# Physical Energy Flow Accounts in TurkStat

Workshop on Energy Statistics, Balances and Accounts for Informed Energy and Climate Policies

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# Overview

- ✓ Achievements so far
- ✓ The Main Data Sources
- ✓ Calculations for spesific domains
- ✓ Improvements - Challenges so far
- ✓ Areas for Improvement
- ✓ Results (users, policy makers etc.)

# Achievements So Far

- Results of PEFA published for the first time for Turkiye (2017-2021).
- All data transmitted to Eurostat and published in Eurobase .
- 2022 will be published on 12/12/2024.
- Annually publishment will be continued.
- https://data.tuik.gov.tr/Bulten/Index?p=Energy-Accounts-2021-49751&dil=2

# The Main Data Sources (PEFA questionnaire

- Table A - Physical supply table for energy flows
- Table B - Physical use table for energy flows
  - Table B.1 - Transformation use of energy flows
  - Table B.2 - End use of energy flows (including non-energy use)
- Table C - Physical use table of emission-relevant use of energy flows (related to fuel combustion)
- Table D - Vectors of key energy indicators
- Table E - Bridge table

# The Main Data Sources

- Energy Balance Tables
- 5 Joint Annual Questionnaires
- Other data sources:
  - Electricity Consumption Data from Administrative Registers of TEDAS
  - Consumption Data Gathered from Natural Gas Distribution Companies
  - Electricity production data for autoproducer assignment
  - Vehicle-Stock Data and Vehicle-Km Data
  - Sectoral Energy Consumption Surveys
  - Final Energy Consumption in Households Survey
  - Foreign Trade data (residence principle)

# The Main Data Sources Energy Balance Tables

## Energy Balance Tables

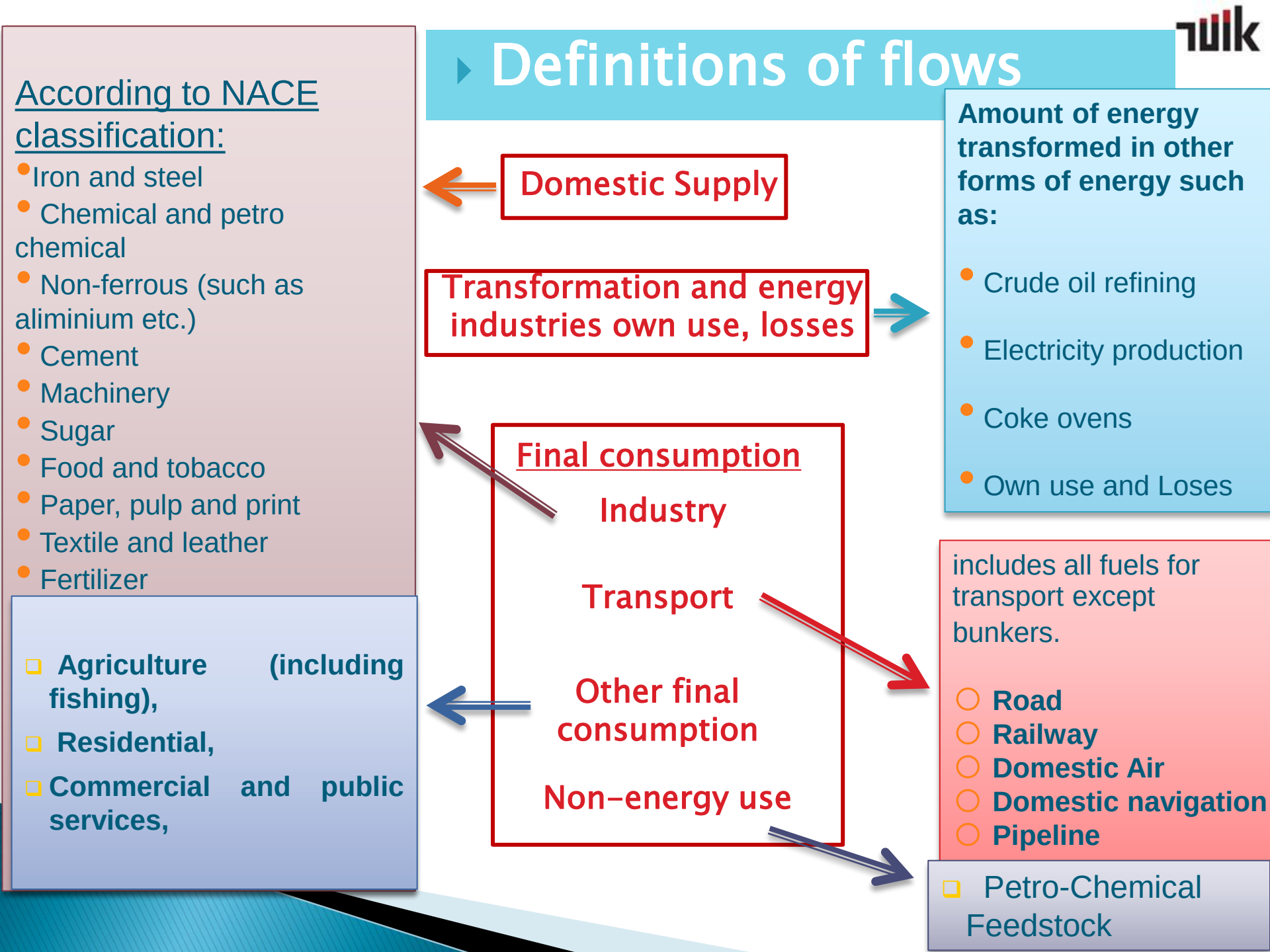
- Prepared, revised and disseminated by MENR (annually in November)
- Data have been widely used in Türkiye and also used as a basis for IEA/EUROSTAT/UNECE annual questionnaires
- It includes supply, transformation, consumption for sectors (industry, household, transportation etc.)

# NATIONAL ENERGY BALANCE TABLE - 2020 DATA

(Kilotonnes of oil equivalent)

| ENERGY SUPPLY DISTRIBUTION | Hard coal | Lignite | Asphaltite | Coke oven coke | Blast Furnace gas | Coke oven gas | Steelworks gas | Coal tar | Crude oil | Petroleum coke | Fuel Oil | Diesel oil | Gasoline | LPG | Rafinery fuel gas | Aviation fuel | Kerosene (Gas oil) | Naphta |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domestic Production (+) | 634 | 14,148 | 938 | | | | | | 3,363 | | | | | | | | | |
| Imports (+) | 24,962 | | | 432 | | | | 9 | 30,838 | 2,441 | 1,943 | 9,151 | | 3,395 | | 135 | | 565 |
| Exports (-) | 86 | 1 | | 2 | | | | 134 | | 10 | 133 | 2,711 | 1,998 | 134 | | 638 | | 82 |
| Bunkers (-) | | | | | | | | | | | 271 | 282 | | | | 1,952 | | |
| Stok Changes (+/-) | -61 | -285 | 41 | | | | | 20 | 192 | 79 | -119 | -140 | 19 | 79 | -1 | 66 | 2 | 4 |
| *ENERGY PRODUCTS SUPPLY* | **25,449** | **13,863** | **979** | **430** | **0** | **0** | **0** | **-105** | **34,393** | **2,510** | **1,421** | **6,018** | **-1,979** | **3,340** | **-1** | **-2,389** | **2** | **487** |
| *Statistical Difference (+/-)-* | **71** | **168** | **-1** | **113** | **0** | **0** | **0** | **16** | **0** | **435** | **-205** | **0** | **0** | **65** | **0** | **0** | **0** | **21** |
| TRANSFORMATION AND ENERGY SECTOR | **-18,017** | **-10,125** | **-609** | **2,715** | **109** | **350** | **41** | **136** | **-34,393** | **1,182** | **-1,467** | **17,428** | **4,402** | **1,097** | **1** | **3,111** | **7** | **1,616** |
| Electricity and heat production[4] | -13,274 | -9,845 | -609 | | -411 | -227 | -74 | | | | -110 | -9 | | | | | | |
| Power plants | -11,978 | -9,760 | -609 | | | | | | | | -6 | -9 | | | | | | |
| Autoproducers | -1,296 | -85 | | | -411 | -227 | -74 | | | | -104 | | | | | | | |
| Heat production[6] | -326 | -269 | | | -84 | -34 | -43 | | | | -63 | | | | | | | |
| Coke Ovens | -4,209 | | | 2,715 | | 867 | | 136 | | | | | | | | | | |
| Blast Furnaces | | | | | 1,242 | | 187 | | | | | | | | | | | |
| Petroleum Refineries | | | | | | | | | -34,034 | 1,182 | 437 | 17,563 | 4,457 | 1,097 | 1,304 | 3,111 | 7 | 1,616 |
| Internal Consumption and Losses | -207 | -11 | | | -638 | -257 | -29 | | -358 | | -1,730 | -127 | -55 | | -1,303 | | | |
| | | | | 113 | | | | | | | | | | | | | | |
| *TOTAL FINAL ENERGY CONSUMPTION* | **7,432** | **3,738** | **370** | **3,145** | **109** | **350** | **41** | **32** | **0** | **3,692** | **-46** | **23,447** | **2,423** | **4,437** | **0** | **722** | **9** | **2,103** |
| *SECTORS TOTAL* | **7,361** | **3,570** | **371** | **3,031** | **109** | **350** | **41** | **16** | **0** | **3,257** | **159** | **23,447** | **2,423** | **4,372** | **0** | **722** | **9** | **2,082** |
| INDUSTRY CONSUMPTION | **3,972** | **1,860** | **256** | **3,031** | **109** | **350** | **41** | **16** | **0** | **3,257** | **23** | **288** | **4** | **96** | **0** | **0** | **0** | **0** |
| Mining Activities(07,08,09) | 0 | 1 | | | | | | | | 15 | 0 | 93 | 0 | 0 | | | | |
| Manufacture of food, beverages, tobacco products(10,11,12) | 287 | 381 | | 33 | | | | | | 6 | 5 | 12 | 2 | 1 | | | | |
| Manufacture of food products(10) | 287 | 367 | | 0 | | | | | | 6 | 3 | 11 | 0 | 0 | | | | |
| Manufacture of beverages(11) | | | | | | | | | | | 0 | 1 | 0 | 1 | | | | |

# Definitions of flows



# The Main Data Sources - 5 JAQs

**Joint Annual Questionnaires**

- Annual coal questionnaire
- Annual oil questionnaire
- Annual gas questionnaire
- Annual electricity & heat questionnaire
- Annual renewables & wastes questionnaire

- In PEFA, they are mainly used for some product and flow details that are not available in energy balance sheets

# The Main Data Sources – Other

- To allocate electricy supply and use to the related NACE industries;
  - We use energy balance table for the use of electricy in agriculture, transport and industry sectors,
  - We use administrative registers of Turkish Electricity Distribution Company for the use of electricity in trade, services and public sector.

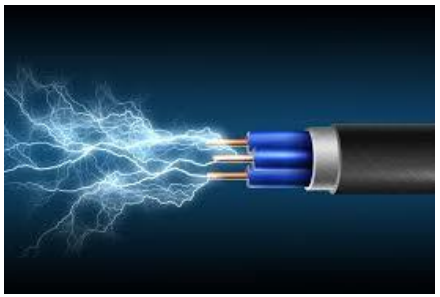
# Calculations- Autoproducer Assignment

- All the data regarding electricity production by MA electricity plants and autoproducers are kept by state owned Turkish Electricity Transmission Company.
- For the ones using non-renewable fuels, they are completely NACE based in 4 digit level. The NACE codes are checked and attributed to the newly opened plants.
- For plants fuelled with renewable energy, the records depend mainly upon the declarations of electricity transmission companies who sell electricity to those plants.

# Calculations- Autoproducer Assignment

## Results for 2021

- Renewables: Almost 14% of production is distributed (instead of NACE D)
- Non-renewables: Almost 11% of production is distributed (instead of NACE D)
- Non-licensed production is increasing



# Calculations- Natural Gas

- To allocate natural gas supply and use to the related NACE industries;
  - We use energy balance table for the use of electricy in agriculture, transport and industry sectors,
  - We use consumption data gathered from Natural Gas Distribution Companies for the use of natural gas in trade, services and public sector.

# Calculations - Transport Fuels

- We get the vehicle stock of the country for the previous year from the related ministry.
- Additionally, we receive vehicle-km administrative data that matches with every single vehicle and annually updated.
- By using those two main data sources we produce vehicle-km statistics annually in our transport unit in the Office.

# Calculations - Transport Fuels

- We simply bring together;
  - vehicles,
  - vehicle-km data
  - consumption factors

to reach fuel consumption.

- In PEFA, we additionally matches the vehicles through ownership info with our business registers in order to get the related NACE codes.

# Calculations – Statistical Difference

- There is an other industry data in balance tables but there is no other industry in PEFA.
- Direct usage, brings very high statistical difference in some of products (especially in heat (P27).
- Other industry data was distributed by using moving average by using the average of the other sectors for the latest 5 years.
- In 2023, we know where to address it directly.

# Calculations – Residence principle

| No | Headline | Content | Data source for TR |
|---|---|---|---|
| 1 | **Energy use by resident units (domestic energy use) – residence principle** | This value is automatically sourced from Table D. | *PEFA results* |
| 2 | **(−) Energy use by resident units, fuel purchased abroad – total** | | |
| 2.1 | Energy use by resident units, fuel purchased abroad – fishing vessels | - | |
| 2.2 | Energy use by resident units, fuel purchased abroad – land transport | fuel bunkered abroad by resident operators | *Energy balance table* |
| 2.3 | Energy use by resident units, fuel purchased abroad – water transport | fuel bunkered abroad by resident operators | *Energy balance table* |
| 2.4 | Energy use by resident units, fuel purchased abroad – air transport | fuel bunkered abroad by resident operators (imports) | *Energy balance table* |
| 3 | **(+) Energy use by non-resident units (only if included in gross inland energy consumption), fuel purchased on the territory – total** | | |
| 3.1 | Energy use by non-resident units (only if included in gross inland energy consumption), fuel purchased on the territory – land transport | Fuel purchased by non-resident units on the territory for undertaking land transport. | *Vehicle - km data of transpoartation* |
| 3.2 | Energy use by non-resident units (only if included in gross inland energy consumption), fuel purchased on the territory – water transport | Fuel bunkered on the territory by non-resident units for undertaking domestic navigation | *Foreign Trade Data* |
| 3.3 | Energy use by non-resident units (only if included in gross inland energy consumption), fuel purchased on the territory – air transport | Fuel bunkered by non-resident units on the territory for undertaking domestic and international aviation. | *Foreign Trade Data (Kerosenes and jet fuels sold by resident to non-residents)* |
| 4 | **(+) Other adjustments and statistical differences** | | |
| *4.m* | *of which (memo): energy flows not reported in energy statistics but included in PEFA (bridging item 1)* | | |
| 5 | **(=) Gross inland consumption - territory principle** | Gross inland consumption (GIC) as compiled and published by Eurostat (internationally harmonised). | *Eurostat database* |

# Improvements So Far

- Industry Detailing – Allocation of the energy use to the A64 Industry Classification
  - Electricity
  - Natural Gas
- Allocation of Road Transport Energy Use
- Autoproducer assignment
- Minimising statistical differences
- Residence principle

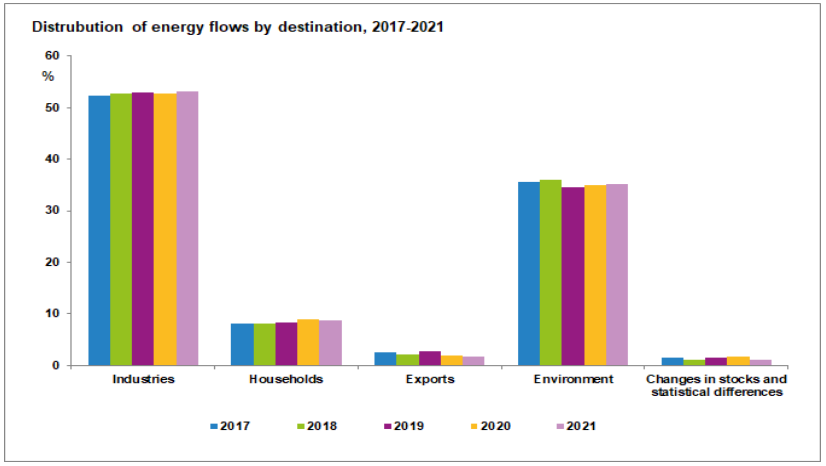
# Challenges So Far

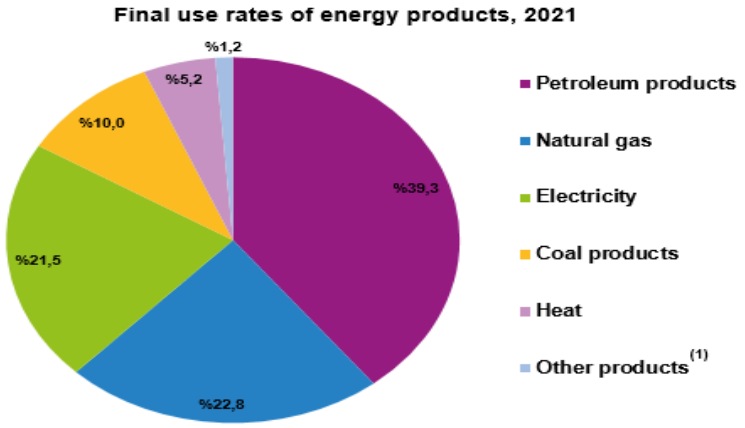
- Consistency of Data Between Energy Balance and 5 JAQs
  - Non-Energy Use
  - Other Petroleum Products, etc.
- The Problem of 'Other Industry' for Some Specific Energy Commodities

# Areas For Improvement

- Documentation of the methodology and metadata
- Automization of all calculations
- Integrating new surveys and data sources that provide more robust and detailed data

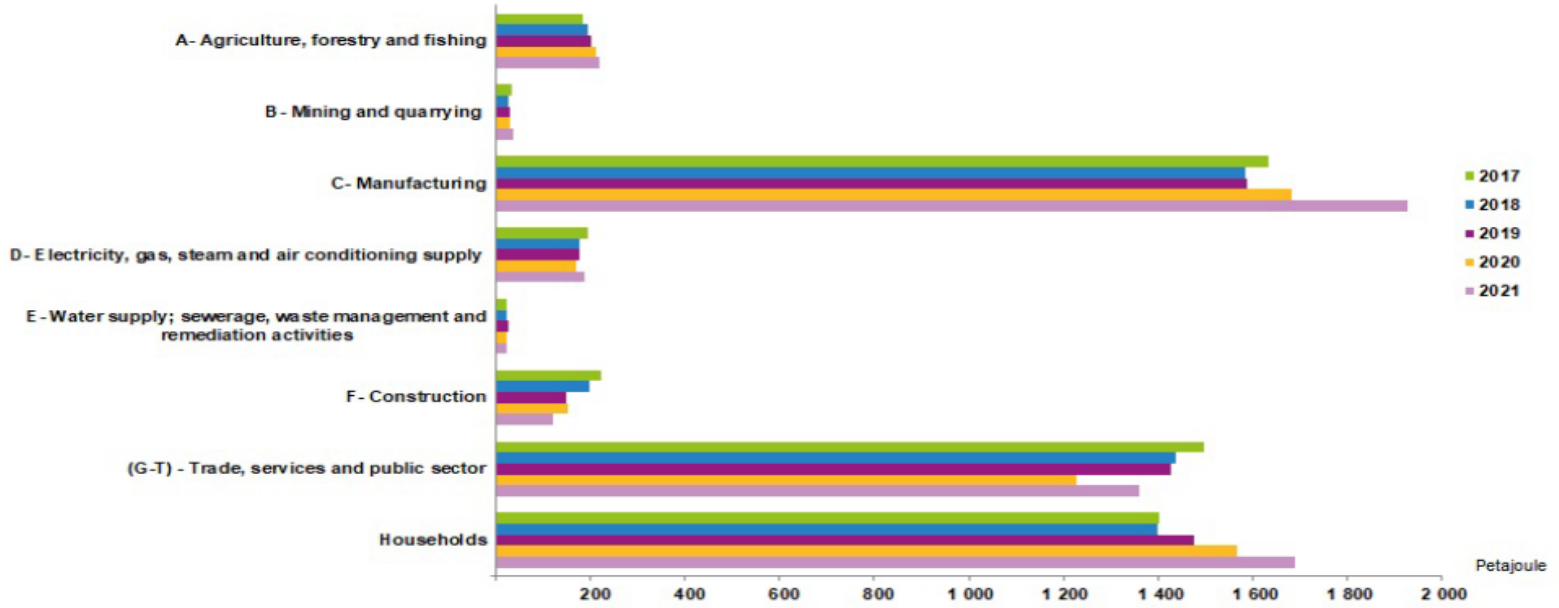
# Results (News release)



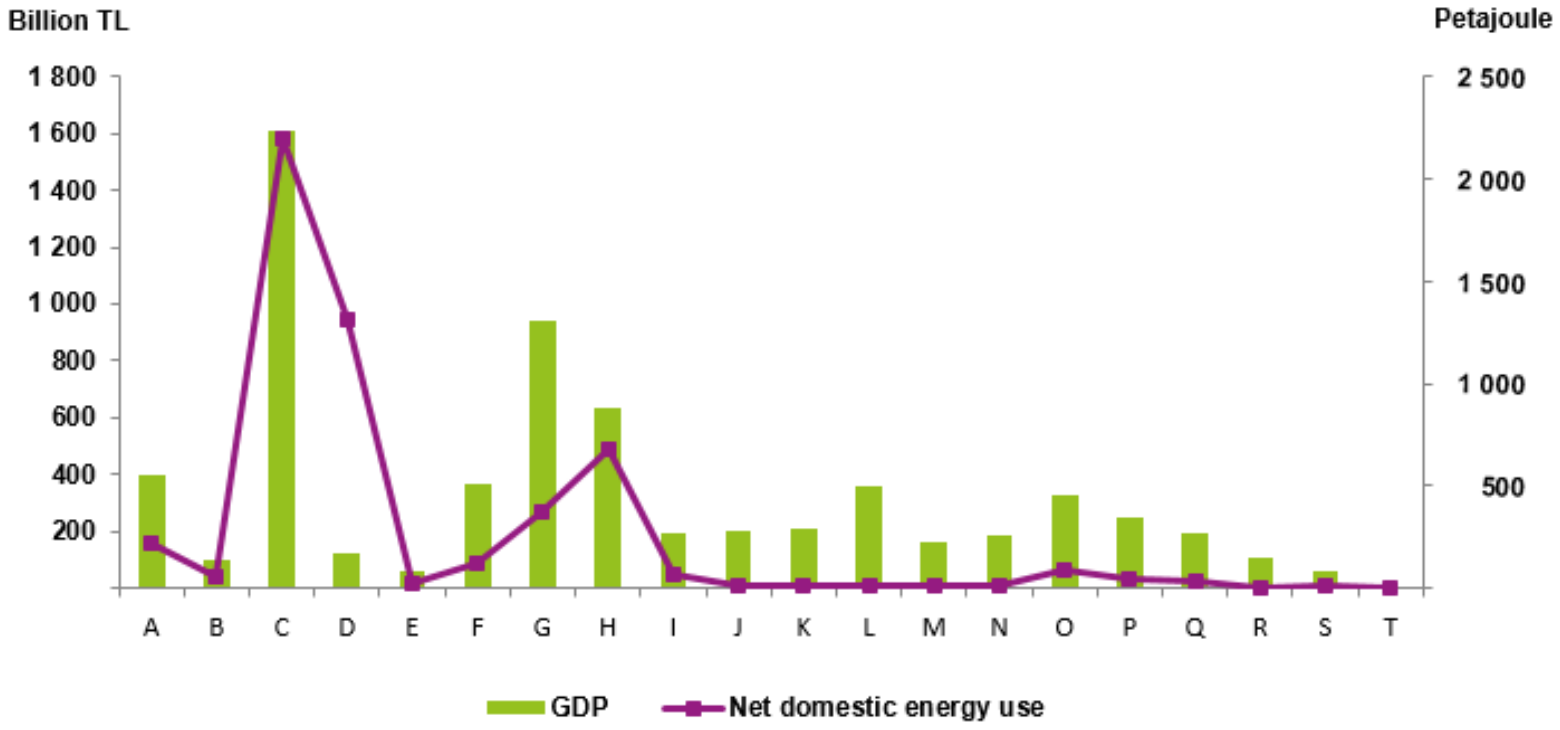

(1) Fuel wood, wood waste, other biomass, charcoal, liquid biofuels and biogas are included.

**Final use of energy by economic activities and households, 2017-2021**



# Results (Reports, policy makers, users etc.)

Net domestic energy use by economic activities, Türkiye, 2021



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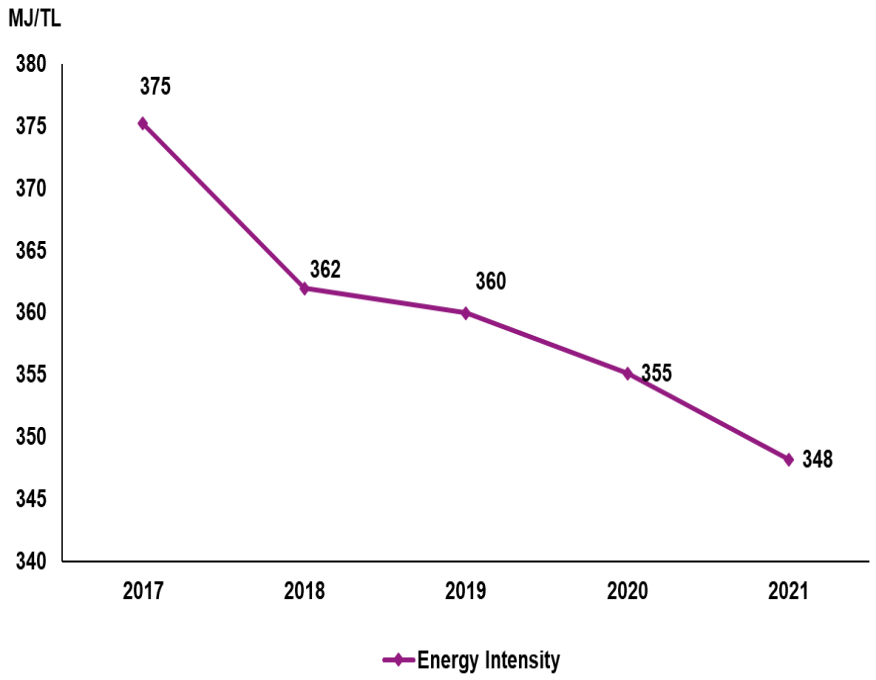


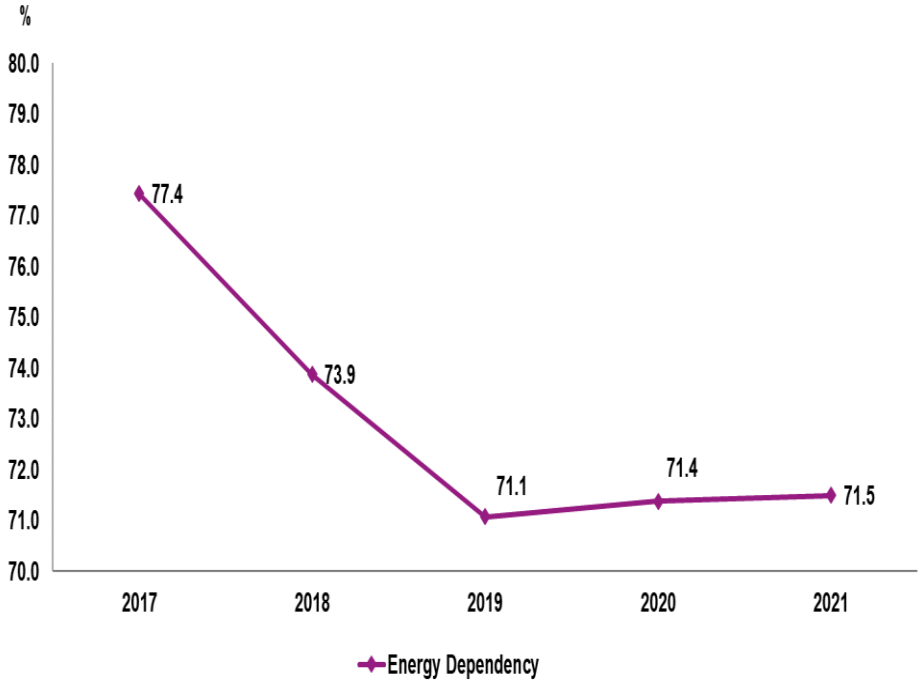

# Thank you for your attention!