TÜRKİYE ENERGY EFFICIENCY OUTLOOK 2025

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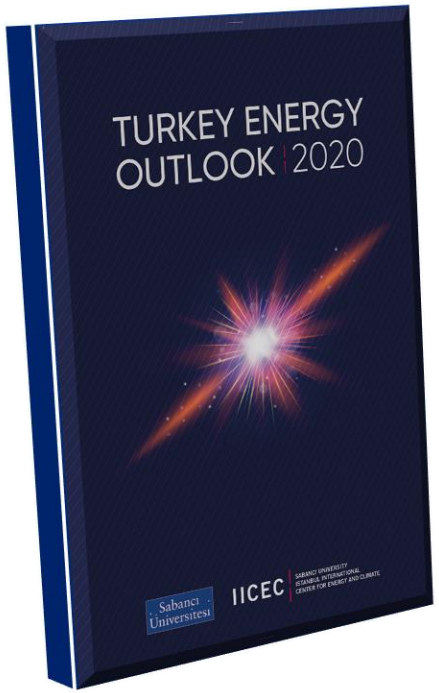
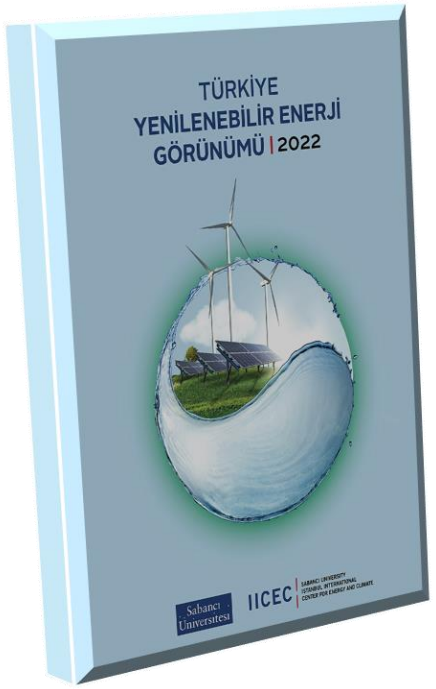
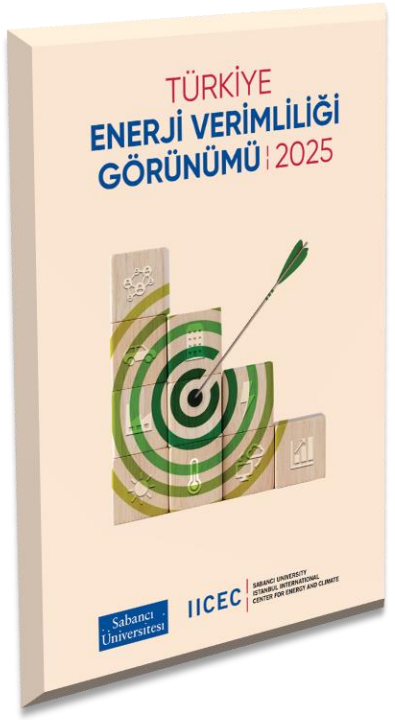
IIICEC energy outlook series support a more secure, competitive, cleaner and sustainable energy future.







Türkiye Energy Efficiency Outlook (TEEO) supports the utilization of the high potential for more efficient growth in energy with multifaceted opportunities for Türkiye and solid recommendations.

Why developed?

- New global dynamics in energy security, competitiveness and clean energy transitions
- Strong growth dynamics in Türkiye's energy demand, critical policy objectives including an energy hub vision & continuous improvement in energy infrastructures
- Türkiye's important energy efficiency targets and strong recent improvements in energy efficiency performance
- Multi-dimensional opportunities that would support a more secure, competitive and sustainable energy future

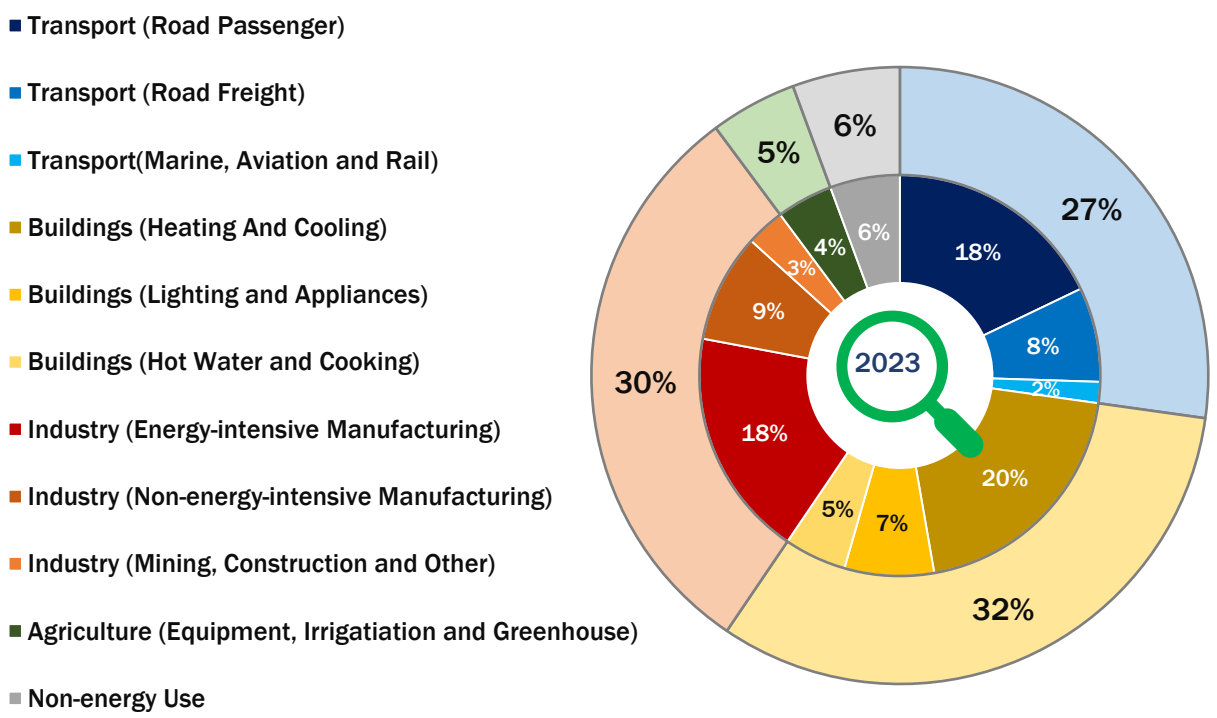
How developed?

- Türkiye Energy Outlook, energy outlook series & the holistic energy model developed by IICEC
- Detailed inventory & comprehensive analyses of Türkiye's energy demand sectors, services and the holistic energy balance
- Türkiye's critical energy policy objectives and priorities, the impact of the market developments and technological advances
- Scenario-based approach including quantitative analysis & innovative perspectives
- Stakeholder engagement built on the Public-Industry-Academia success triangle
- An independent, participatory and exemplary work

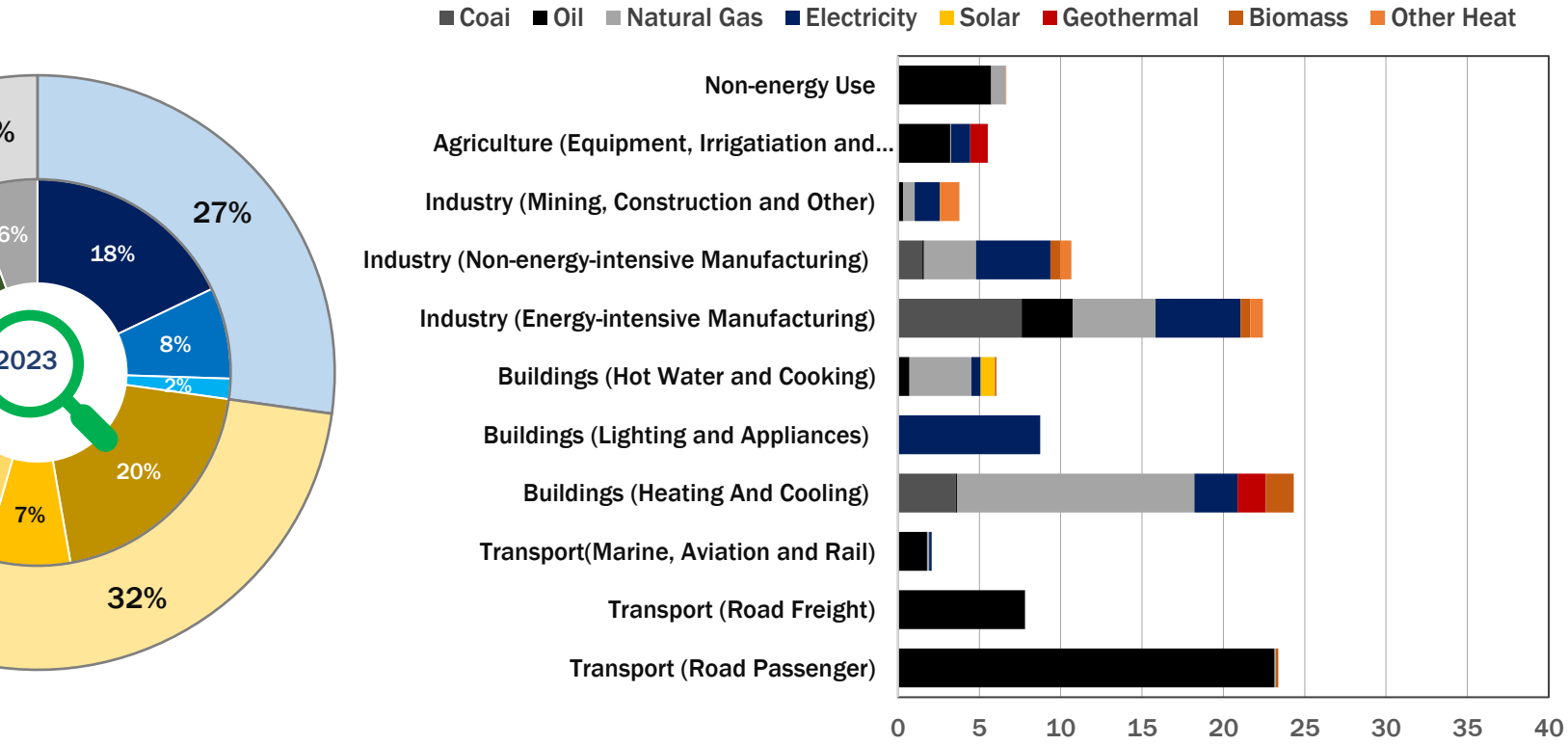
11 IICEC RECOMMENDATIONS

Structure of the energy demand including fuel and technology preferences in consumption have been analyzed in detail...

Overview of Total Final Energy Demand by Sectors and Demand Services (%)

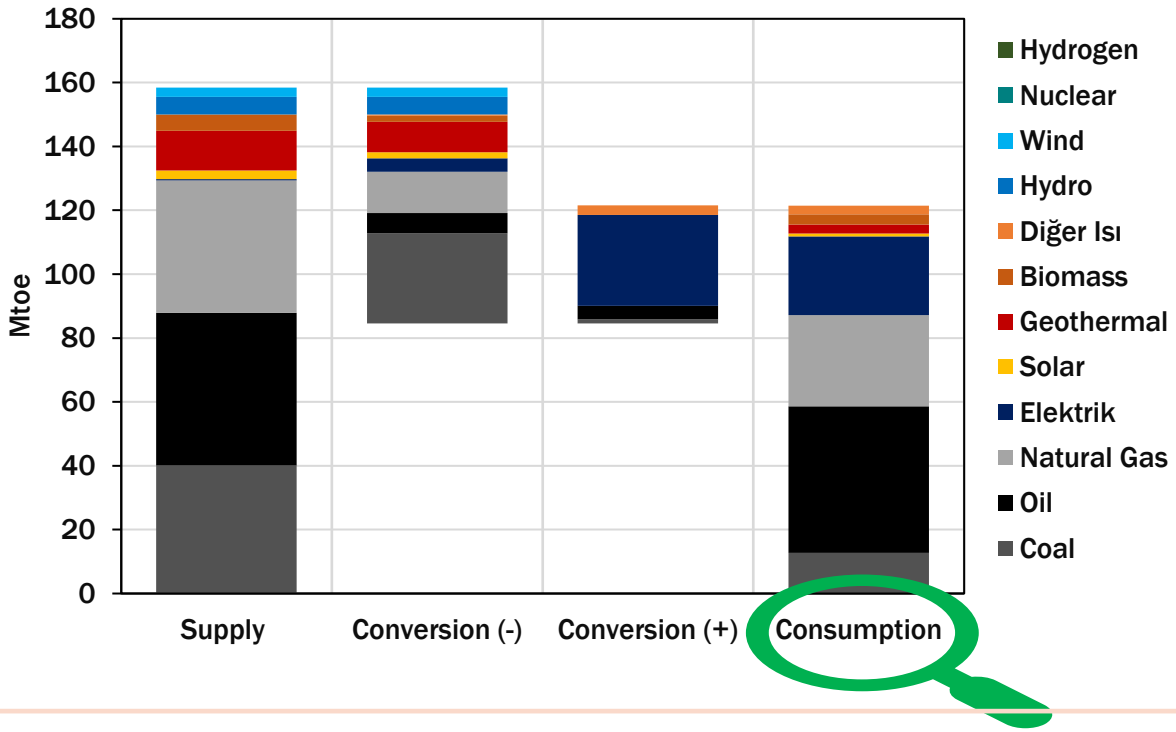


Overview of Total Final Energy Demand by Fuels and Technologies (Mtoe)

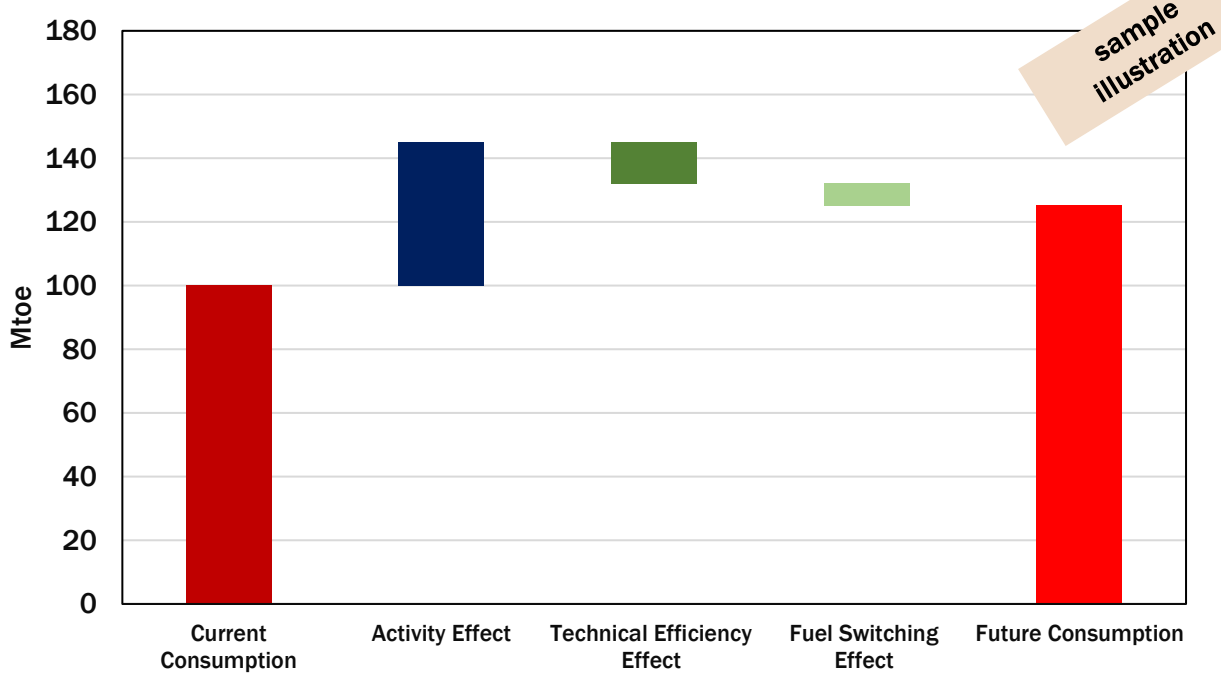


...together with assessments on activity, efficiency and fuel substitution effects on demand dynamics as well as analyses regarding components of the holistic energy balances

Holistic Overview of Energy Balance (Mtoe)



Factors Determining the Evolution of Energy Demand (Mtoe)



- **Supply - consumption =** Transformation and transportation losses from supply to final consumption

  Transformation sectors: Power generation, refineries, coke ovens and other conversion processes

- **Activity dynamics:** Economic growth, population increase, growth in the number and area of buildings, vehicle park and travel activity, stock of equipment and appliances, etc.
- **Technical efficiency dynamics:** Building insulation, efficiency performance in appliances, fuel economy, efficiency of electric motors, LED conversion in general lighting etc.
- **Fuel substitution dynamics:** Electric mobility, heat pumps, geothermal district heating, etc.

Based on two IICEC scenarios, the impact of different energy demand and efficiency pathways to energy balances, emission inventories and critical policy objectives is analyzed.

Base Scenario

- Policy objectives are partially realized.
- Sustainable investment growth momentum remains limited.
- Technological development opportunities are partially utilized.
- Growth in electrification and renewable heat use progresses slowly.
- Limited changes in consumption behavior and limited structural transformations in industry.

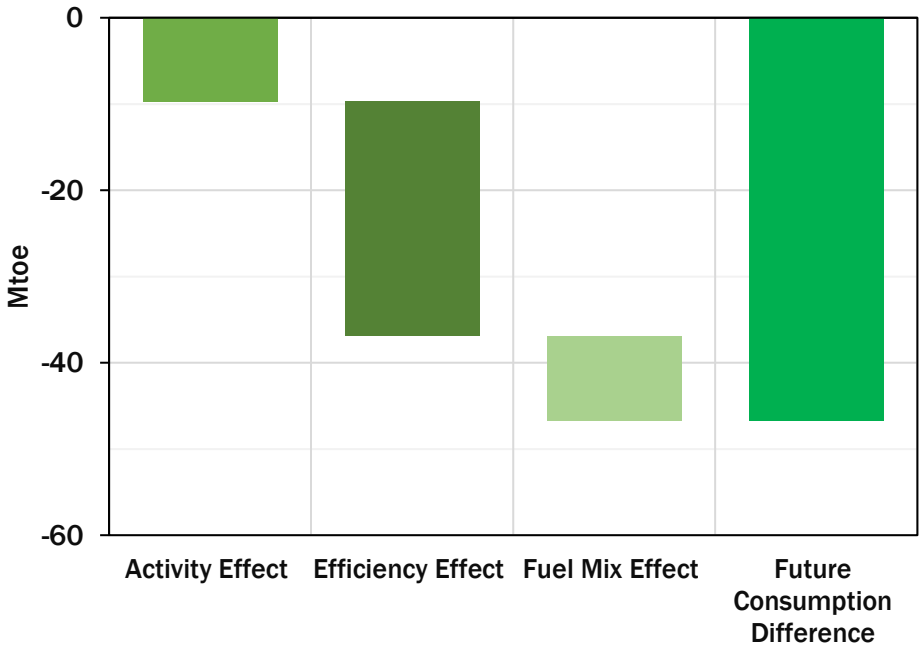
Efficient Growth Scenario

- Policy objectives are realized with substantial growth in electrification and renewable heat use advancing critical efficiency gains in the overall energy balances.
- Efficiency-oriented investments are growing and diversifying.
- Policies and new business models strengthen further dissemination of more energy efficient technologies.
- Growing consumer awareness enable behavioral changes and more rational consumption patterns.
- In the medium and long term, some structural transformations are realized across the economy, reducing energy intensity with more value-added opportunities.

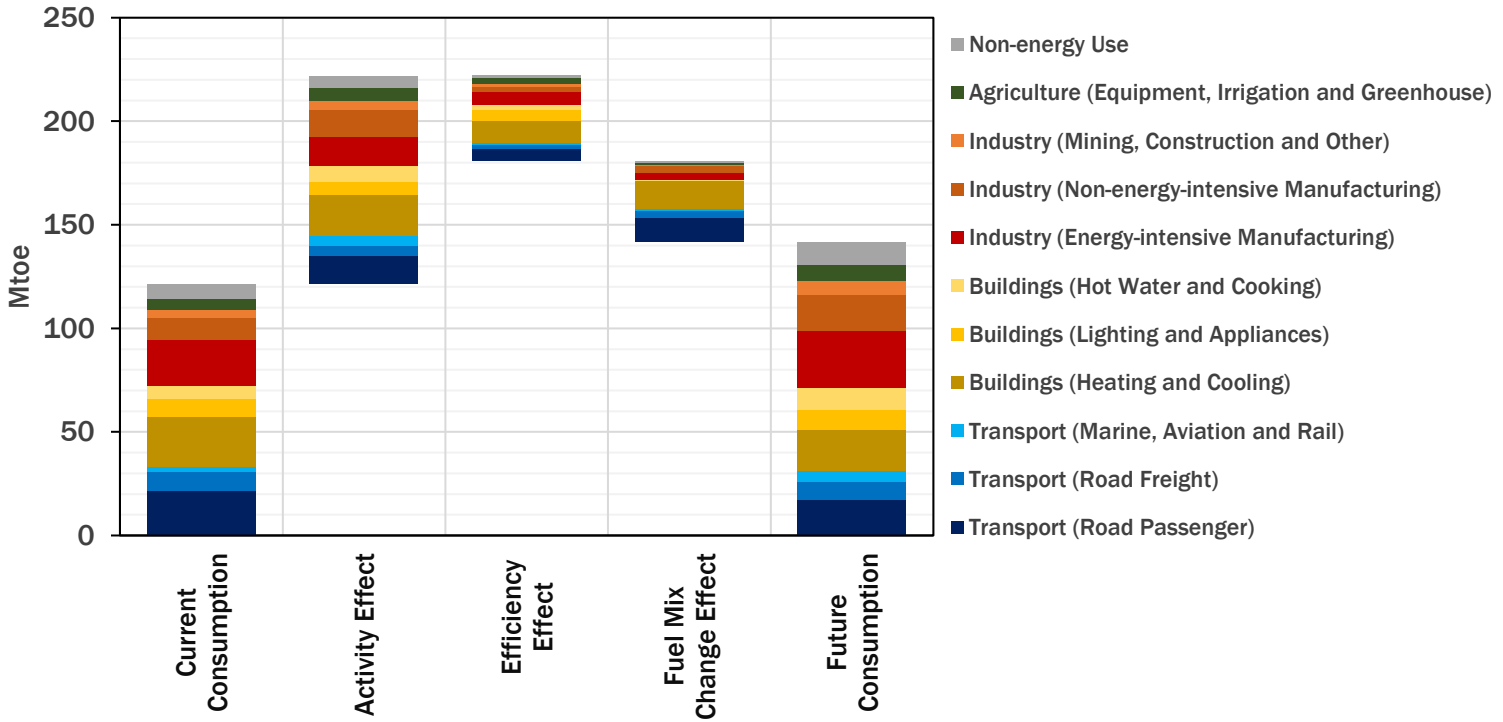
Policy actions, increased investment portfolios, awareness and behavioral changes, technological advances, faster electrification and direct renewable energy use together with efficiency-oriented market and economic developments support a more **efficient growth in energy.**

The Efficient Growth Scenario presents critical gains for more sustainable energy balances through accelerated improvements in technical efficiency and fossil fuel substitution as well as behavioral changes.

Total Saving in Final Energy Demand in the Efficient Growth Scenario Compared to the Base Scenario (2053, Mtoe/year)



Development of Final Energy Demand in the Efficient Growth Scenario (2023-2053, Mtoe)

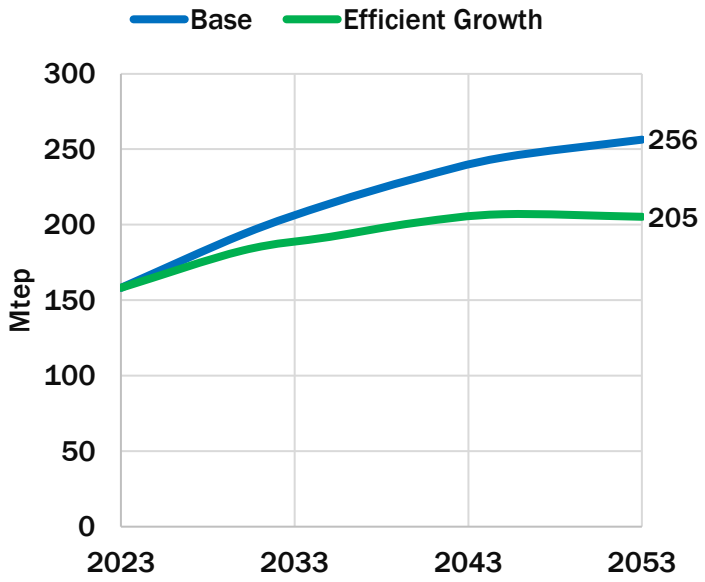


In the Efficient Growth Scenario, final energy consumption is 21% lower than the Base Scenario while behavior changes that enable efficient consumption reduce activity-related energy demand by around 10% by 2053*.

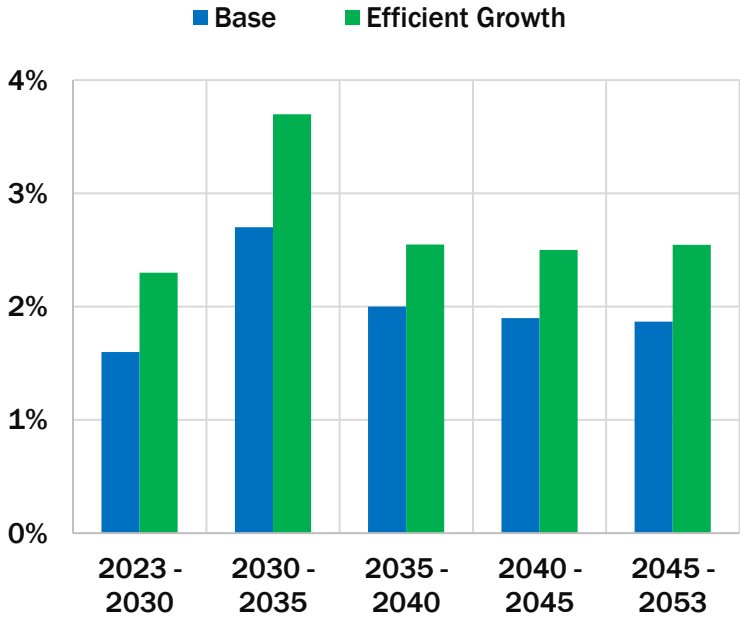
*Changes in comfort temperatures, especially in heating and cooling, fuel saving habits in driving, traffic regulations, increase in public transportation preferences.

In the Efficient Growth Scenario, primary energy consumption growth rate slows after 2045, while primary energy intensity is reduced by more than 50% until 2053.

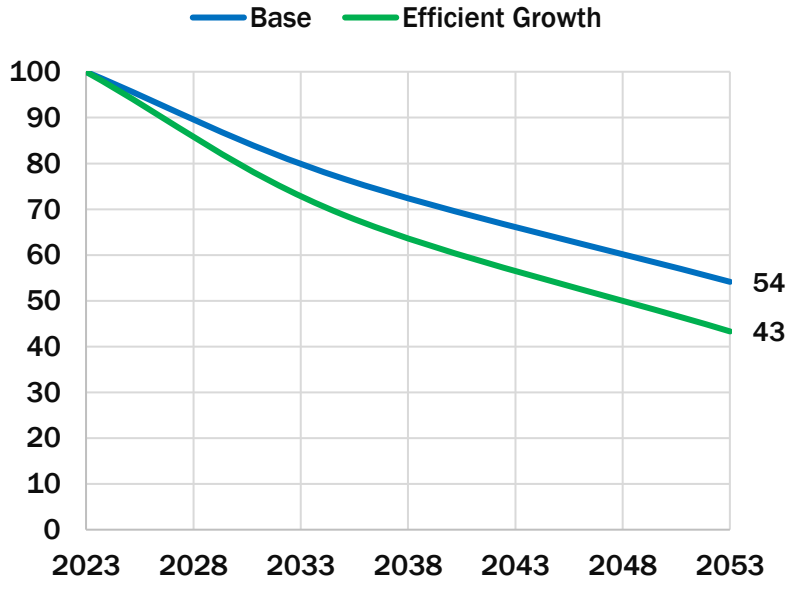
Total Primary Energy Supply (2023-2053, Mtoe)



Average Improvement in Primary Energy Intensity (2023-2053, %)



Primary Energy Intensity Development (2023=100)



The Efficient Growth Scenario can deliver the same quality, comfort and economic output with 12% less cumulative primary energy supply until 2053, which is equivalent to about five years of primary energy supply at current consumption levels.

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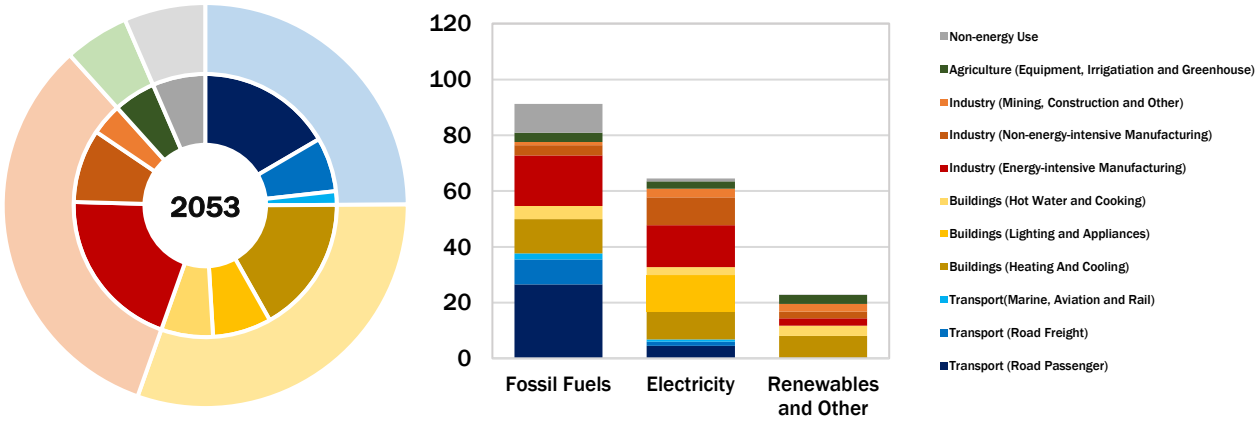
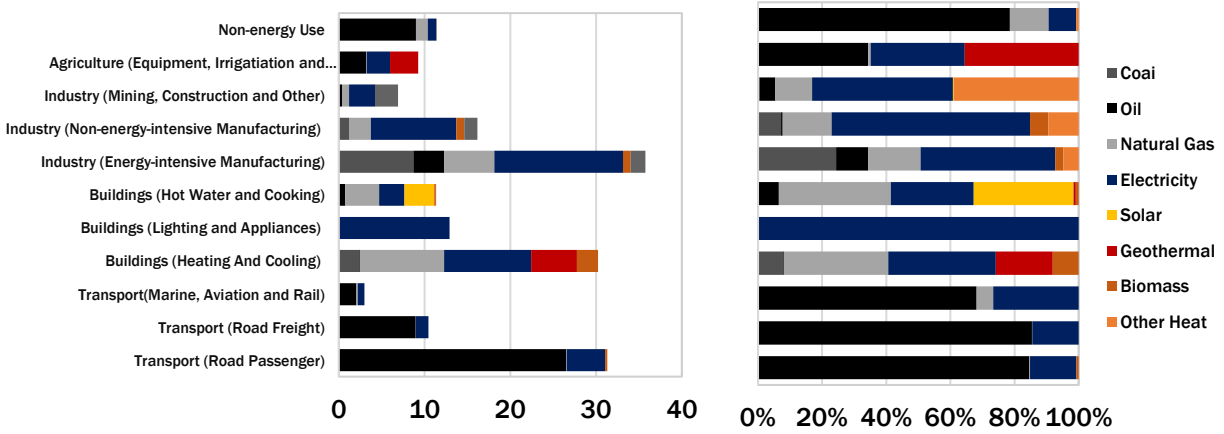
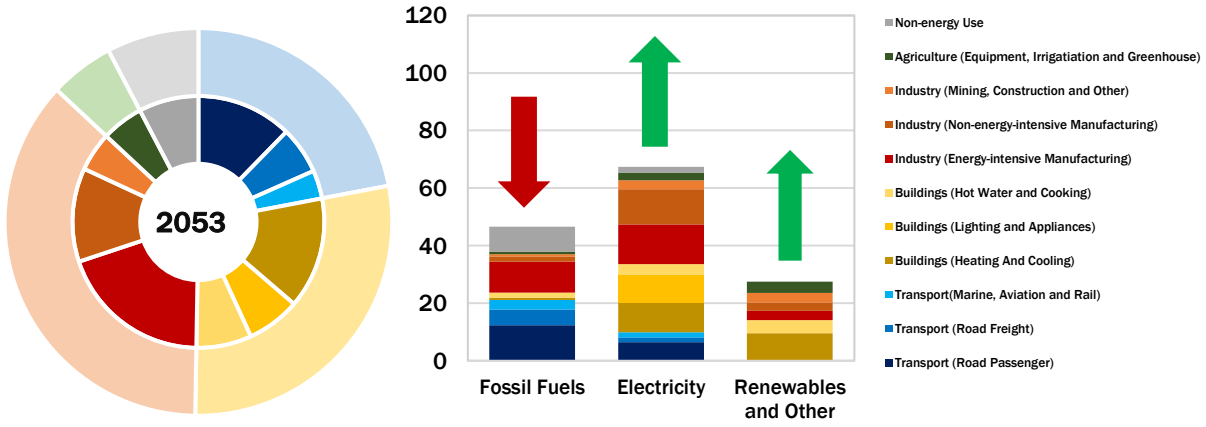
In the Efficiency Growth Scenario, final energy demand progresses towards a more secure, cleaner and sustainable future ...

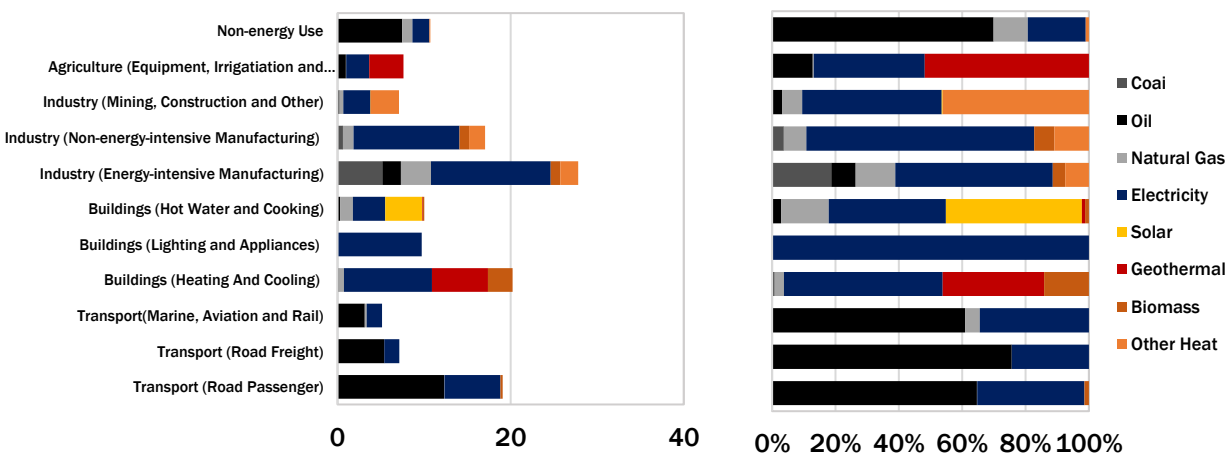
Base Scenario (Mtoe, %)





Efficient Growth Scenario (Mtoe, %)





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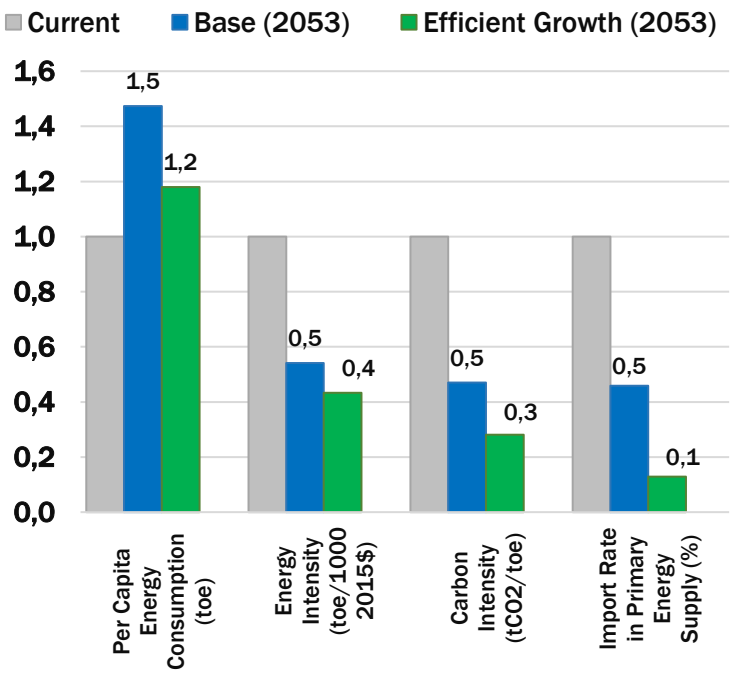
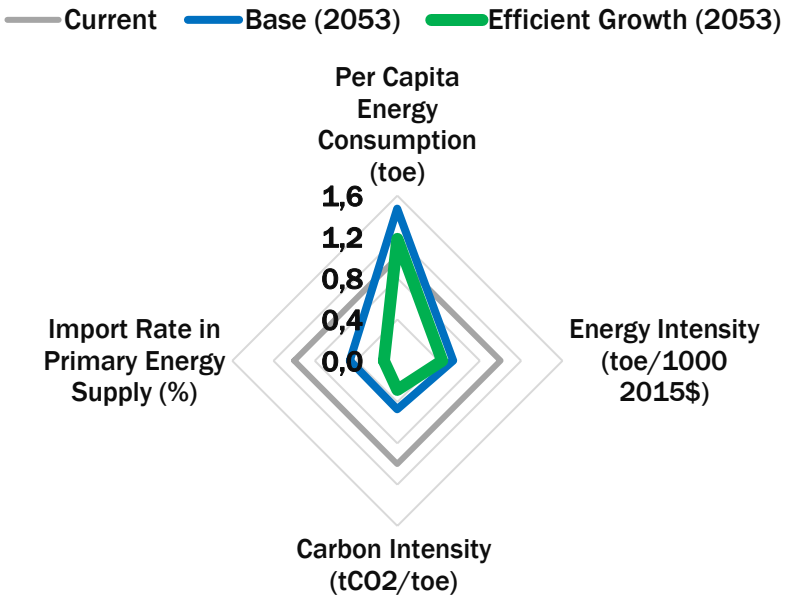
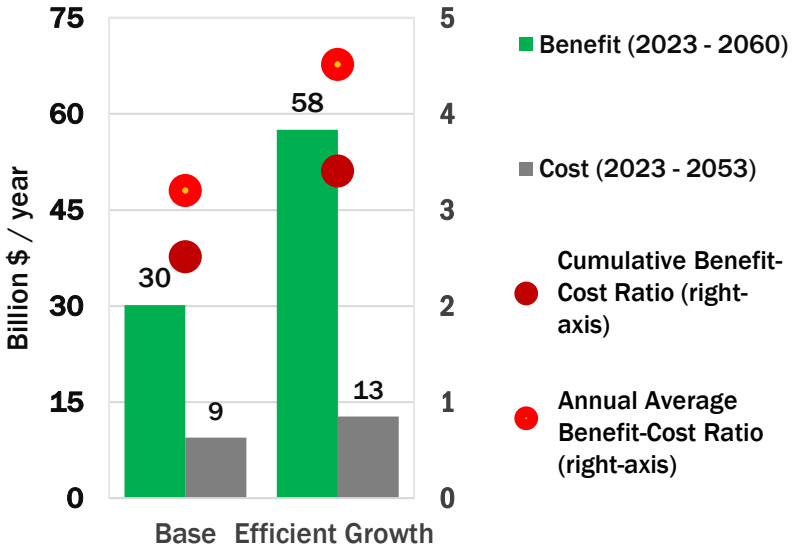
...Türkiye's energy security, energy independence and net-zero emission targets are strongly and cost-effectively supported through efficiency gains and fuel composition shifts.

Future of Energy with Critical Indicators (2024=1)





Annual Average Economic Benefit, Cost and Benefit-Cost Multipliers

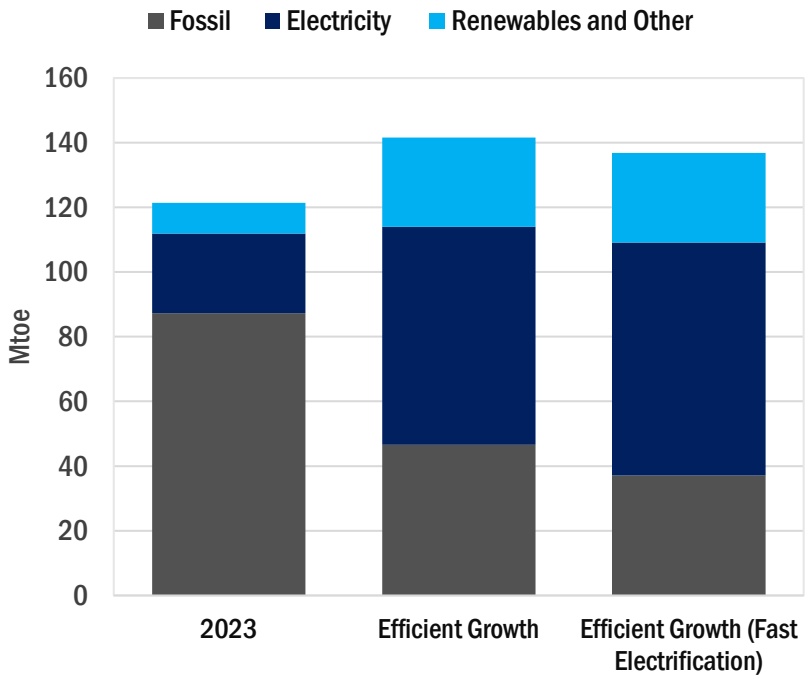


The Efficient Growth Scenario provides an average annual economic benefit-cost multiplier of 4.5; it provides an additional $28 billion/year energy import and emission savings with an additional investment of $4 billionyear compared to the Base Scenario*.

* Based on IEA APS Scenario price series

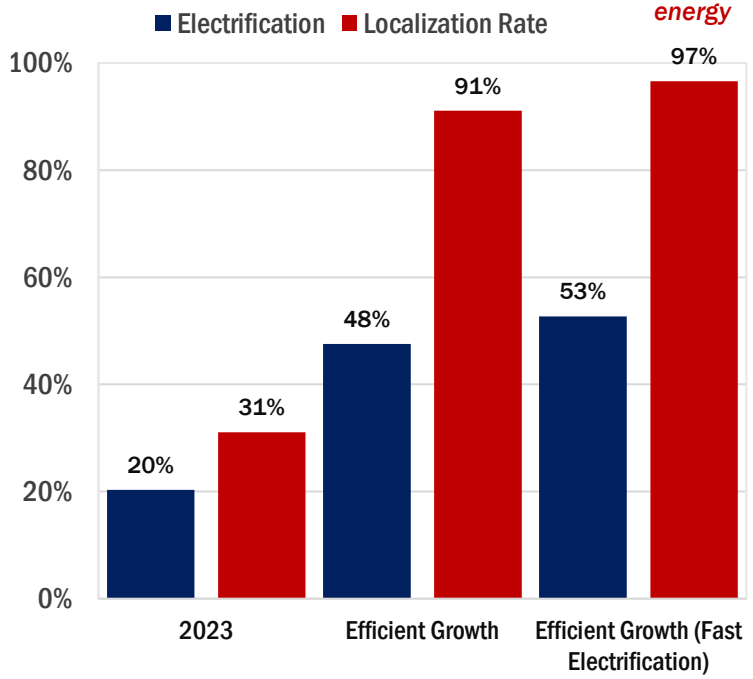
Faster growth in electrification, supported by technology and efficiency-driven business models and advanced data analytics solutions, further advances these gains.

Development of Total Final Energy Demand (2023-2053, Mtoe)

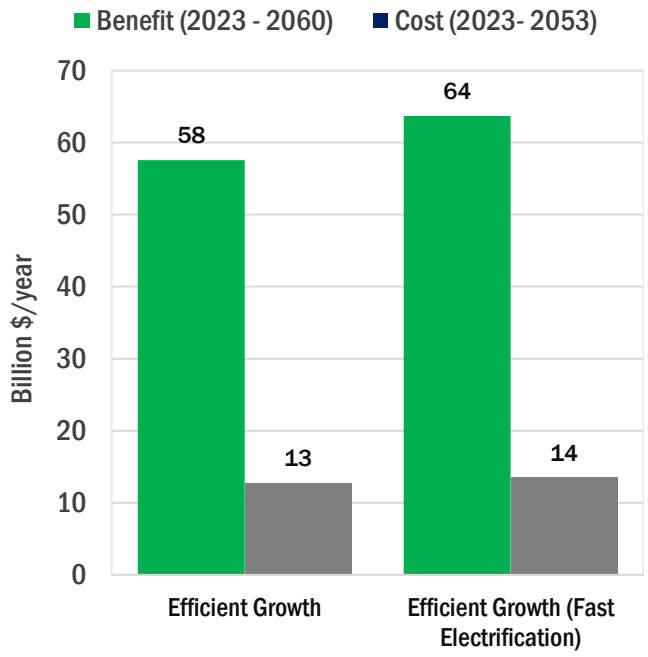


Rate of Electrification & Primary Energy Supply Localization (2023-2053,%)

Net exporter vision in energy



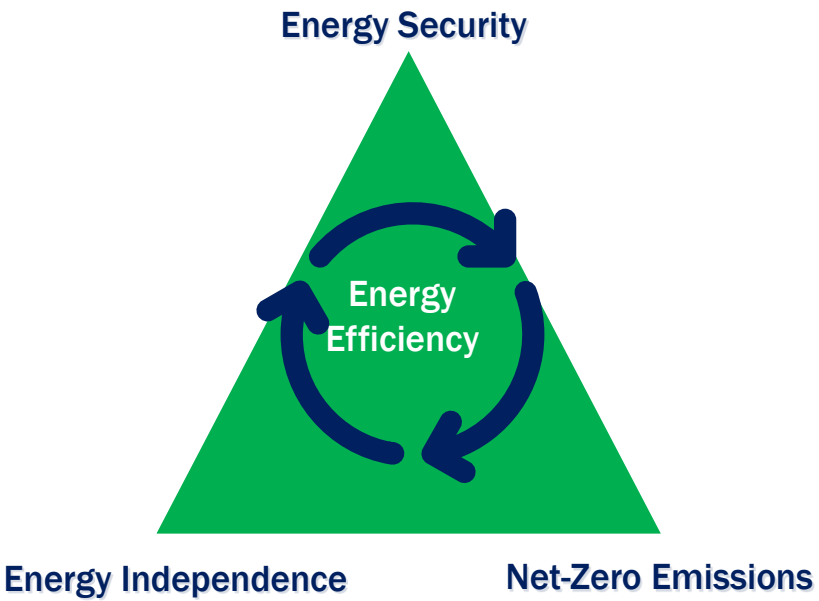
Annual Average Benefit and Cost Development (billion $/year)



An additional 5 pp increase in electrification in 2053 would increase the domestic content of primary energy by 6 pp while reducing the energy-related emissions inventory by about one-third of its current level and generating an additional $6 billion in economic benefits with an additional investment of $700 million per year*.

The current electrification rate in final energy demand of about 20% at present is 36% in the Base Case, 48% in the Efficient Growth Scenario and 53% in the Rapid Electrification Case by 2053.

TEEO offers critical development areas and opportunities to harness the potential for improved energy efficiency with multifaceted benefits.



11 Global Leadership in Energy Efficient Growth

Fuel Technology and Structure

8 Electrification & Direct Renewable Energy

9 Efficient Heat Solutions

10 Infrastructure and Structural Transformation

End-use Sectors

5 Buildings and Services

6 Transport and Mobility

7 Industry

Horizontal Topics

2 Awareness and Behavioral Changes

3 Investment & Finance

4 Measuring, Monitoring, Data & Digitalization

Policy Objectives and Roadmaps 1

1. Implementing energy efficiency policies, strategies, and roadmaps in line with strong demand dynamics to support energy security, energy independence, and energy transition objectives,
2. Raising awareness and promoting behavioral change to encourage more efficient energy use while fostering competitive and efficient energy markets, addressing social dimensions, and ensuring access to modern energy,
3. Strengthening stakeholder collaboration to develop and implement innovative financing mechanisms and business models that diversify and expand the investment portfolio,
4. Enhancing monitoring and measurement systems by leveraging data analytics, digitalization, and artificial intelligence to advance energy efficiency improvements,
5. Developing a comprehensive building stock inventory and implementing a transformation program with a roadmap to improve energy efficiency performance, especially in old residential buildings,
6. Maximizing fuel and energy efficiency in passenger and freight transportation through electric mobility, fleet renewal, intermodal shifts, micro-mobility, and integrated transport solutions,
7. Expanding support for energy efficiency improvements to enhance competitiveness and value-added industries while promoting benchmarking studies, best practices, and advanced technologies,
8. Accelerating the adoption of clean electrification and geothermal and solar heating to maximize technical energy efficiency and carbon reduction benefits,
9. Establishing an effective heat market by promoting district heating and cooling systems, particularly those utilizing domestic and renewable resources, waste heat, and heat pump technologies for better management of heating and cooling energy demand,
10. Integrating energy and resource efficiency into long-term urban and transportation infrastructure plans, industrial transformations, and sustainable agriculture and food supply strategies,
11. Achieving an exemplary global leadership in energy efficiency by continuously advancing energy efficiency-focused policies and strategies.

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Implementing energy efficiency policies, strategies, and roadmaps in line with strong demand dynamics to support energy security, energy independence, and energy transition objectives

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Raising awareness and promoting behavioral change to encourage more efficient energy use while fostering competitive and efficient energy markets, addressing social dimensions, and ensuring access to modern energy

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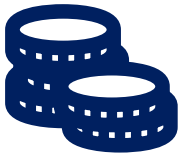

Strengthening stakeholder collaboration to develop and implement innovative financing mechanisms and business models that diversify and expand the investment portfolio

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Enhancing monitoring and measurement systems by leveraging data analytics, digitalization, and artificial intelligence to advance energy efficiency improvements

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Developing a comprehensive building stock inventory and implementing a transformation program with a roadmap to improve energy efficiency performance, especially in old residential buildings

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Maximizing fuel and energy efficiency in passenger and freight transportation through electric mobility, fleet renewal, intermodal shifts, micro-mobility, and integrated transport solutions

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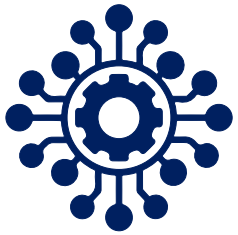

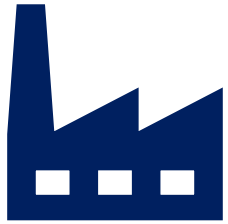

Expanding support for energy efficiency improvements to enhance competitiveness and value-added industries while promoting benchmarking studies, best practices, and advanced technologies

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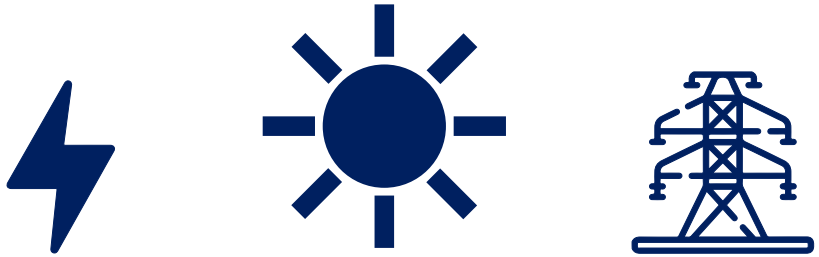

Accelerating the adoption of clean electrification and geothermal and solar heating to maximize technical energy efficiency and carbon reduction benefits

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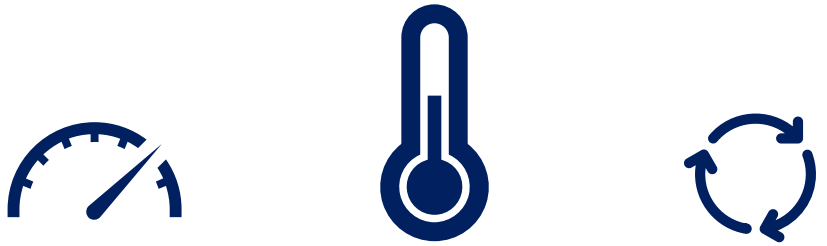

Establishing an effective heat market by promoting district heating and cooling systems, particularly those utilizing domestic and renewable resources, waste heat, and heat pump technologies for better management of heating and cooling energy demand

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Integrating energy and resource efficiency into long-term urban and transportation infrastructure plans, industrial transformations, and sustainable agriculture and food supply strategies

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Achieving an exemplary global leadership in energy efficiency by continuously advancing energy efficiency-focused policies and strategies

1. Implementing energy efficiency policies, strategies, and roadmaps in line with strong demand dynamics to support energy security, energy independence, and energy transition objectives,
2. Raising awareness and promoting behavioral change to encourage more efficient energy use while fostering competitive and efficient energy markets, addressing social dimensions, and ensuring access to modern energy,
3. Strengthening stakeholder collaboration to develop and implement innovative financing mechanisms and business models that diversify and expand the investment portfolio,
4. Enhancing monitoring and measurement systems by leveraging data analytics, digitalization, and artificial intelligence to advance energy efficiency improvements,
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THANK YOU

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