Clean Energy Growth

Bora Şekip Güray

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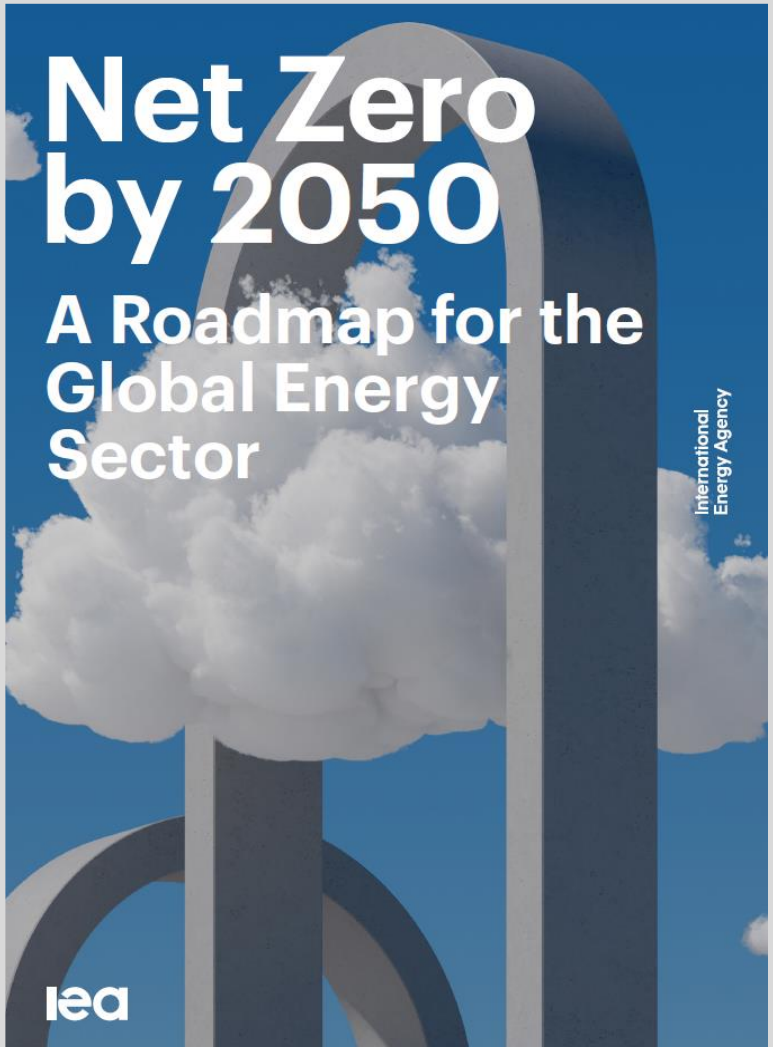
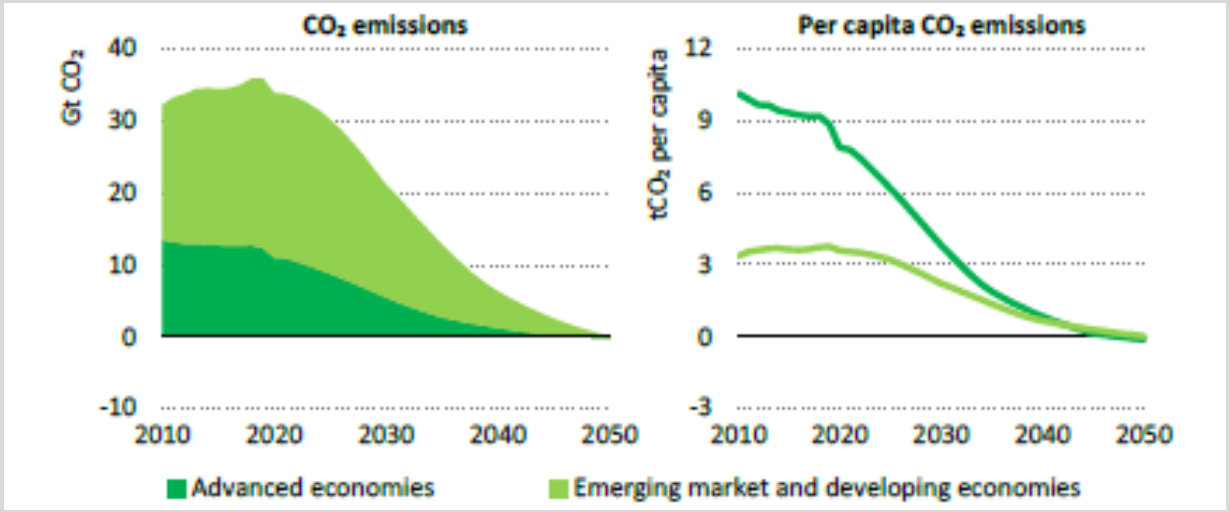
International Energy Agency

World's First RoadMap for Net-Zero Emissions (NZE)



The global pathway to net-zero emissions by 2050



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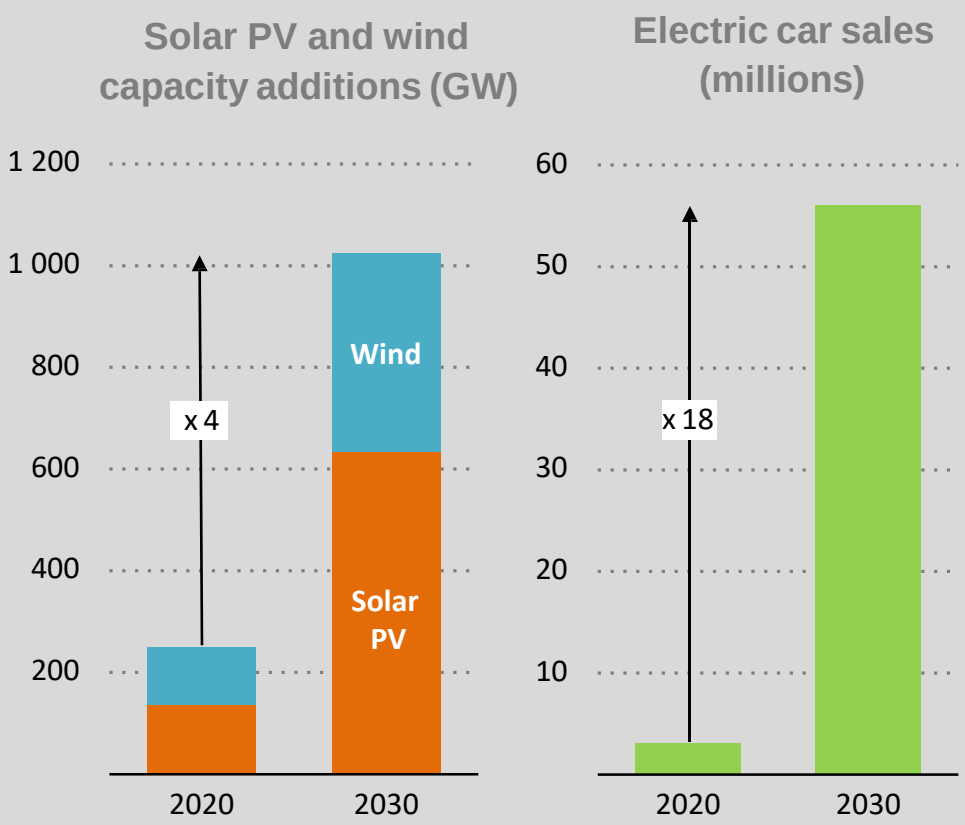
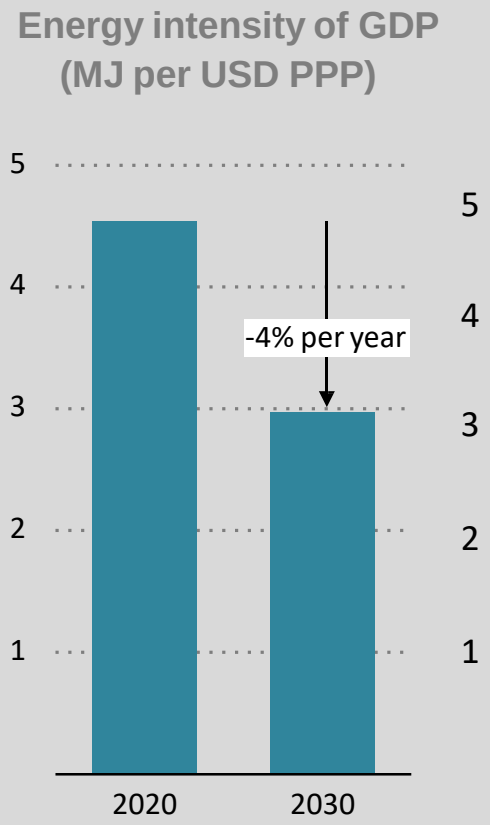
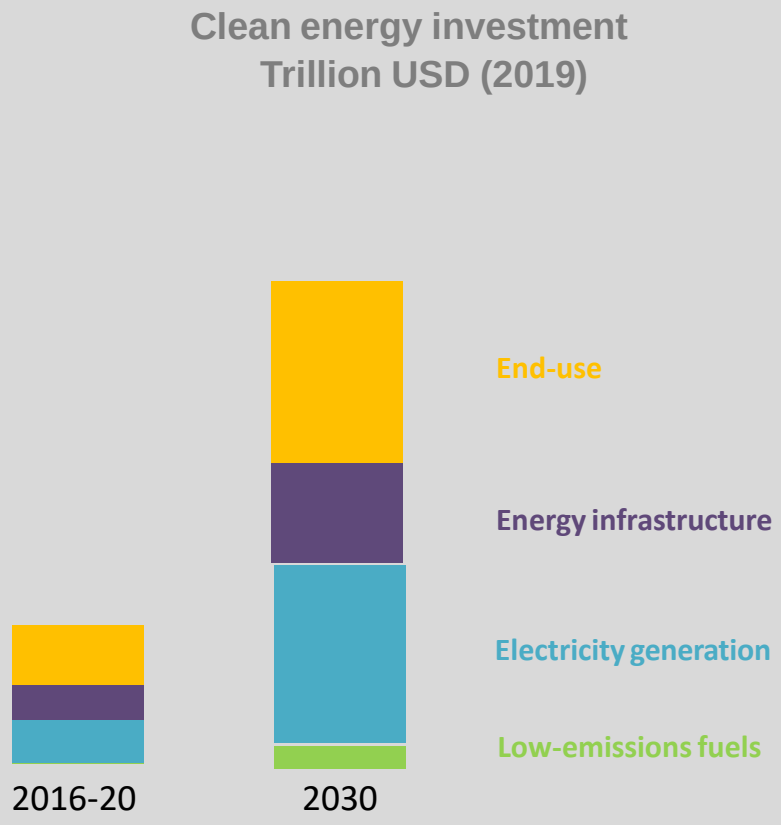
Towards the 2050 Goal:
2020s as a decade of massive clean energy investment







IEA Net Zero by 2050: A Roadmap for the Global Energy Sector

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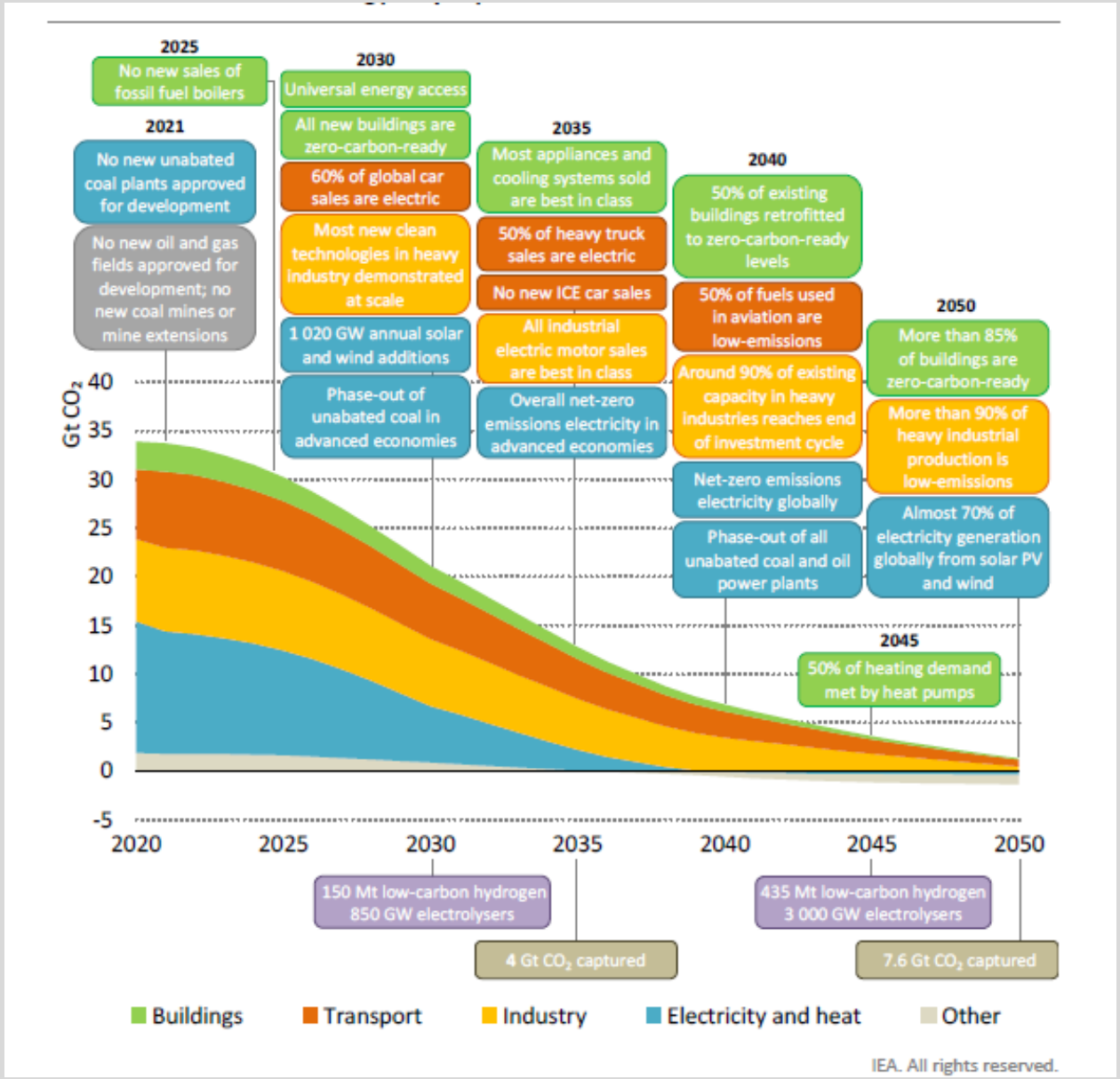
Global Milestones in the NZE Scenario



IEA Net Zero by 2050: A Roadmap for the Global Energy Sector

Key to Success: Electrification, Broader Renewable Energy & Energy Efficiency, Battery Storage, Hydrogen and CCUS

Selected Indicators from the NZE Scenario	2020	2030	2050
Share of Electricity in Total Final Consumption (%)	20%	26%	49%
Renewables Share in Power Generation (%)	29%	61%	88%
Renewables Share in Total Final Consumption of Energy (%)	5%	12%	19%
Share of Electric Cars in Total Car Stock (%)	1%	20%	86%
Battery Storage Capacity (GW)	18	590	3100
Total Production of Hydrogen-based Fuels (Mt)	87	212	528
Low-Carbon Hydrogen Production (Mt)	9	150	520
Share of Electrolysis-based Production in Low Carbon Hydrogen Production (%)	5%	54%	62%
Total CO_2 captured (Mt)	40	1670	7600
Annual Investment in Energy (trillion USD)	2.0	5.0	4.5

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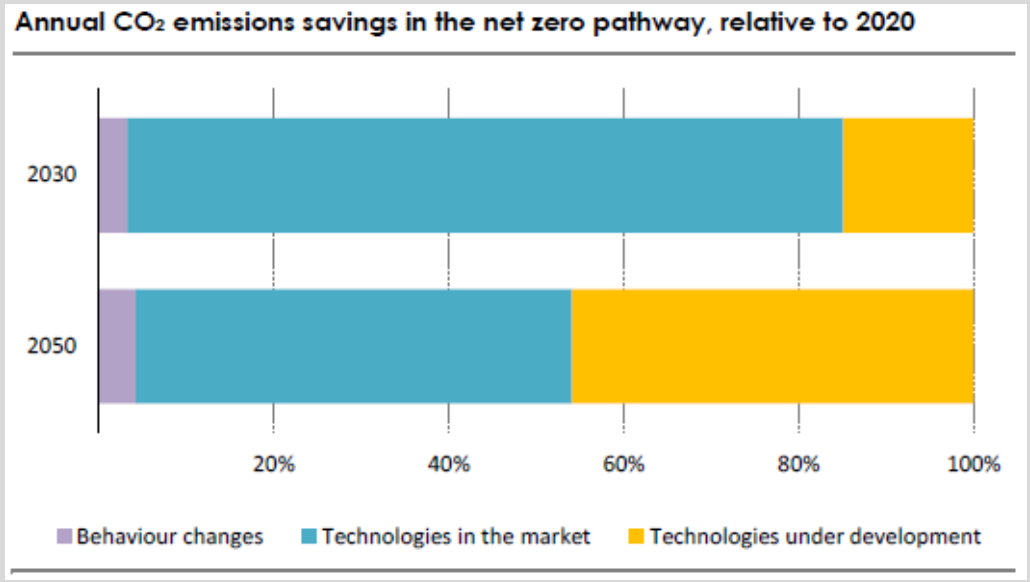
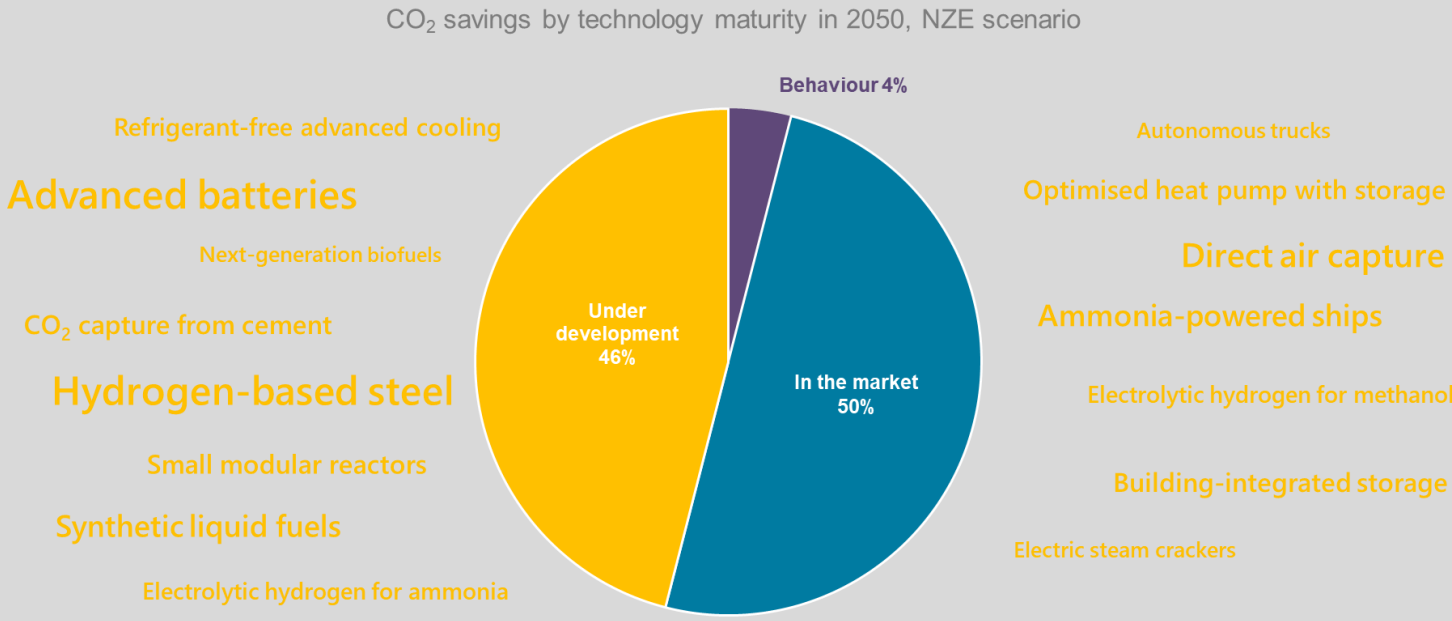
Technologies and Behavior Changes





Next generation of low-carbon energy technologies

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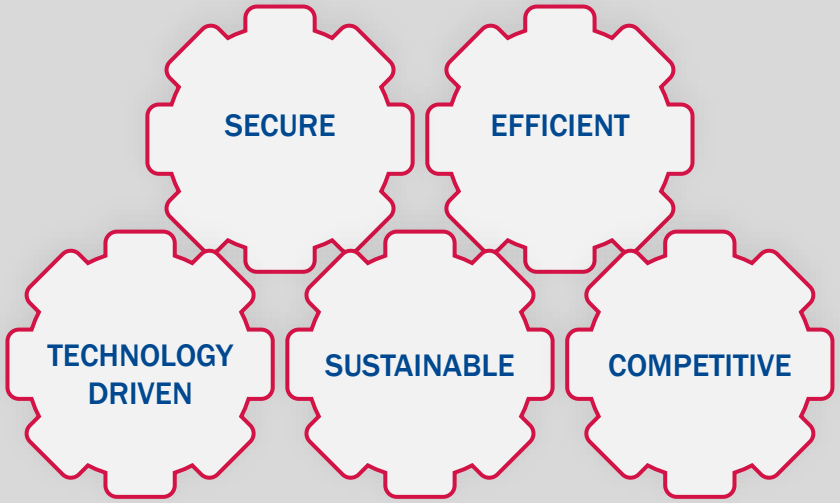
Turkey: Key energy sector characteristics and opportunities

- Robust growth fundamentals in modern energy services as an emerging energy economy,
- The transition towards more efficient and competitive energy markets,
- Major policy goals of
  - enhanced energy security,
  - more predictable markets,
  - advanced localization,
- The significant potential in renewable energy, energy efficiency, energy storage and other clean energy areas as well as digitalization



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.

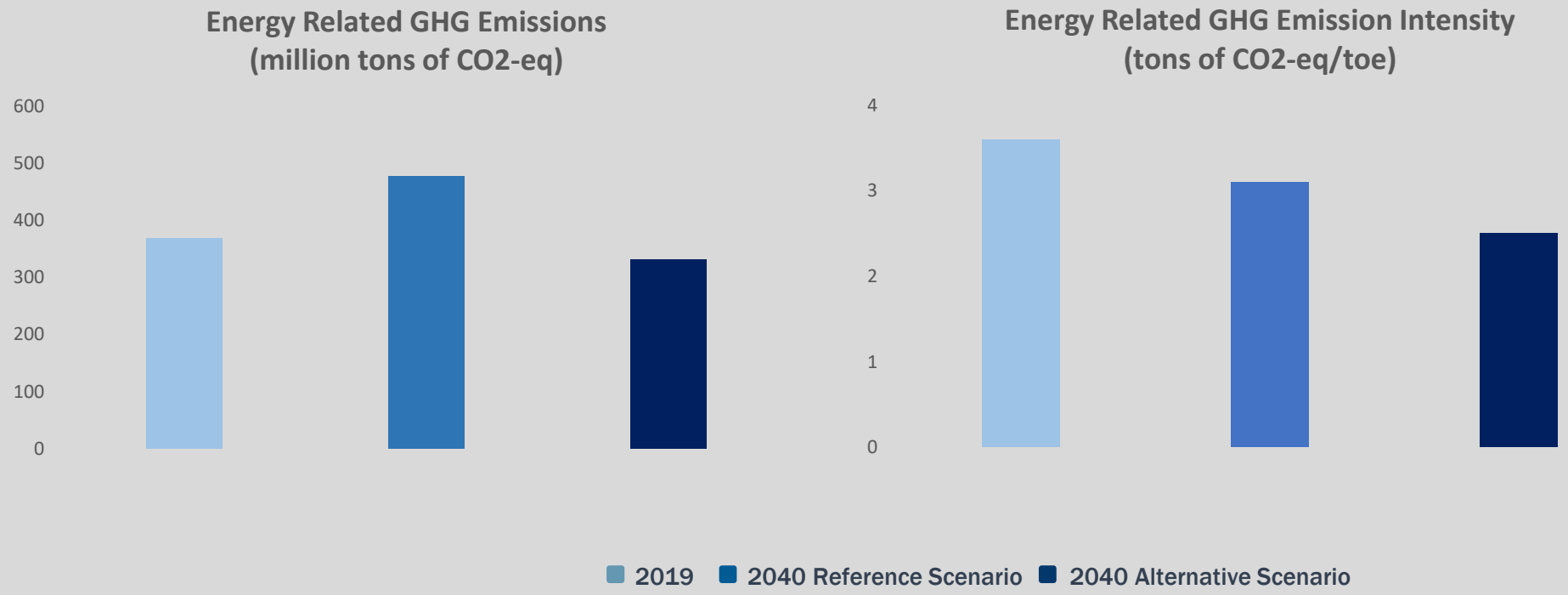
07 Increased modal shifts from energy and oil intensive road to rail and marine as well as a data-driven urban transportation planning structure to ensure effective public transit capital investments and measures to discourage private automobile travel.

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.

TEO Alternative Scenario projects peaking GHG emissions before 2040



Advancing towards a net—zero emissions pathway for Turkey

TECHNOLOGIES

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.

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