&P investments,
 - Advances in energy technologies and digitalization
- will all enable a stronger energy economy.



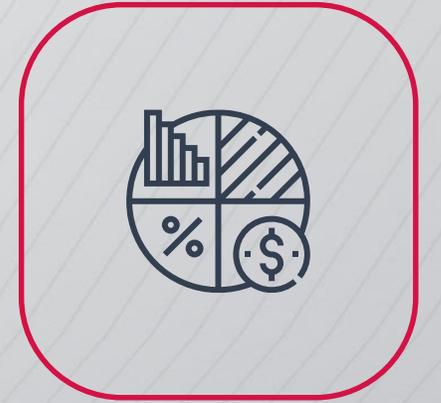
10 TEO Recommendations for a more secure, efficient, competitive, technology-oriented and sustainable energy future

- 01  An attractive investment framework to mobilize investments for meeting increasing demand for modern energy services while achieving a more secure, efficient and sustainable energy future.
- 02  Faster progress towards competitive power and natural gas markets and wider private sector participation with cost-reflective energy prices while addressing the social dimension.
- 03  Increased renewable and nuclear power with more flexibility in the power grid including demand side services.
- 04  Increased energy and fuel efficiency across all sectors supported by fuel shifts towards further electrification and larger use of renewable energy.
- 05  Strong policy initiatives, market based and innovative financing and business models to exploit the energy efficiency potential in buildings and industries.
- 06  Faster uptake of electric vehicles and Turkey's recharging infrastructure and faster retirement of older, inefficient and polluting transportation vehicles.
- 07  Increased modal shifts from energy and oil intensive road to rail and marine as well as a data-driven urban transportation planning structure to ensure effective public transit capital investments and measures to discourage private automobile travel.
- 08  Sustained exploration and production (E&P) efforts and investments to discover and produce more domestic oil and gas.
- 09  Increased uptake of digitalization and advanced data analytics along the energy supply and demand chain.
- 10  Increased innovation, R&D and manufacturing of advanced energy technologies.

10 TEO Recommendations for a more secure, efficient, competitive, technology-oriented and sustainable energy future

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Increased energy and fuel efficiency across all sectors supported by fuel shifts towards further electrification and larger use of renewable energy.



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Increased uptake of digitalization and advanced data analytics along the energy supply and demand chain.



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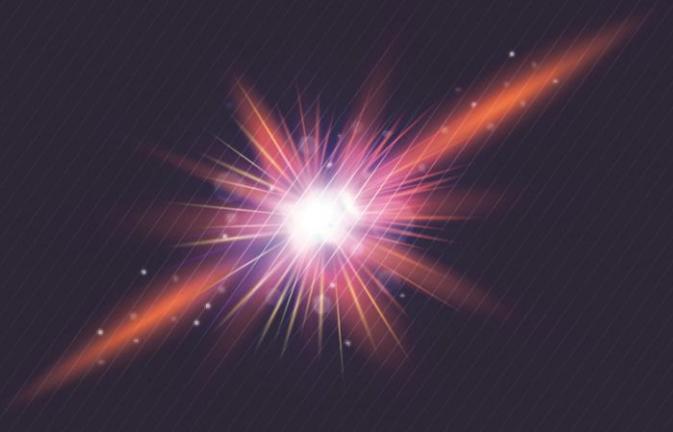
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