

Results and key findings

SDG 7 Roadmap for Armenia

NEXSTEP

National Expert SDG Tool for Energy Planning

Second National Stakeholder Consultation Workshop and Capacity Building on the National Expert SDG Tool for Energy Planning (NEXSTEP) for the SDG 7 Roadmap for Armenia

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13 May 2024



Objective of this Presentation

Provide:

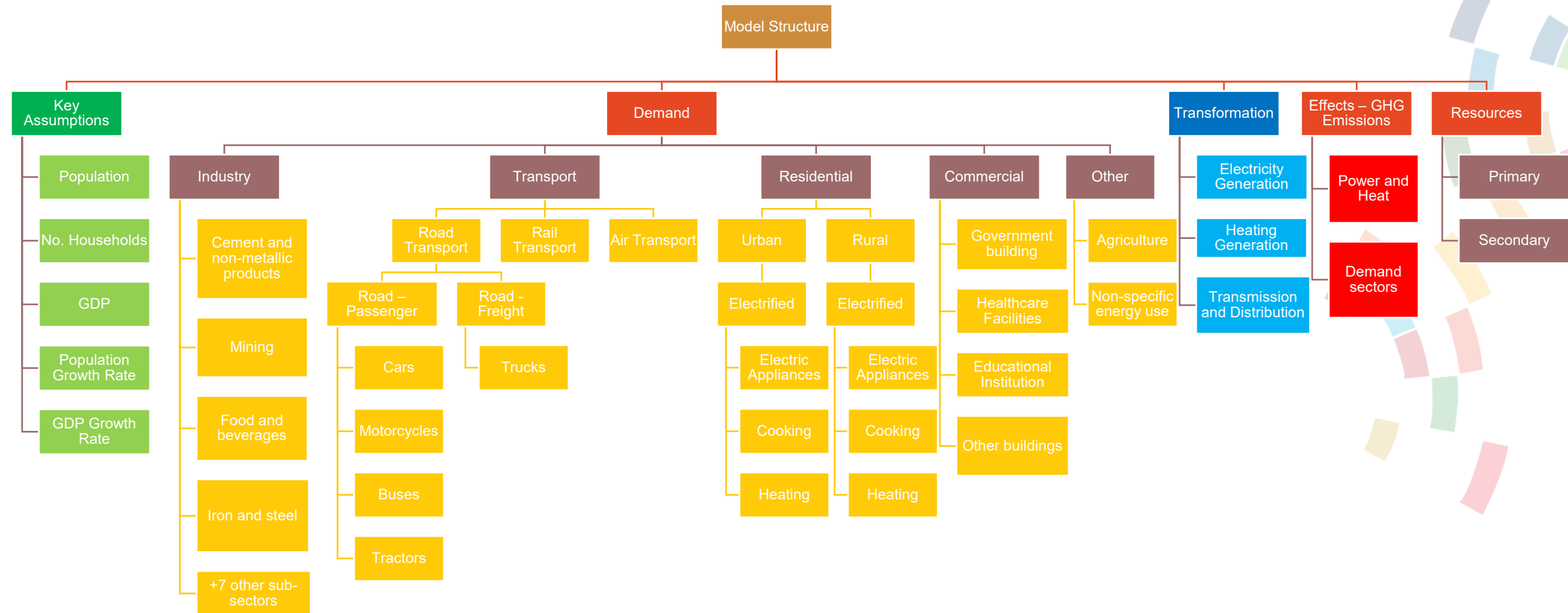
- Brief introduction to the modelling methodology
- Current energy situation (2021)
- Highlights of energy transition pathways (scenarios)

Invite stakeholders' feedback:

- Modelling data and assumptions used
- Proposed energy transition interventions



Scenario Development Process in LEAP



Data Collection – bottom-up approach

Residential

- Cooking distribution and intensity data
- Appliance ownership consumption intensity
- Heating distribution and intensity data

Industry

- Fuel consumption data (i.e. electricity, oil products)

Transport

- Vehicle statistics (i.e. number of vehicles by fuel type)
- Annual travelled mileage, passenger load factor, fuel economy

Commercial

- Floorspace data
- Electricity and fuel consumption intensity (kWh/m²)

Power

- Existing capacity and generation
- Planned power capacity expansion

Data Sources

- Governmental reports/surveys
- Governmental databases
- International organisation databases
- Benchmarking
- Research papers etc.

Current situation of the energy sector

Base year 2021



Energy Situation in 2021

Armenia's 2021 status for the **SDG 7** indicators and GHG emissions



ACCESS TO MODERN ENERGY

100%

Population with access to electricity in **2021**

98.6%

Population with access to clean cooking in **2021**



RENEWABLE ENERGY

6% of TFEC

Excluding traditional biomass usage in residential cooking and heating



ENERGY EFFICIENCY

4.0 MJ/USD

Primary energy intensity measured in terms of primary energy and GDP (PPP, 2017)



GHG EMISSIONS

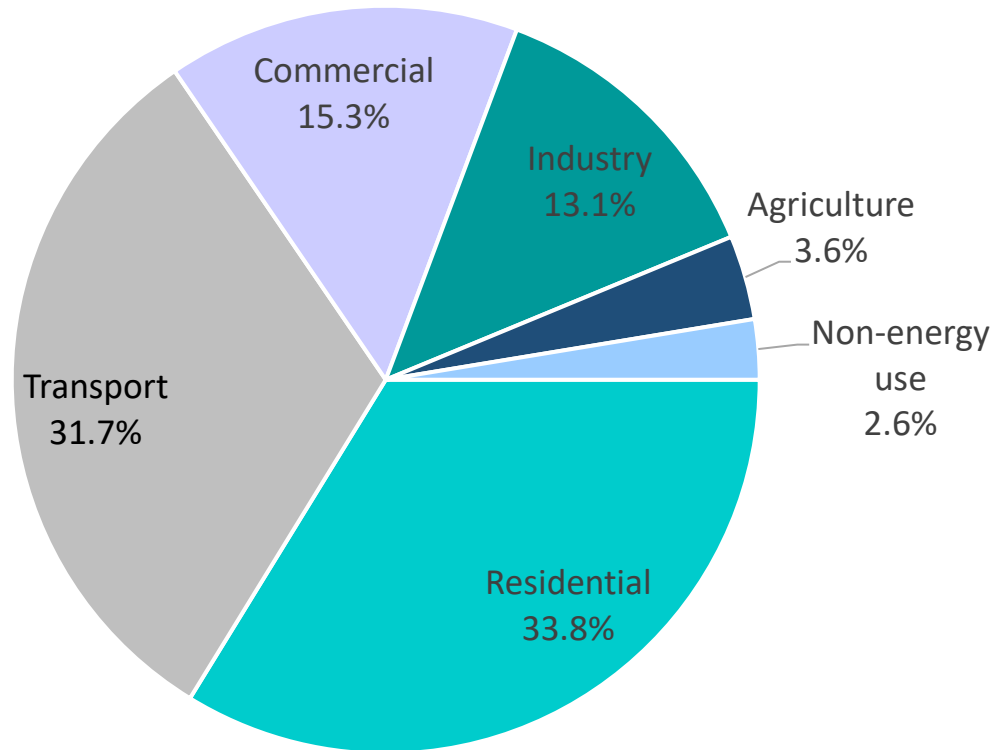
6.9 MtCO₂-e

Considering the energy sector only

TFEC and TPES, 2021

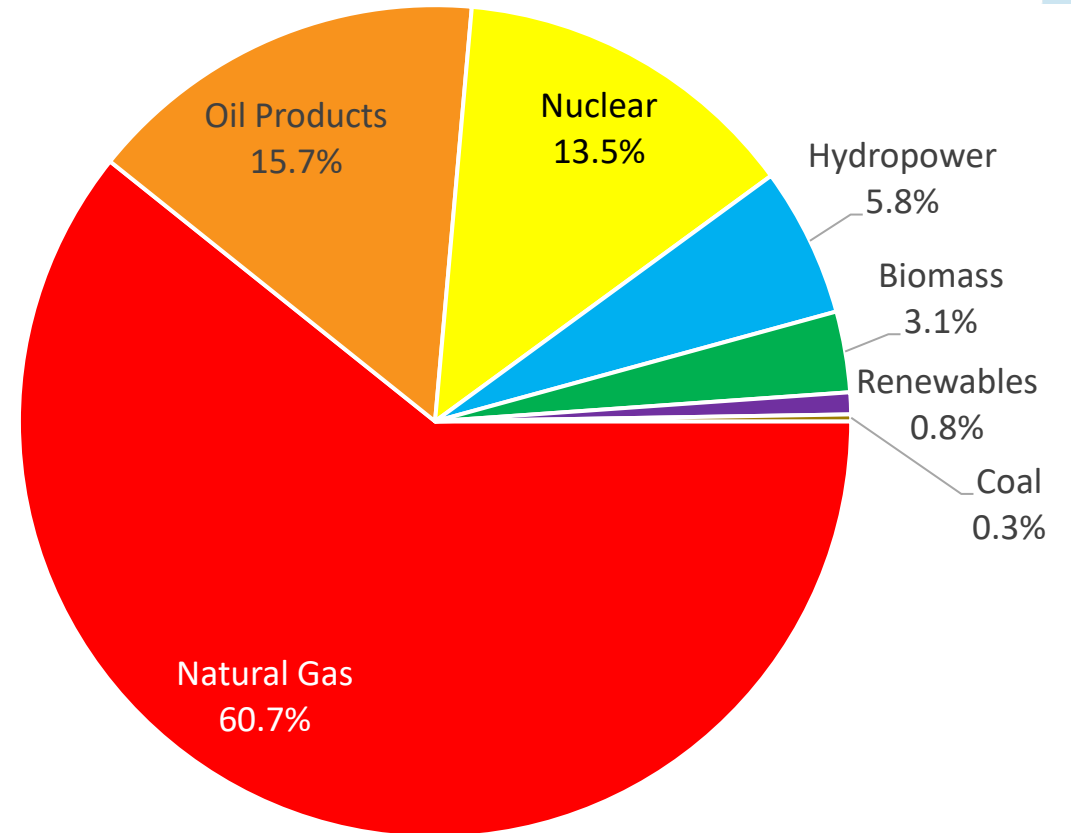
Total final energy consumption (TFEC) in 2021 by Sector

2.84 Mtoe



Total primary energy supply (TPES) in 2021 by Fuel

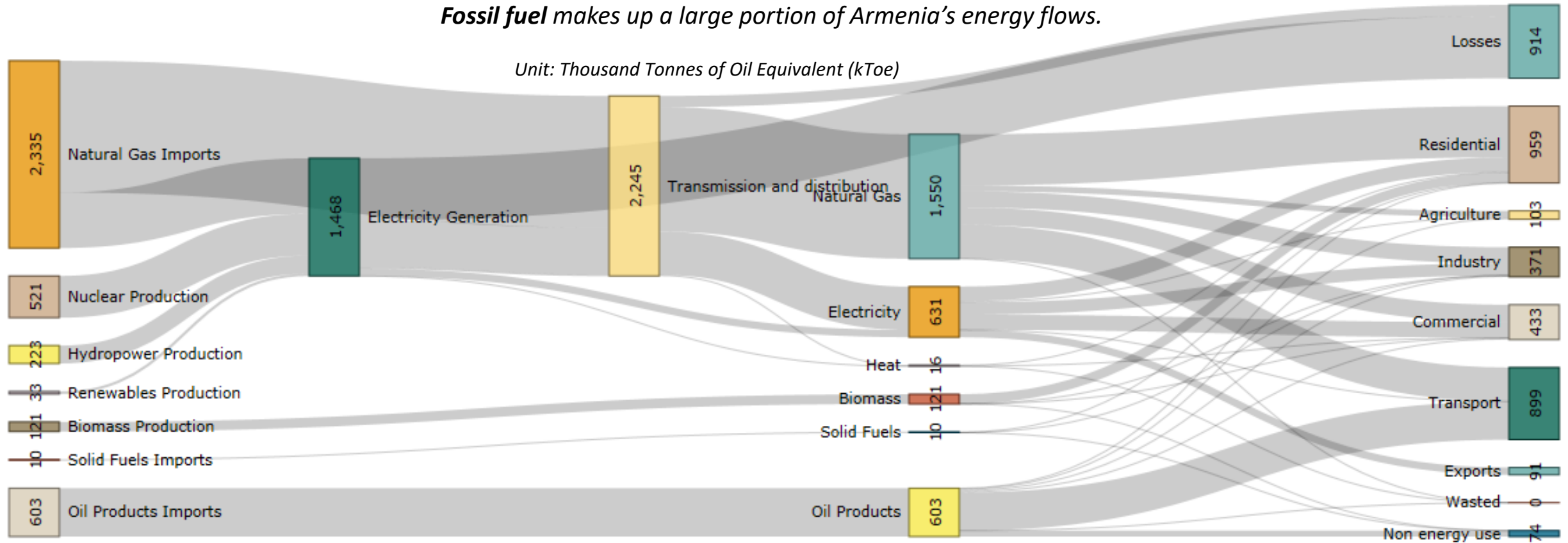
3.75 Mtoe



Energy Balance 2021

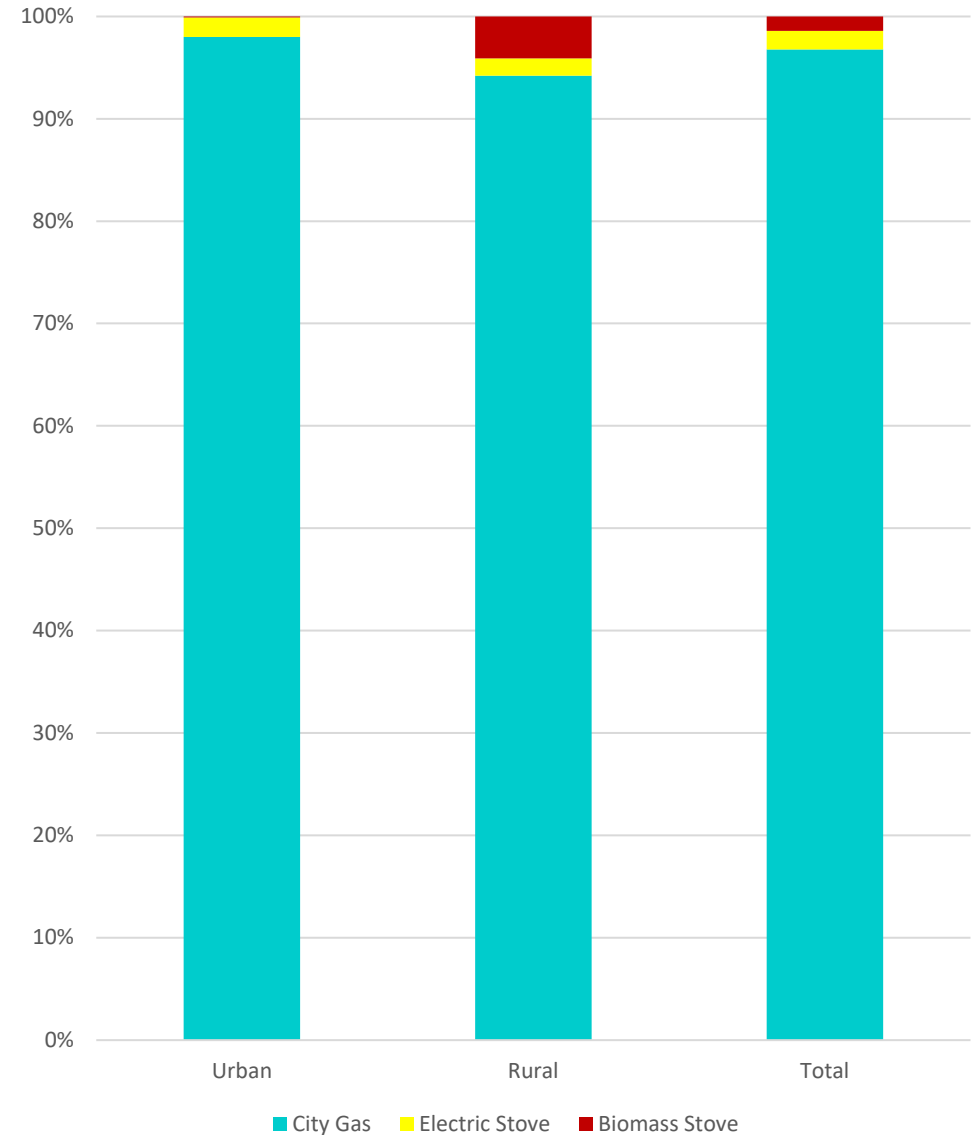
Fossil fuel makes up a large portion of Armenia's energy flows.

Unit: Thousand Tonnes of Oil Equivalent (kToe)

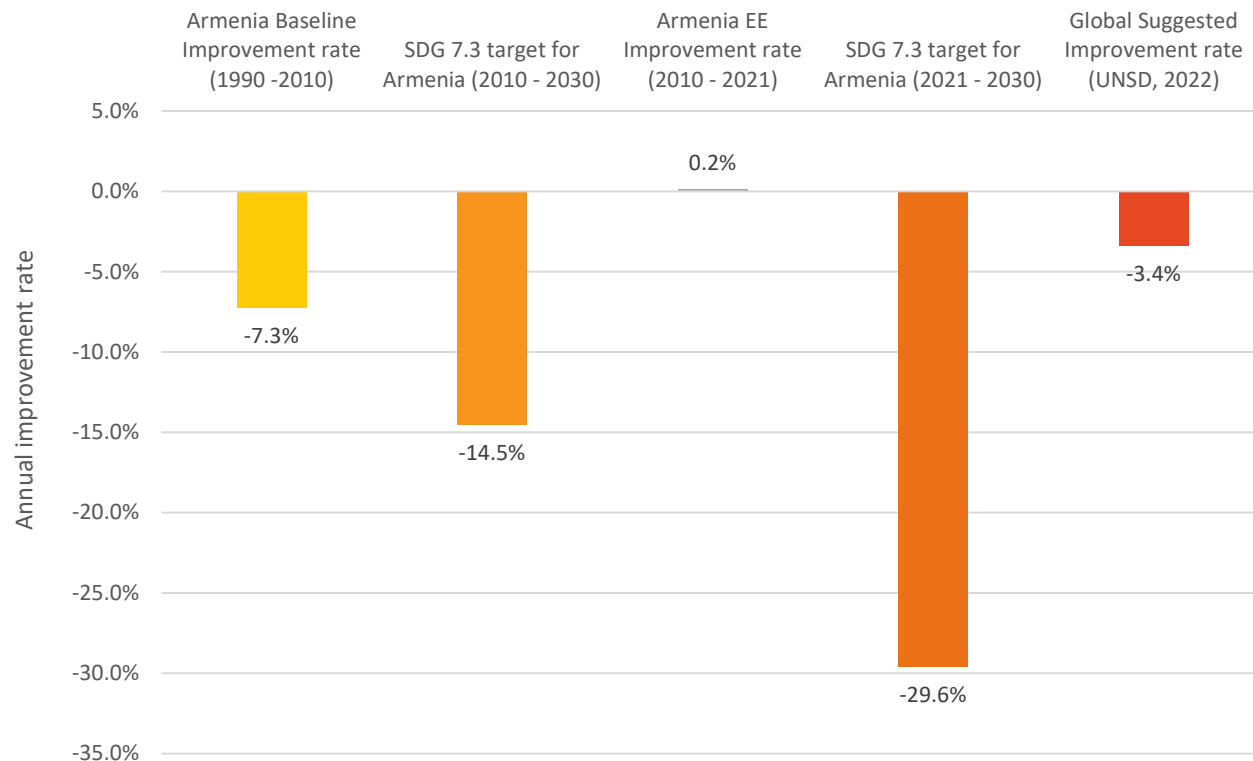


Access to modern energy in 2021

- The electrification rate in Armenia **was already 100 per cent in 2021**
- The clean cooking access was **98.6 per cent in 2021**
- Around 10,706 households still relied on unclean and polluting kerosene and biomass stoves as their primary cooking technology



Energy intensity target setting

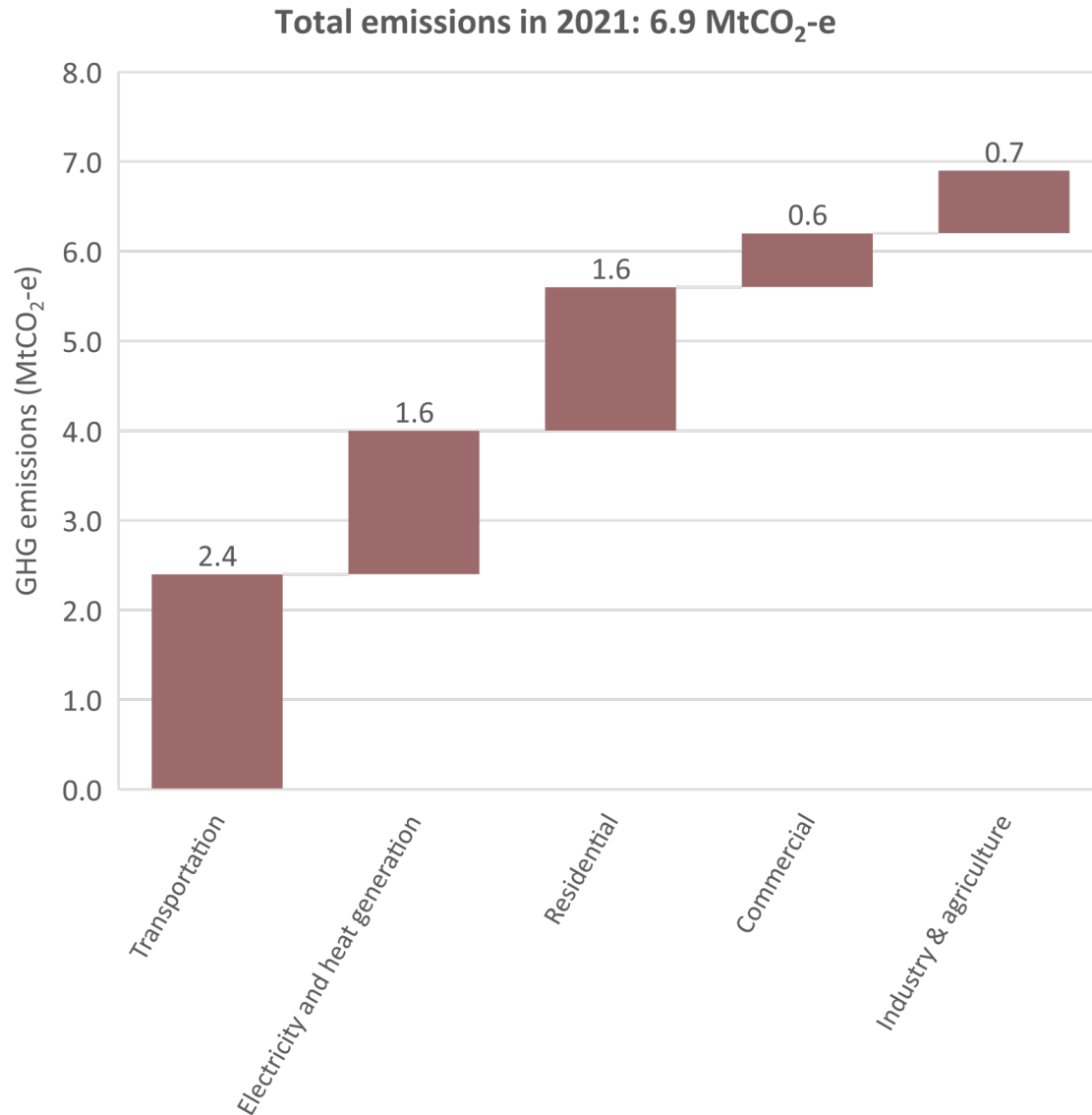


Energy efficiency improvement rate to achieve the SDG 7.3 target requires the energy intensity to drop to 2.9 MJ/US\$ in 2030.

The CAGR between 2021 and 2030 must be around 29.6 per cent which is a challenge.

NEXSTEP analysis suggests to align with the global target of 3.4 per cent, reaching 2.9 MJ/US\$.

GHG emissions in 2021



- Emissions calculated based on IPCC Tier 1 emission factors in terms of 100-year GWP values.
 - For the energy sector emissions were estimated at 6.9 MtCO₂-e
 - Transport sector emissions were the largest at 2.4 MtCO₂-e
 - Power generation and residential sectors each at 1.6 MtCO₂-e.
 - Commercial, industry and agriculture sectors together 1.3 MtCO₂-e

Scenarios development 2030

Assumptions, growth factors and constraints



Scenarios

The baseline – Business As Usual (BAU) Scenario

Assessing the gap – Current Policy Scenario (CPS)

Meeting the SDG and NDC targets – Sustainable Development Goal (SDG) Scenario

Beyond 2030 - Towards Net Zero Scenarios

Key Growth Projections and Assumptions

Parameters	Business as usual scenario	Current policy scenario	Sustainable Development Goal scenario
Economic growth	12.6 per cent between 2021 and 2022, 8.7 per cent between 2022 and 2023, 5.7 per cent between 2023 and 2024, and 6 per cent per annum from 2024		
Population growth	-0.48 per cent per annum ¹		
Urbanization rate	67 per cent in 2021, growing to 68 per cent in 2030 ²		
Commercial floor space	Assumed annual energy consumption increasing at the same growth as GDP		
Industrial activity	Assumed annual energy consumption increasing at the same growth as GDP		
Transport activity	Passenger transport activities and freight transport activities are assumed growing at a rate like the growth in GDP per capita		
Residential activity	The appliance ownership for electrical appliances is projected to grow at a rate like the growth in GDP per capita.		
Access to electricity	The 100 per cent access to electricity has been achieved.		
Access to clean cooking fuels	Projected based on the historical penetration rate between the 2000-2020 period. 100 per cent clean cooking access rate is expected to be achieved by 2026		
Energy efficiency	Additional energy efficiency measures not applied	Improvement based on current policies	Global improvement in energy intensity adopted
Power plant	Considers 2021 RE share in power generation and grid emissions	Considers capacity expansion provided by Armenia	

¹ Historical data and estimation from Asian Development Bank

² This assumes that the urbanisation rate grows with an annual rate of 0.16 per cent, with reference to the national historical urbanisation growth from 2010 to 2020.

SDG scenario

Achieving SDG 7 Targets in 2030



SDG and NDC Targets



SDG 7 Targets

- 7.1.1 Access to Electricity – ***100% by 2030***
- 7.1.2 Access to Clean Cooking Fuel – ***100% by 2030***
- 7.1.3 Renewable Energy in TFEC – ***no set target***
- 7.1.4 Energy efficiency – ***doubling the rate of improvement in energy efficiency***



a mitigation target of Armenia's NDC that will be that the emissions will need to cap at 13.6 MtCO₂-e from the energy sector by 2030.

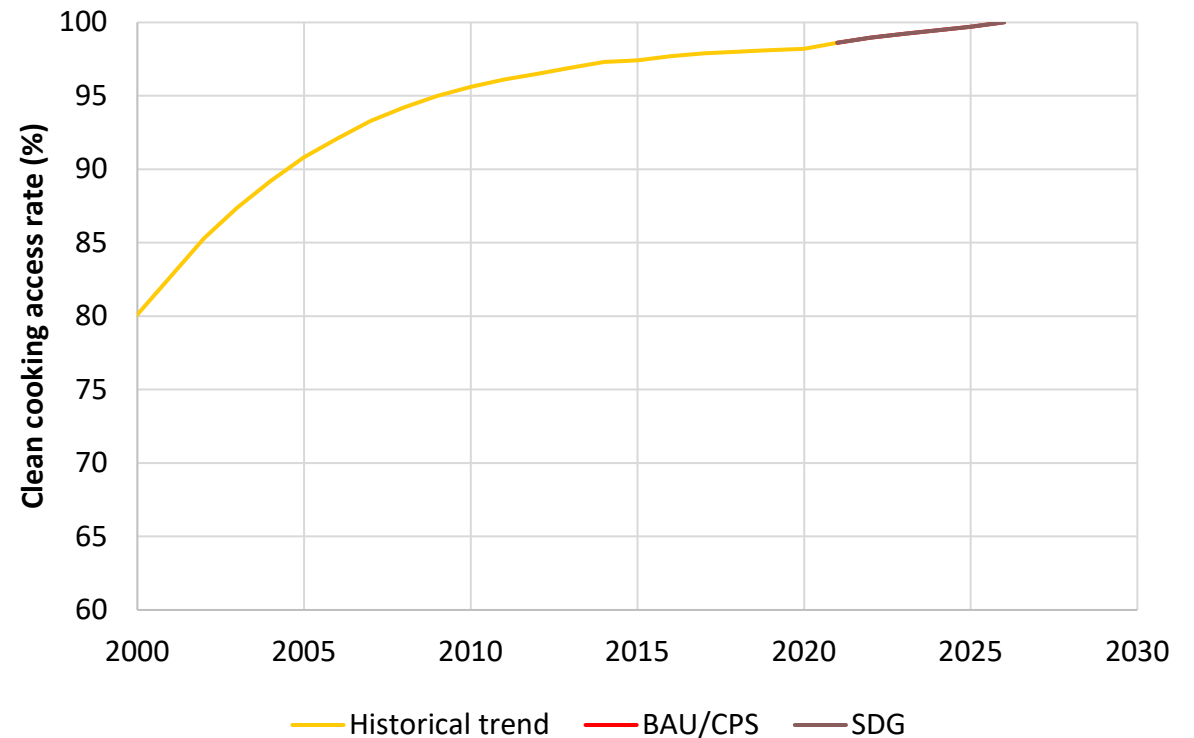
Access to modern energy in 2030

Access to Electricity

- Universal access to electricity is already achieved

Access to Clean Cooking

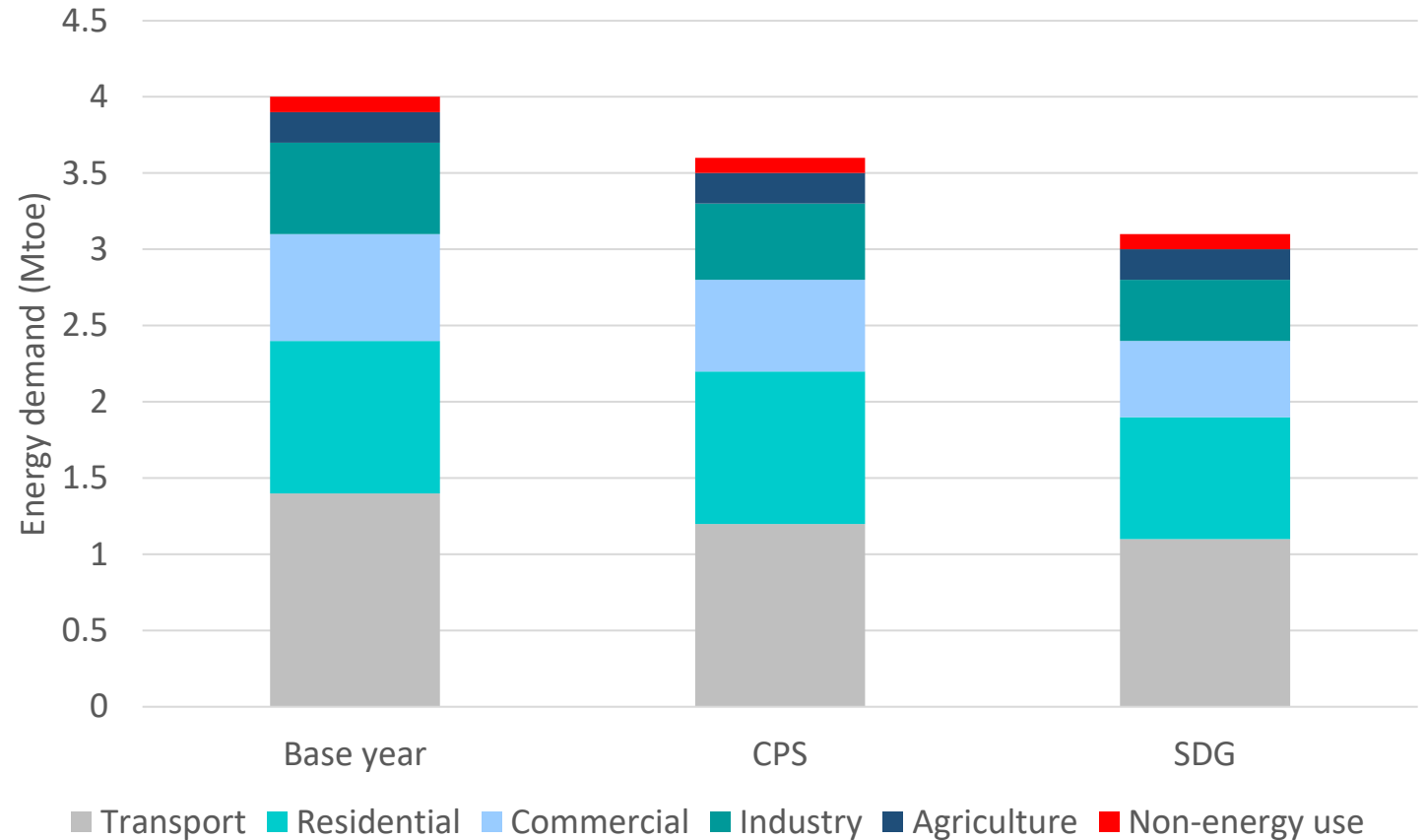
- Universal clean cooking is likely to be achieved under the current policy settings
- Based on the historical improvement rate, Armenia is expected to achieve universal access to clean cooking by 2026



Technology	Annualized cost
Electric cooking stove	US\$ 164
Natural gas stove	US\$ 98

Energy Demand in 2030

- By 2030, in all scenarios, the Transportation sector consumption will be by far still the largest followed by the power and residential sectors.
- Adoption of energy efficiency measures in the SDG scenario might reduce around 0.3 Mtoe compared to the CP scenario.



Energy saving opportunities in 2030

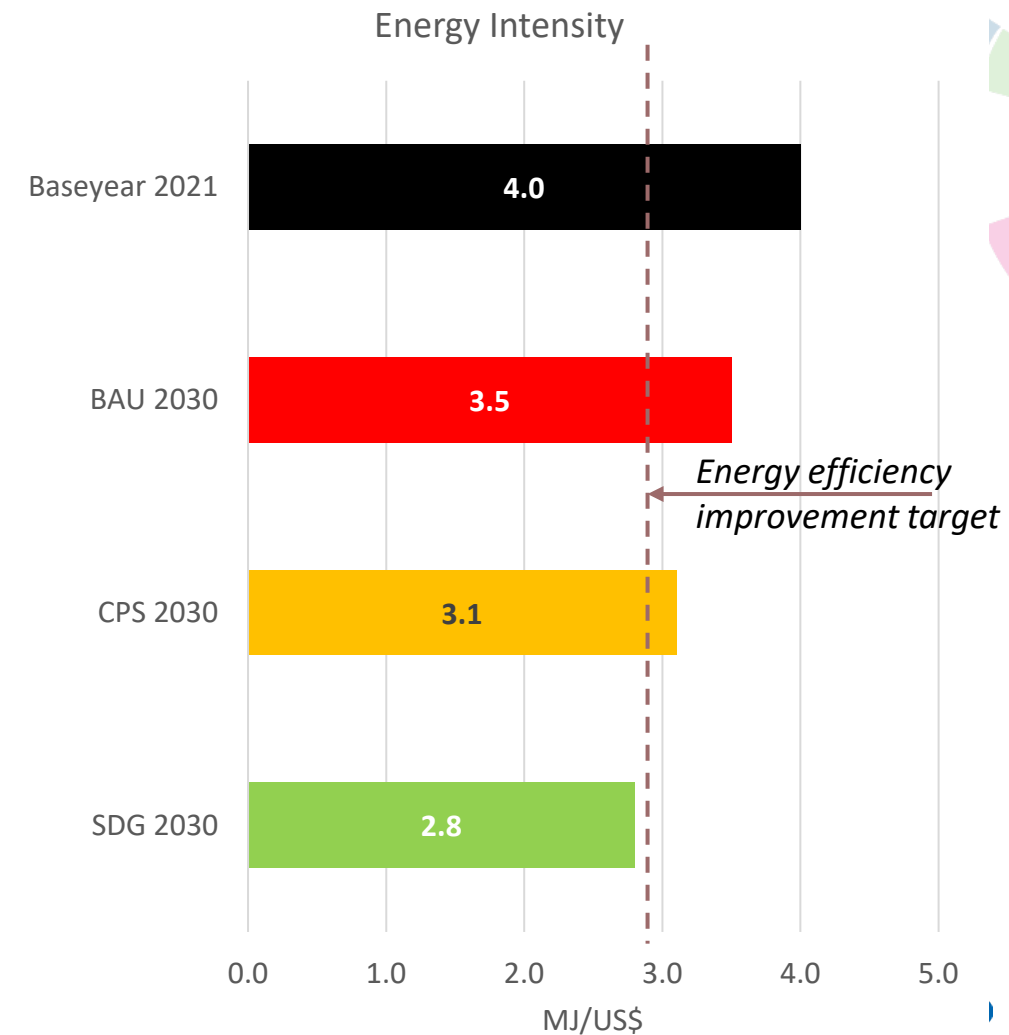
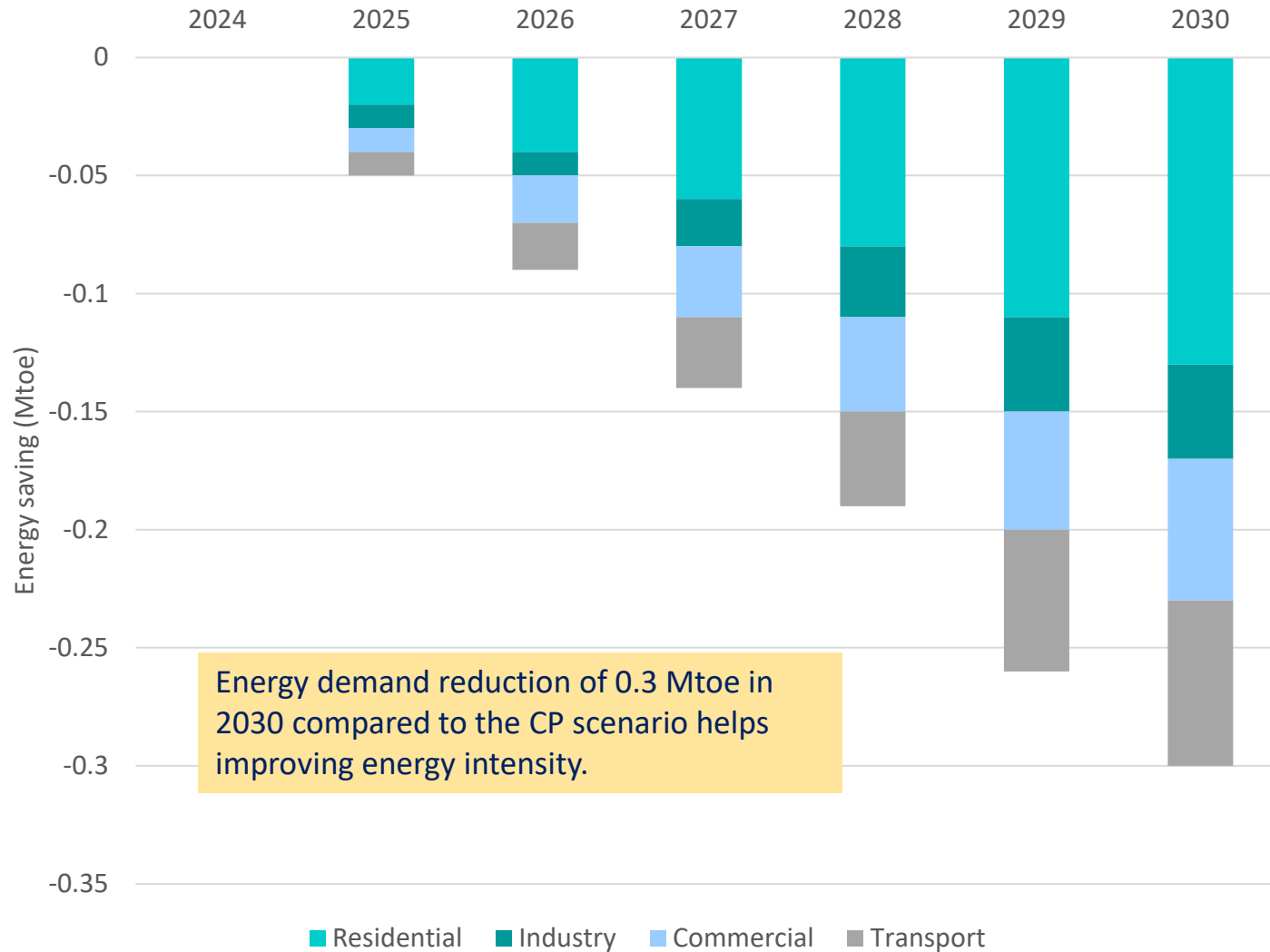
Energy demand reduction in 2030 (ktoe) in CPS, compared to BAU

Sector	Measure	Energy demand reduction in 2030 (ktoe)
Residential	The development of energy-efficient construction	16.0
Transport	Improve fuel economy of passenger cars and trucks	165.6
Industry	Financing measures for modernizing technological processes and equipment and introducing energy-saving measures in all industries	69.8
Commercial	An increase in the share of purchased energy-efficient equipment	91.7
Total		343.1

Energy demand reduction in 2030 (ktoe) in SDG scenario, compared to CPS

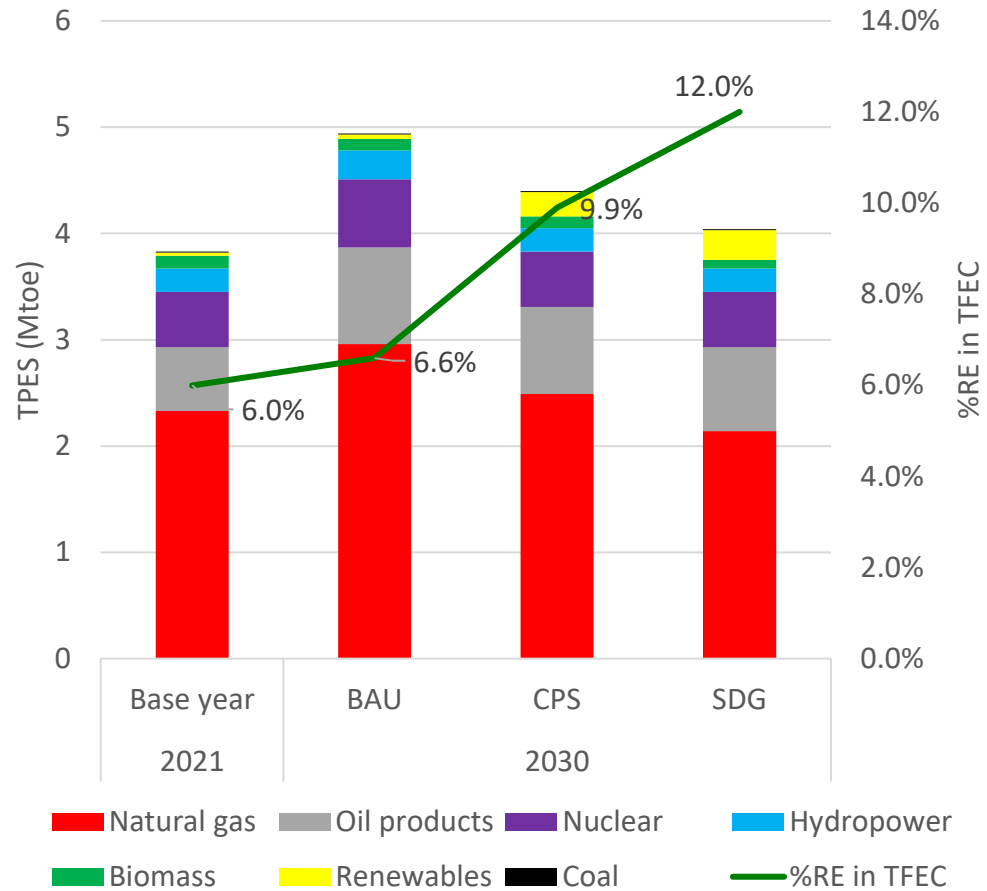
Sector/area	Measure	Energy demand reduction in 2030 (ktoe)
Residential Cooking	Adoption of electric cook stoves to 25% in urban and 10% in rural areas in 2030	22.0
Residential Heating	15% heat pumps in urban and promote electric heaters to 25% in rural areas.	71.3
Residential MEPS	For lighting, refrigeration, and television	40.9
Commercial	External insulation of commercial buildings	58.9
Industry	Deep retrofitting to reduce thermal loss	44.9
Transport	EV penetration by 20%	68.9
Total		306.9

Energy Intensity (MJ/US\$) in 2030

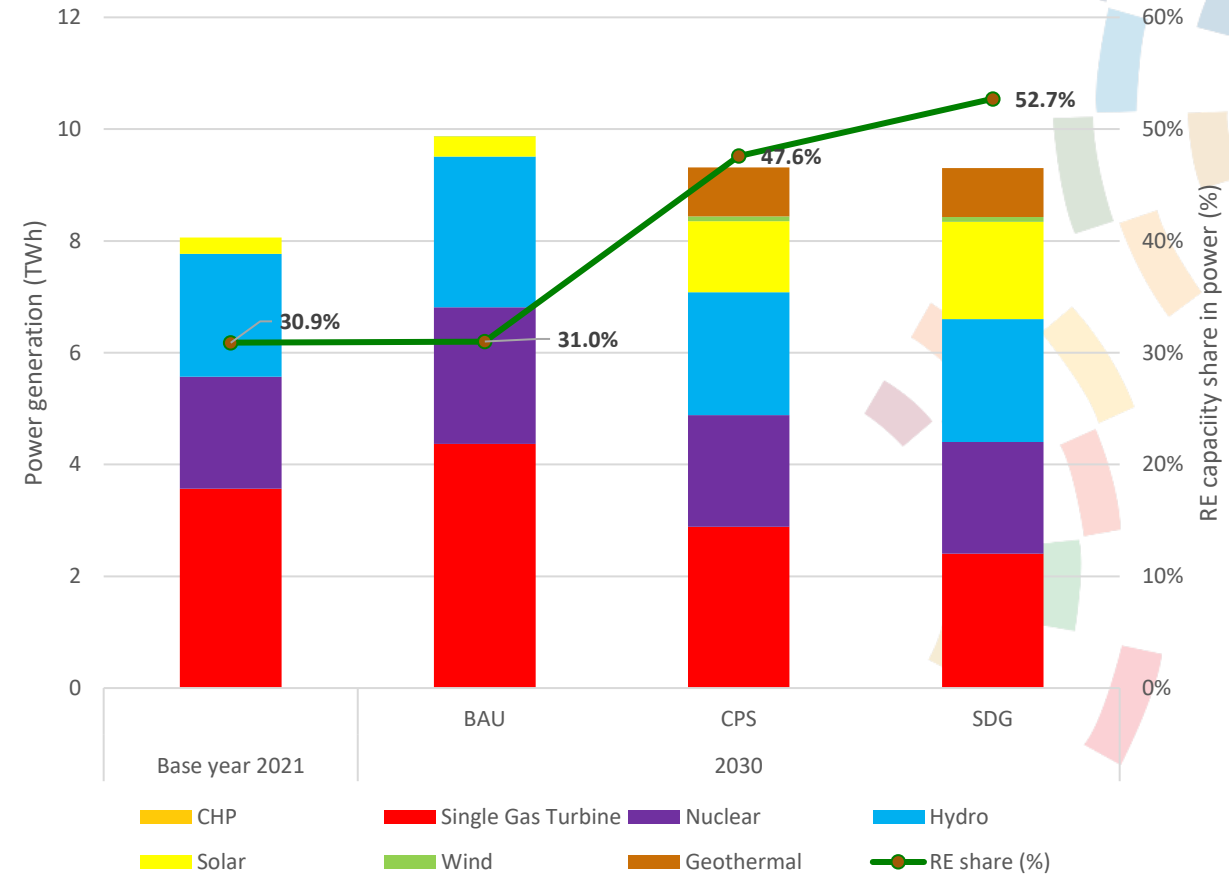


Renewable Energy

Renewables share in TFEC

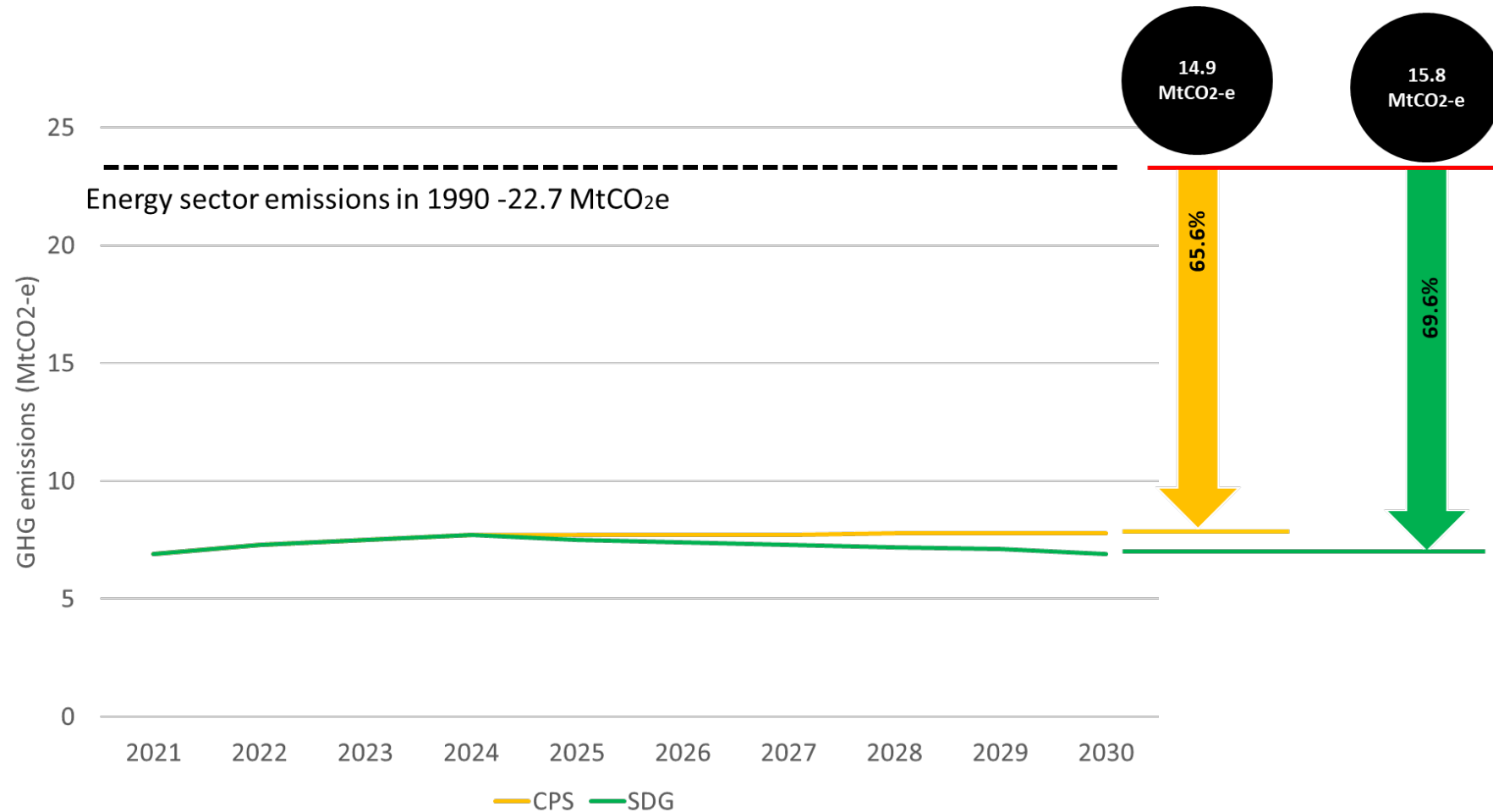


Renewables share in power generation

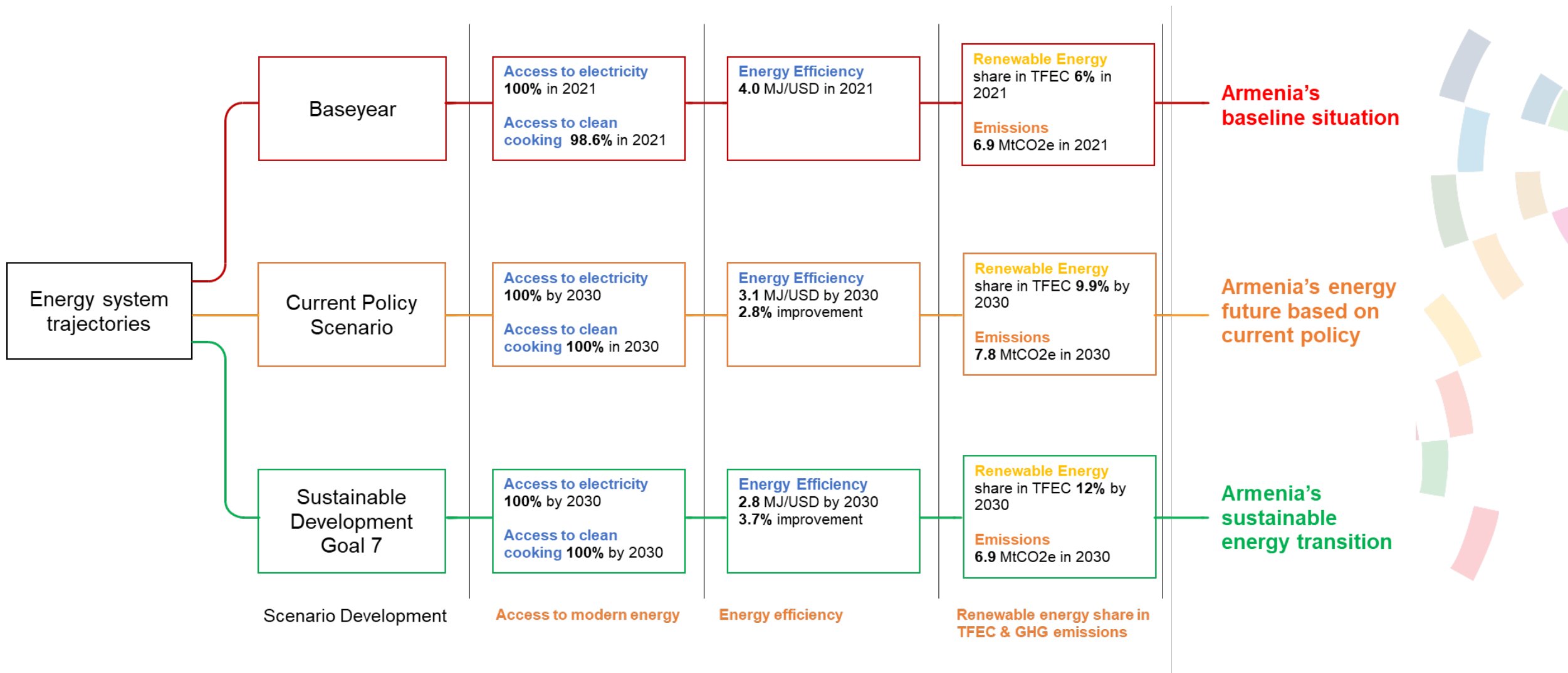


Emissions in 2030

- The mitigation target of Armenia's NDC that will be a 40 per cent reduction in total national greenhouse gas (GHG) emissions by 2030 compared to 1990 level.



Progress towards SDG 7 Targets for 2030



Energy transition beyond 2030

Net Zero Emissions by 2050

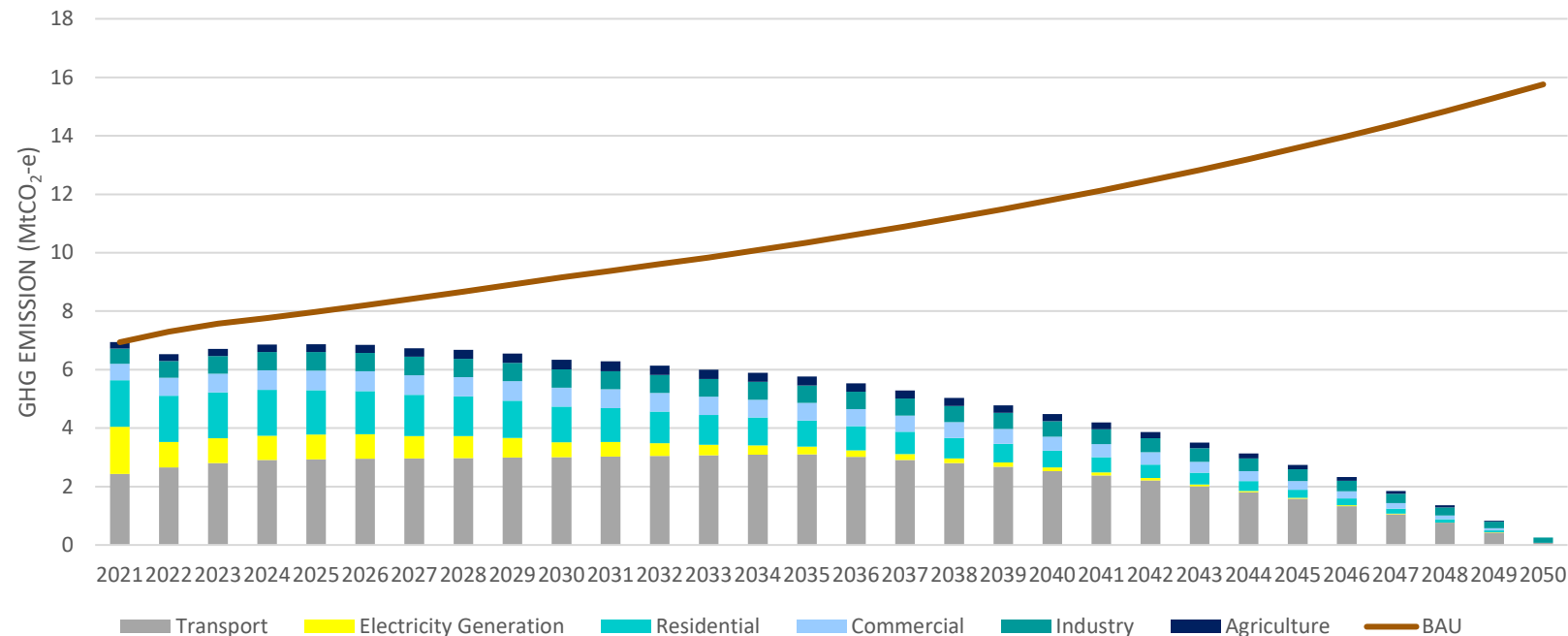
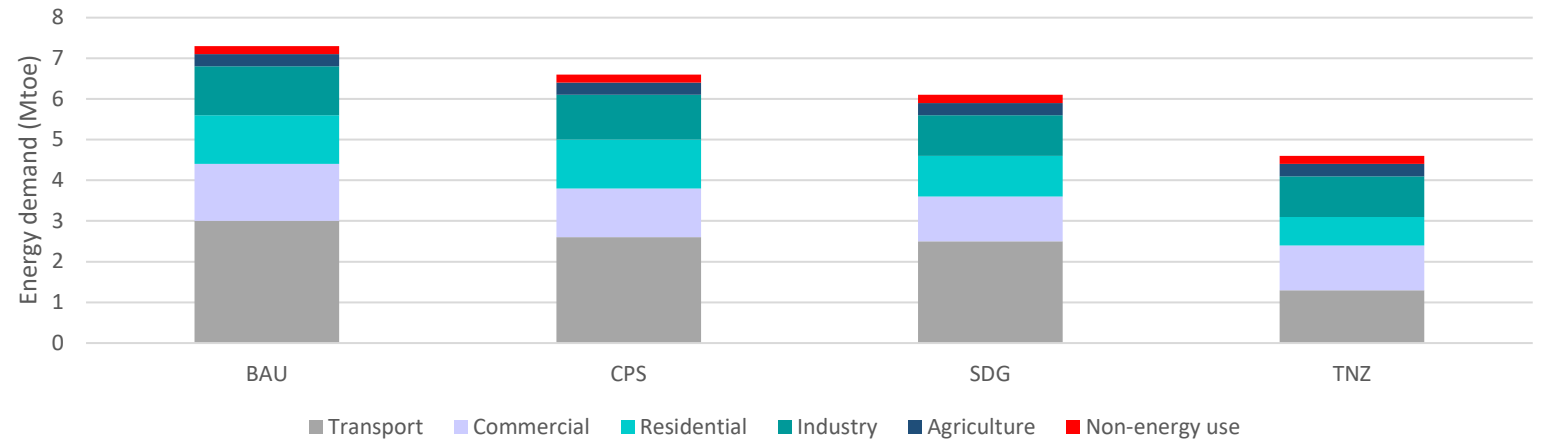


Towards Net Zero by 2050

Additional **demand and GHG emission reduction** can be realized through the following:

2031 - 2050

- Adoption of 100 per cent electric cook stoves by 2050
- Adoption of 100 percent electric vehicles for road transport by 2050
- Fuel switching to electricity in the industry sector
- Decarbonise power sector using renewable system with BESS
- Decarbonise heating sector with heat pump



Policy recommendations/Conclusion

- 1. Increasing the efficiency of energy use in all economic sectors should be pursued.** The presence of a national energy efficiency plan will help Armenia reduce its energy intensity by 2030. Additional measures in the SDG scenario can reduce energy demand further.
- 2. Transport electrification provides multi-fold benefits in the long run.** Vigorous adoption of electric vehicles reduces the demand for oil products, hence reducing Armenia's reliance on imported petroleum fuels.
- 3. Decarbonisation of the power supply is the key to achieving net zero emissions by 2050.** It provides the highest potential in GHG emission reduction as well as improves energy security
- 4. Enabling policy measures are required to improve clean cooking by 2030.** The adoption of electric cookstoves by at least 20 per cent of the population will significantly help improve energy security and reduce emissions.

Thank you

