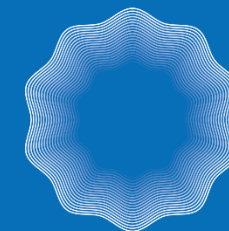




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Presidencia de la Nación



ARGENTINA
200 AÑOS DE
INDEPENDENCIA

Energy Scenarios 2025

National office of Energy Scenarios and Project Assessment
Undersecretariat of Energy Scenarios and Project Assessment
Secretariat of Strategic Energy Planning

December 2016

The outcomes of the analysis shown in these slides, which are associated to four scenarios deriving from the combination of different demand, investment, price and productivity assumptions, do not intend to be predictive, but they are projections of what it may occur according to the combination of such assumptions.

Due to the dynamic nature of an energy sector which is undergoing a regulatory, economic and institutional normalization process, such scenarios are dynamic. For this reason, the outcomes of the scenarios might change significantly in subsequent editions, in line with the evolution of the national and international energy reality, with the development of the different economic sectors and with changing boundary conditions – for example the changes in the dynamic of international prices, the evolution of climate change agreements or the occurrence of events of technological or political disruption -, which would lead to the inclusion or the adjustment of the used assumptions.

Additionally, it should be highlighted that the Ministry of Energy and Mining does not assign different probabilities of occurrence to the modeled scenarios , instead, it impartially presents the outcomes for the analysis of the population.

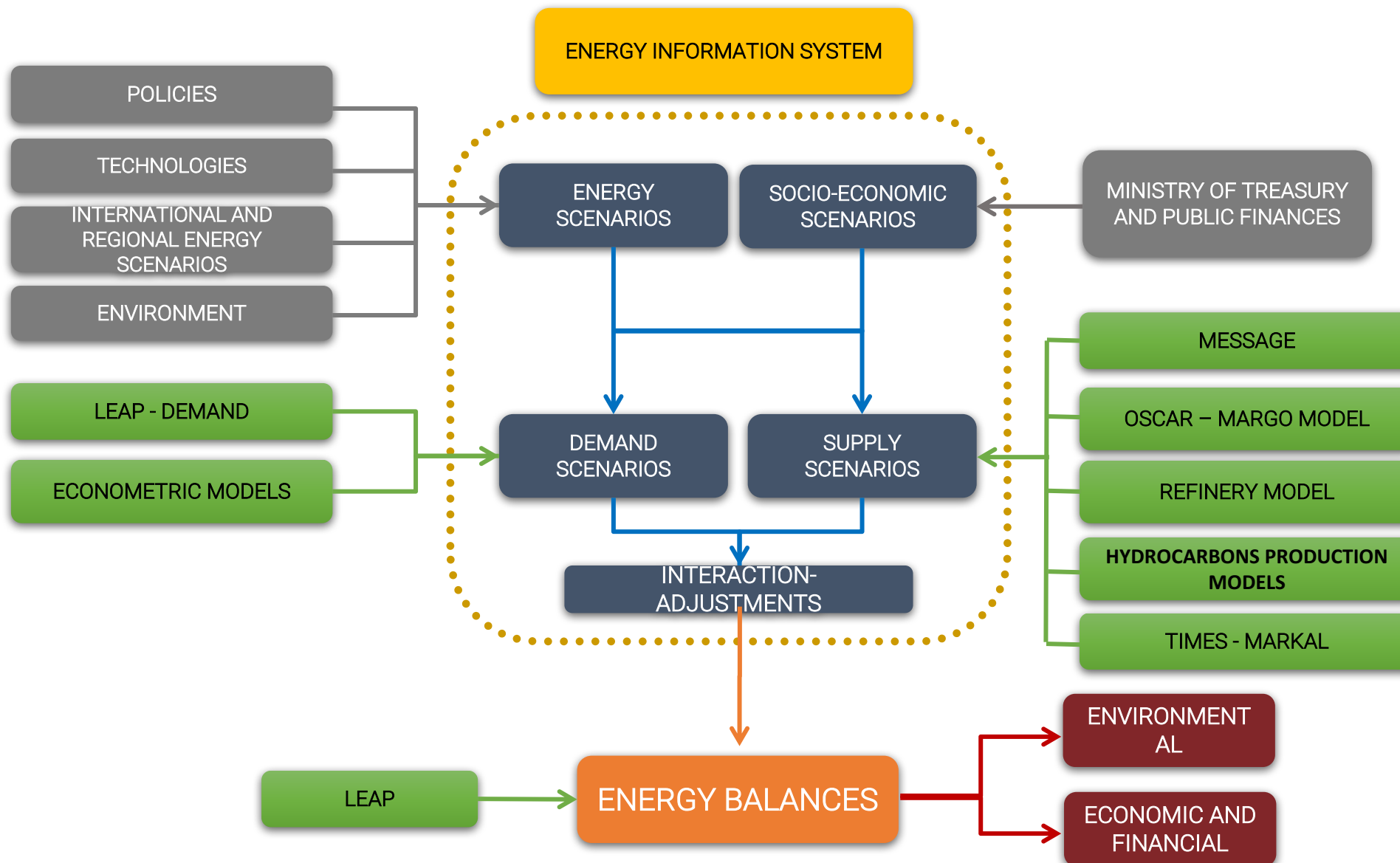
This is part of the beginning of a shared vision building process of the Argentine society in order to build a sustainable energy future. By virtue of this ministry, the National Executive Power promotes the creation of spaces for dialogue, as well as a greater transparency by making more and better information available, and also, clearly contributes to strengthen the abilities of the State to suitably reflect, in its future editions, scenarios that show goal-related outcomes.

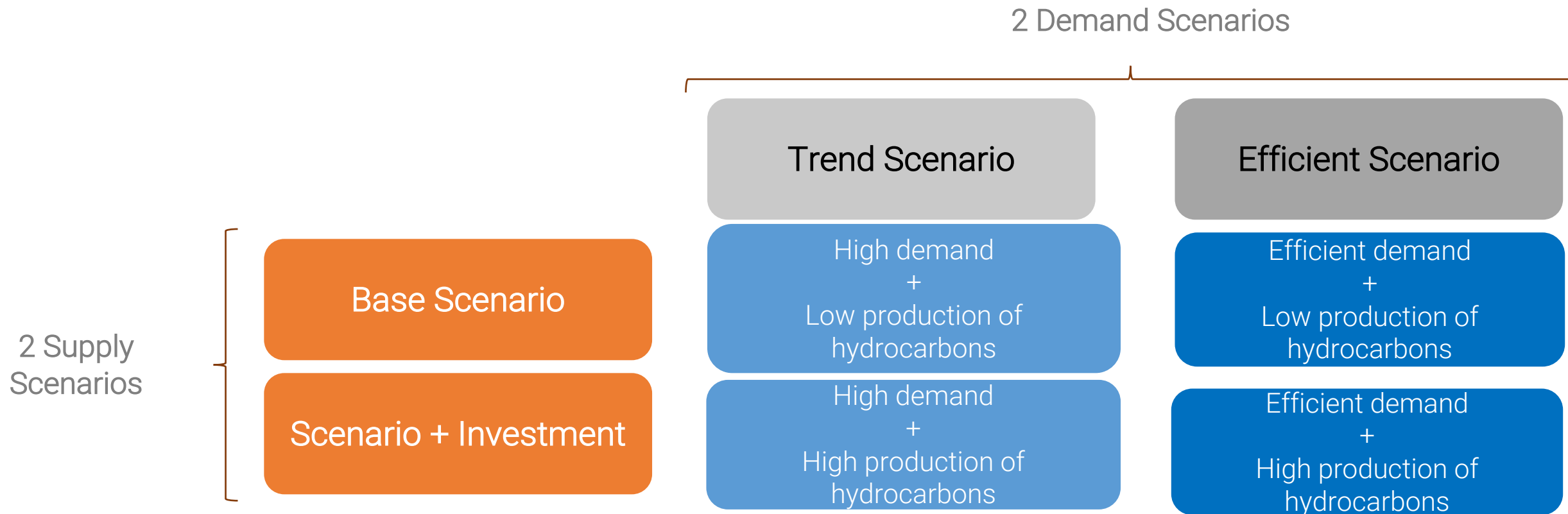
- International context
- Definition of cases and assumed basis
- Demand forecasting and supply alternatives
- Outcomes of the supply/demand balance
- Economic and environmental impact

Definition of cases and assumed basis



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- Two demand scenarios which include the impact of energy efficiency and energy saving
- Two scenarios of hydrocarbons supply which are defined according to prices, investment levels and improvements in productivity and in efficiency
- If combined, 4 scenarios may be obtained.

Demand growth with less energy intensity

- Higher growth in developing countries, including China, India and Latin America
- Impact of the incorporation of electric vehicles and other technologies

Paris Agreement on climate change will generate important changes in energy policies

- 2/3 of the greenhouse gas emissions are produced by the energy sector
- Commitment to reduce emissions to limit global warming to 2°C

New technologies allow for the reduction of fossil fuel consumption and for the generation of clean electricity

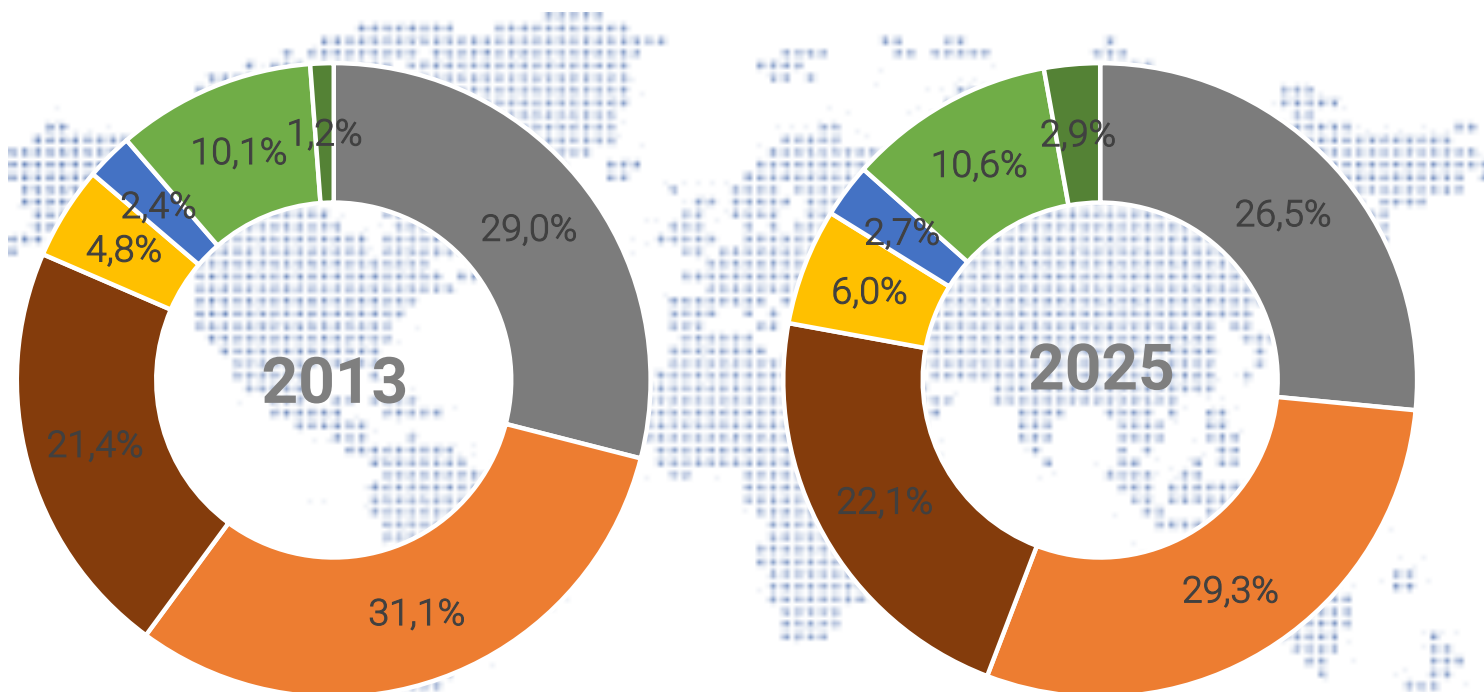
- Competitiveness of non-traditional renewable sources

Uncertainty in oil and natural gas markets

- Lower growth in oil demand and reduced price vs previous scenarios
- Global market for natural gas at a stable and lower price

Region	GDP(% y.y.)	Pop. (% y.y.)
	2014-2020	2014-2025
OECD	2.00%	0.5%
Non-OECD	4.60%	1.2%
Asia (non-OECD)	6.10%	0.8%
Latin America	0.80%	0.9%
World	3.50%	1.0%

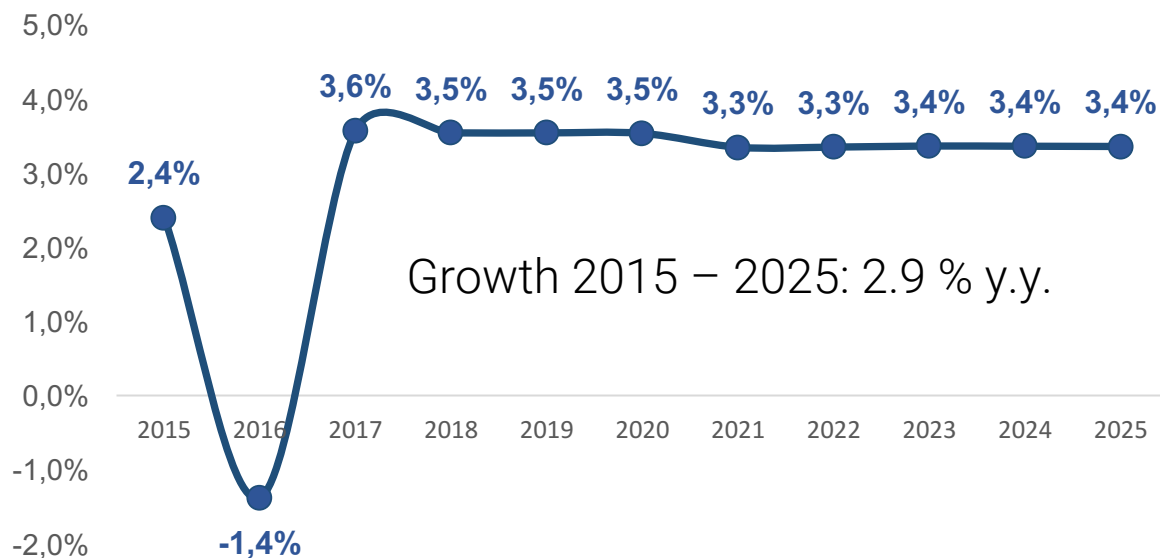
Source: International Energy Agency - World Energy Outlook 2015



Source: International Energy Agency - World Energy Outlook 2015

- The economic growth continues to be the main driver of energy demand. The population grows from 7.1 trillion to almost 8 trillion people.
- Within the scenario of new policies of the IEA, there is a coal and oil downturn, and an increase of natural gas, nuclear and renewables.

GDP Annual variation



Population 2025: 47.5 MM



Motor vehicles on the road

2015: 240 vehicles per 1,000 people.
2025: 305 vehicles per 1,000 people.
2040: 400 vehicles per 1,000 people.



Price scenarios

US Energy Information Administration (EIA)
Short Term Energy Outlook, July 2016 &
Annual Energy Outlook 2016.



Natural gas penetration

2015: 62 % of households.
2025: 68 % of households.

Measures for electric power (15% saving)

- Efficient appliances
- Switching light bulbs in the residential sector
- Setting of air conditioners to around 25 °
- Street and public lighting
- Efficient engines
- Energy management systems
- Energy diagnosios
- Co-generation
- Variable speed drives

Measures for natural gas (2.3% saving)

- Heat pumps
- Boilers and water heaters
- Furnaces

Measures in transport - gasoil (10.6% saving)

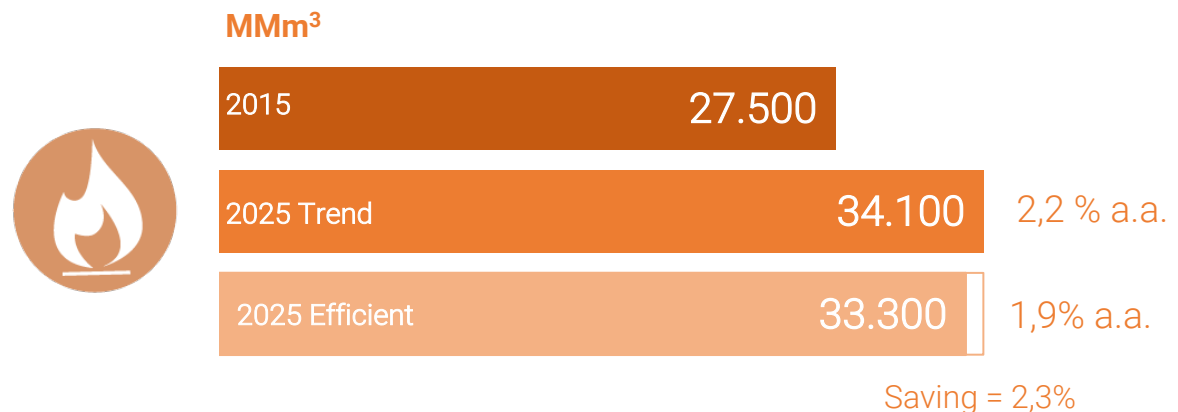
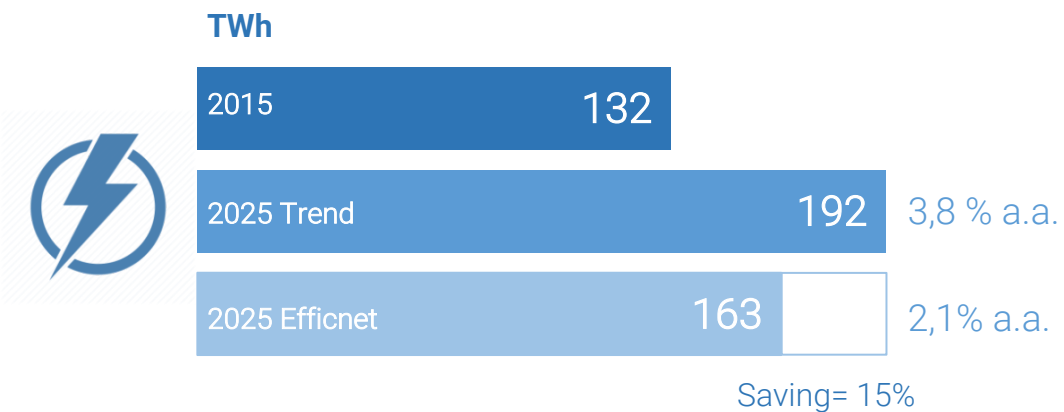
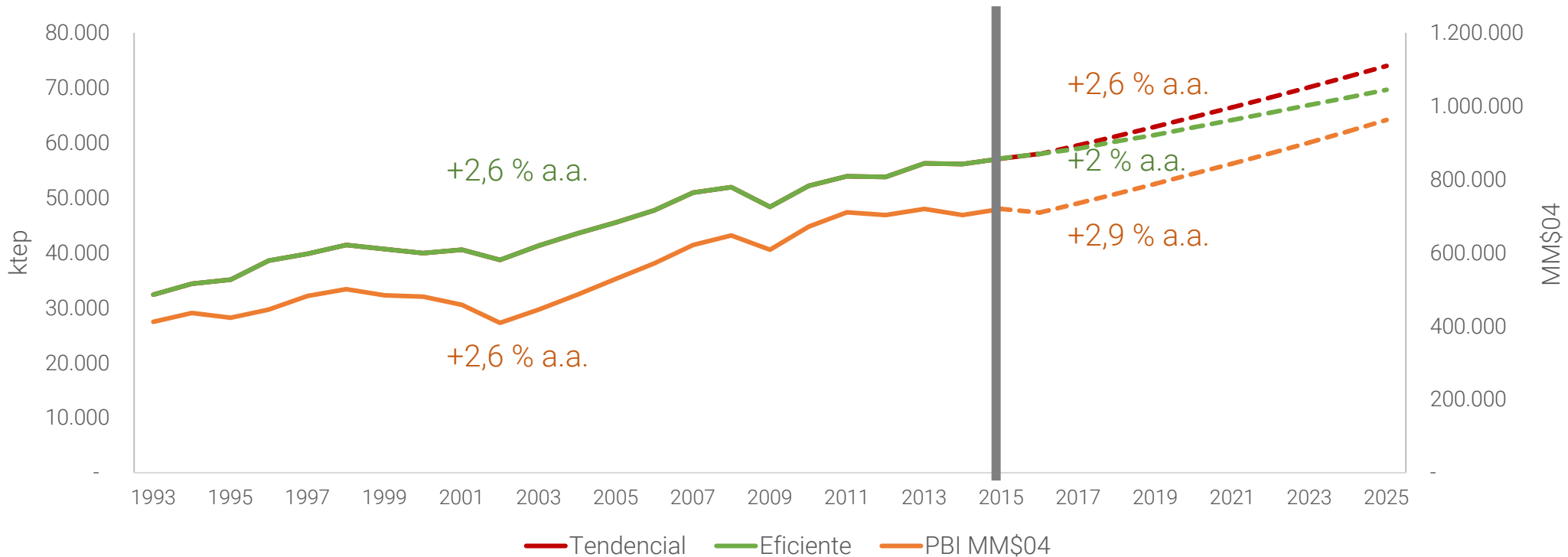
- Efficient road transport



Demand forecasting and production alternatives



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NOTE: Natural gas demand does not include RTP CERRI (1.390 MMm3 en 2015) or the consumption in power plants (14.916 MMm3 en 2015).

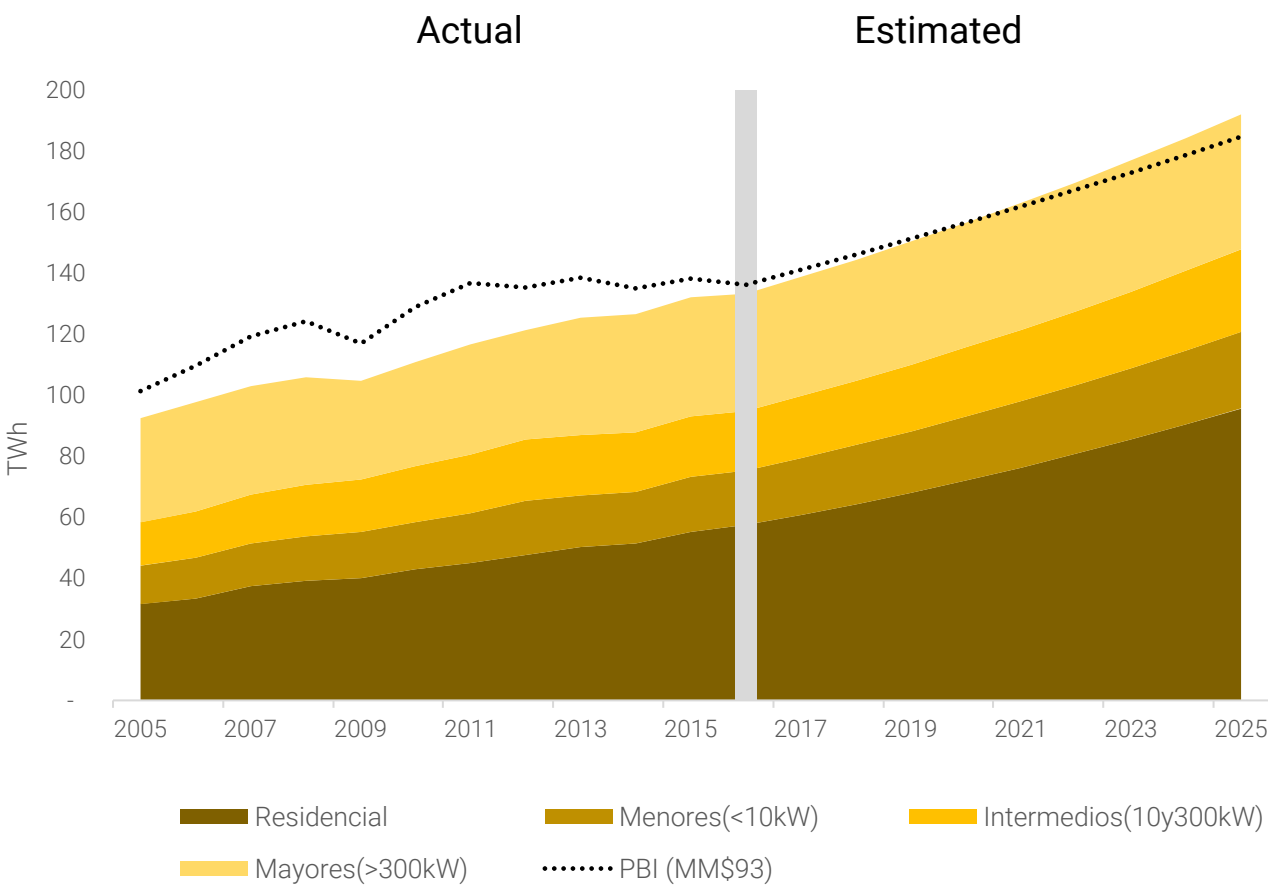
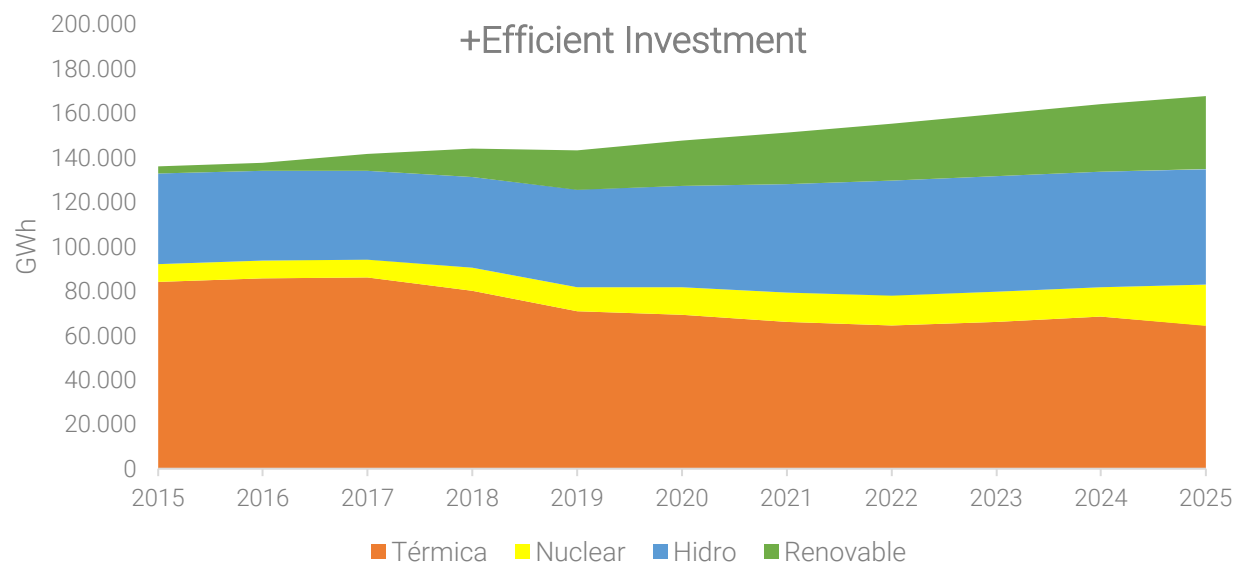
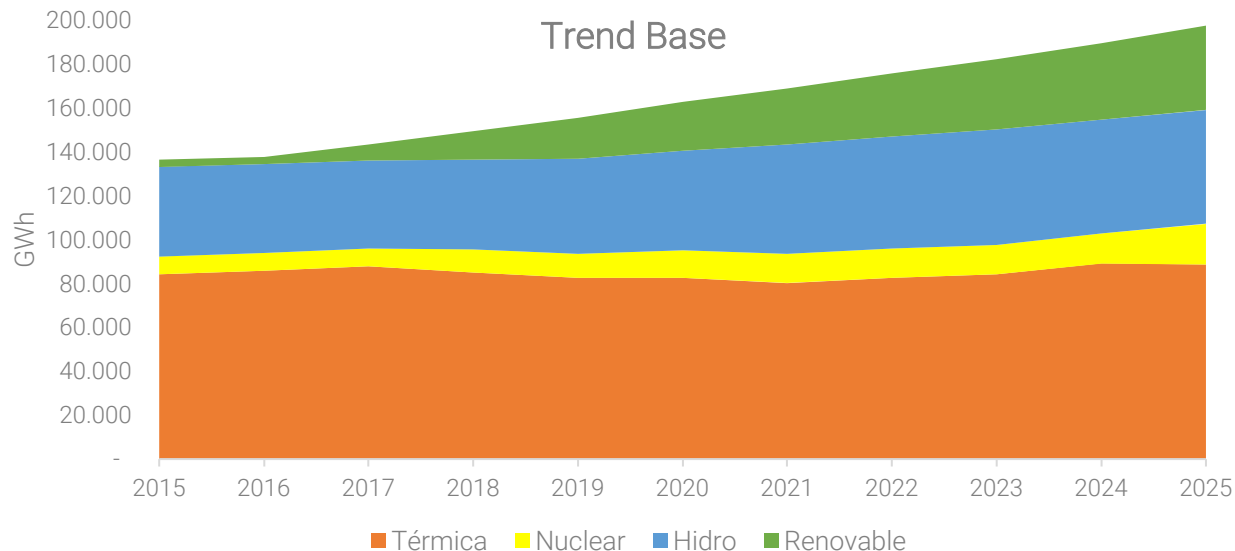


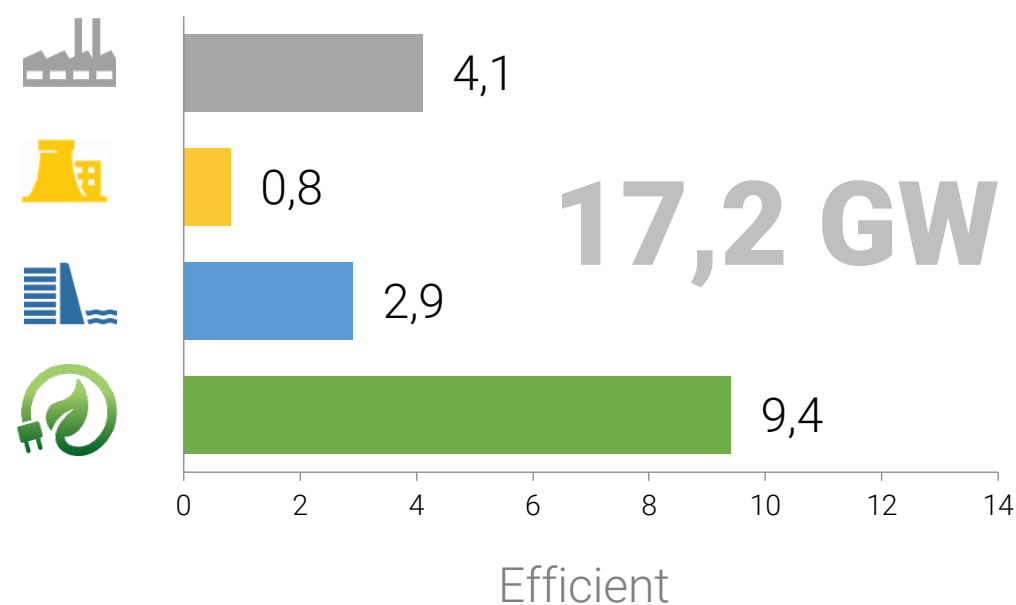
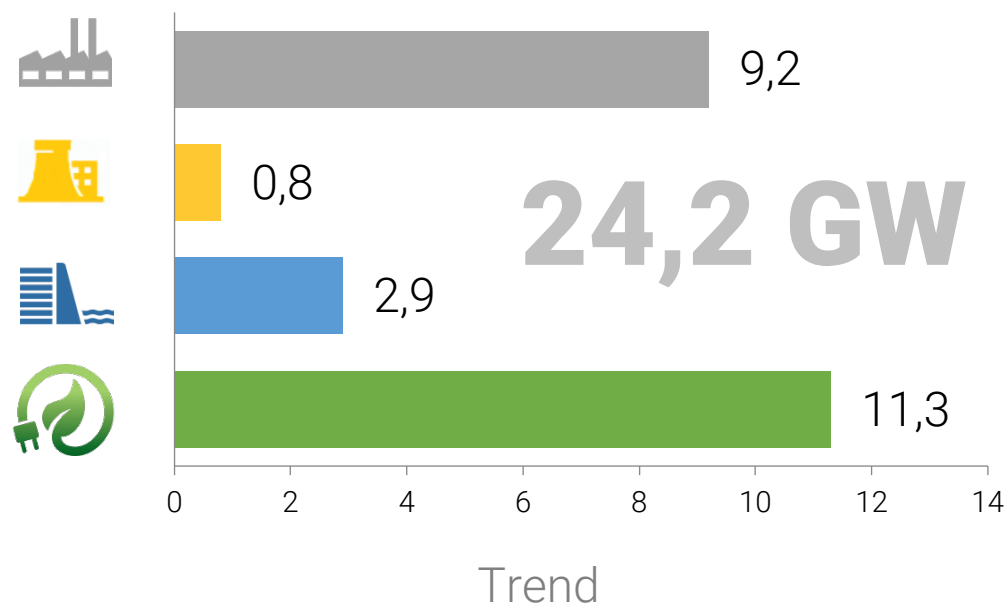
Chart 1 TWh	% y.y.	Demand	
	2015-2025	2015	2025
Residential	5,7%	55,1	95,6
Lower (<10kW)	3,3%	18,1	25,2
Intermediate (10 y 300kW)	3,1%	19,8	27,0
Higher (>300kW)	1,3%	39,0	44,2
Total	3,8%	132,0	192,0

- Prices gradually align with the production costs. The social tariff is kept throughout the whole period .
- A better access and service improvements contributes to the growth of demand .
- Energy saving and energy efficiency are reflected in a reduction in the alternative scenario.



- Hydroelectric, nuclear and renewable power generation meets the growing demand of electricity.
- Decrease in the share of thermal power (64 % in 2015).
- Observance of the Renewable Energy Act.
- Reduction in the use of liquid fuels for generation due to a greater availability of natural gas.

New total installed capacity to 2025 (GW)



Measuring energy efficiency reduces power capacity demand by 7 GW.

For 2025, between 9.4 and 11.3 of additional installed capacity from unconventional renewable sources will be required in order to comply with the law 27.191.

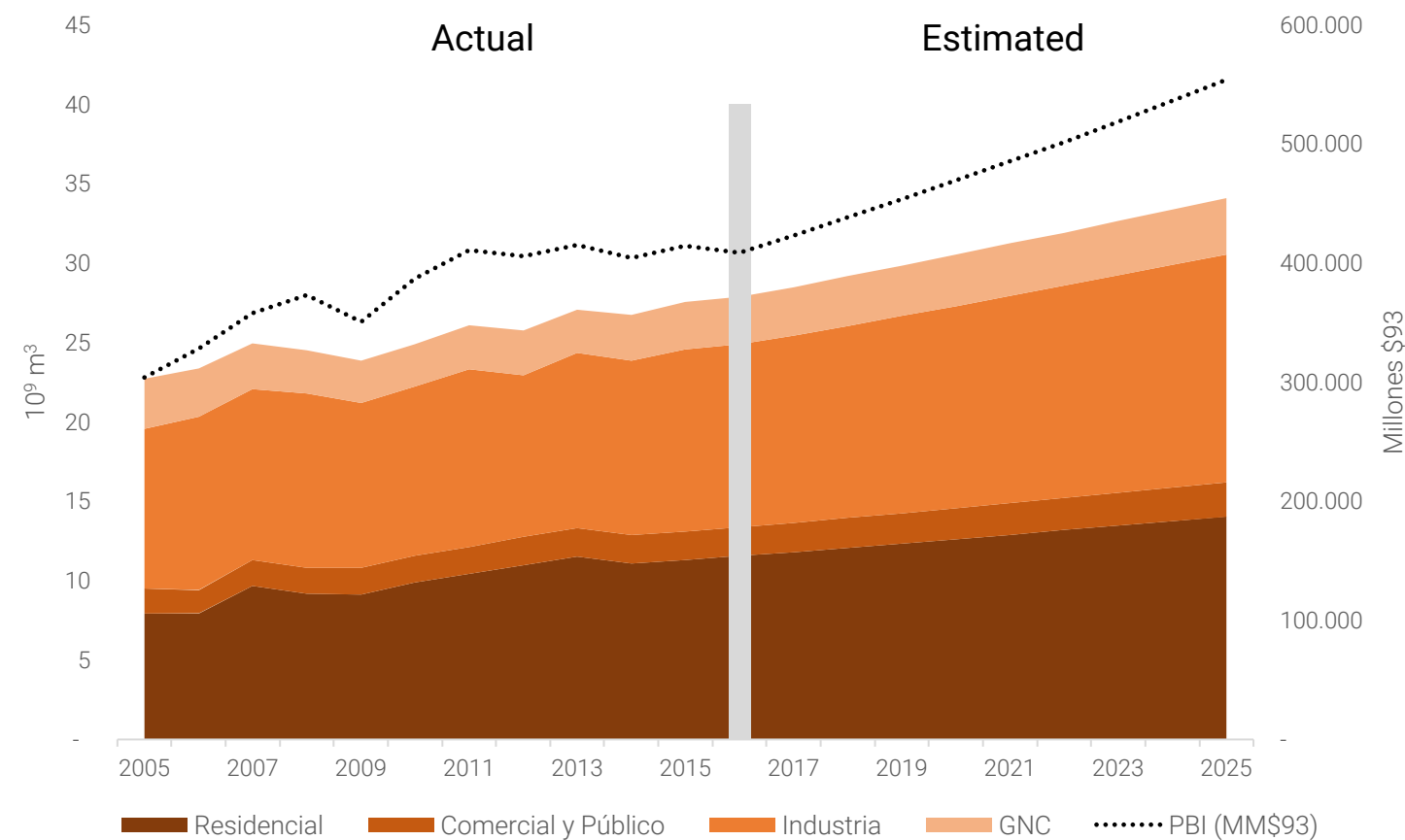
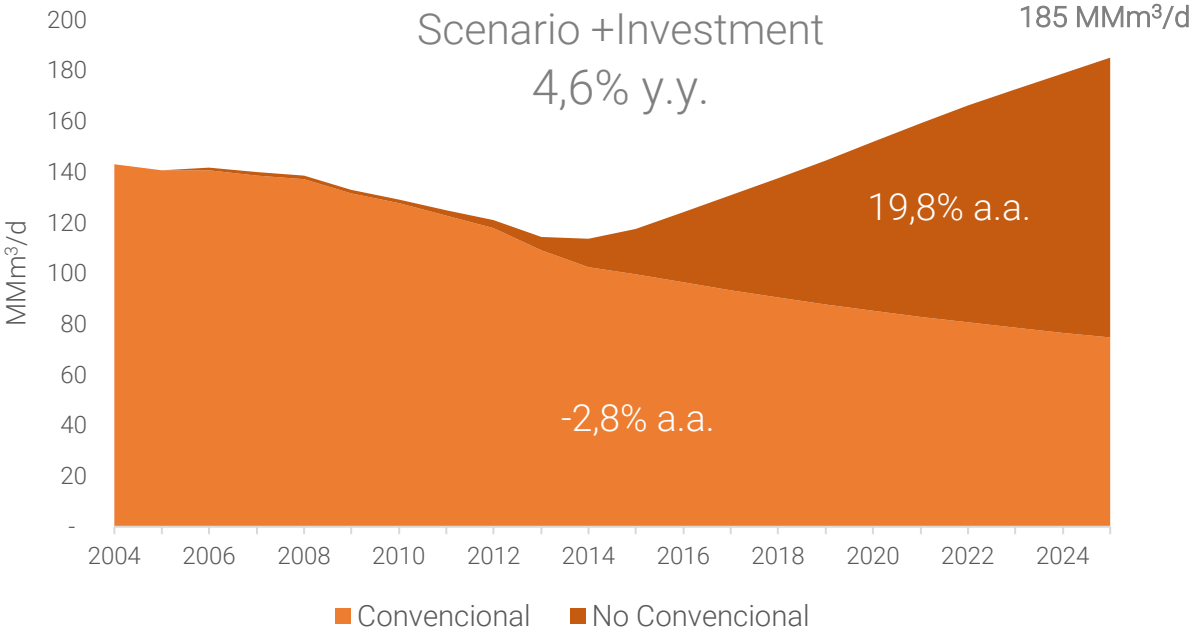
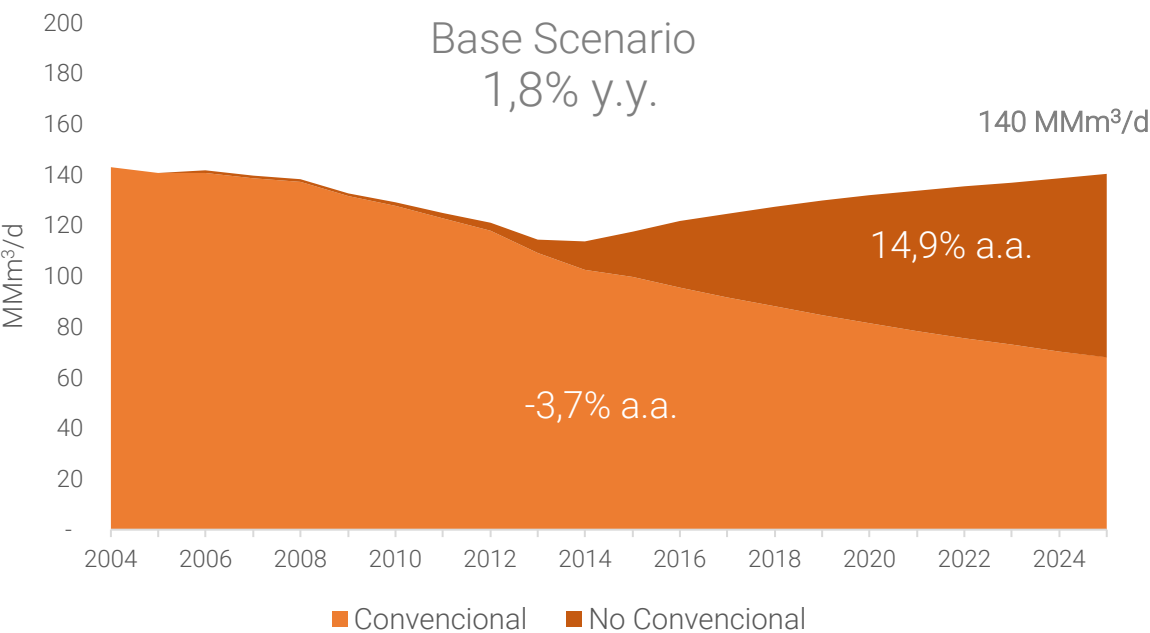


Chart 2 10 ⁹ m3	% y.y.	Demand	
	2015-2025	2015	2025
Residential	2,2%	11,3	14,0
Commercial and Public	1,9%	1,8	2,2
Industry	2,2%	11,5	14,4
CNG	1,9%	2,9	3,6
Total (*)	2,3%	27,5	34,1

- Gradual price increase to users is reflected in a lower intensity
- New users are connected to the GNEA and there is an expansion of distribution grids
- Energy saving and energy efficiency are reflected by means of a reduction in the efficient scenario .

* NOTE: Natural gas demand does not include RTP CERRI or the consumption in power plants. .



Investments related to the development of unconventional natural gas

35.000 MMUSD accumulated to 2025



55.000 MMUSD accumulated to 2025

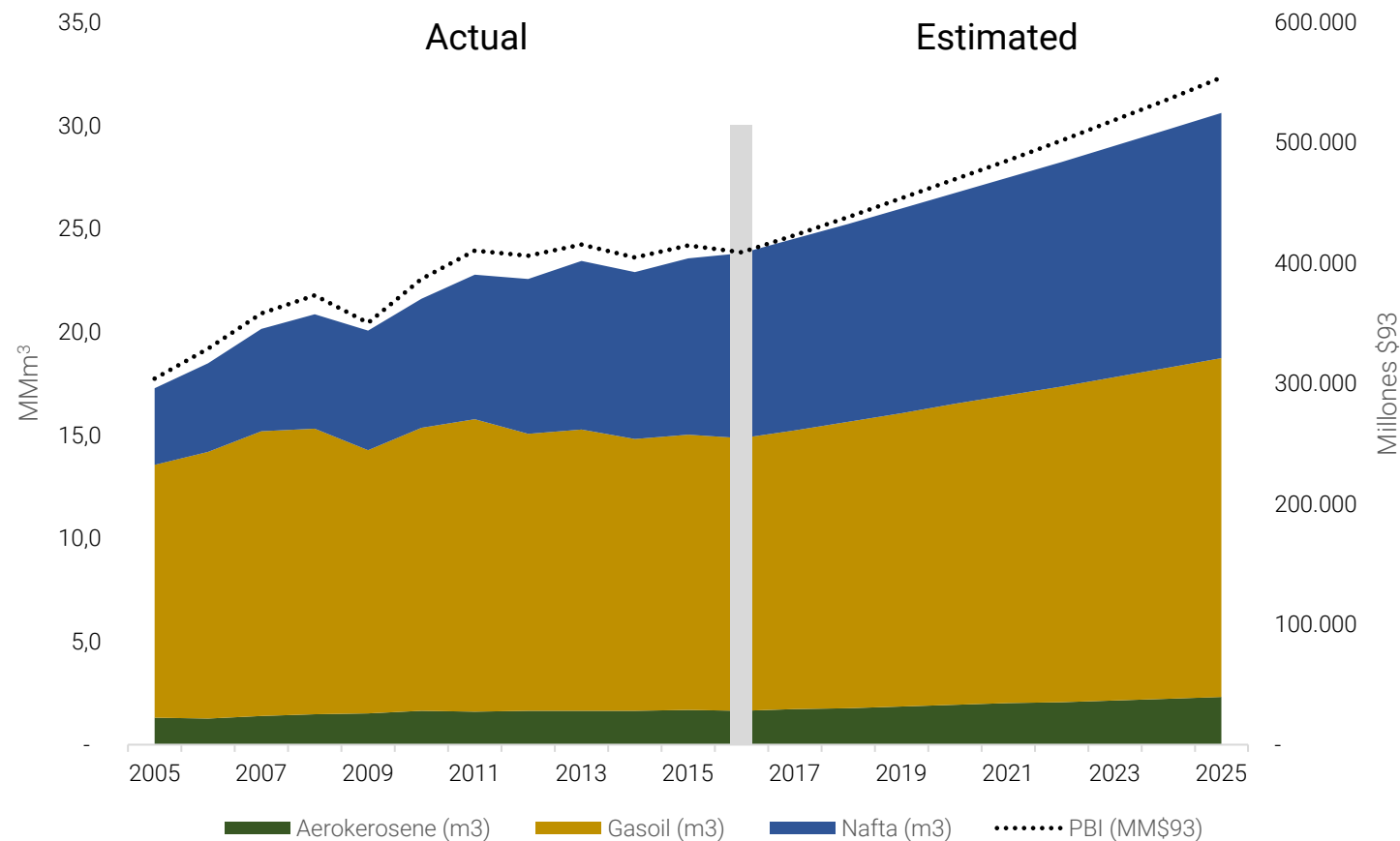
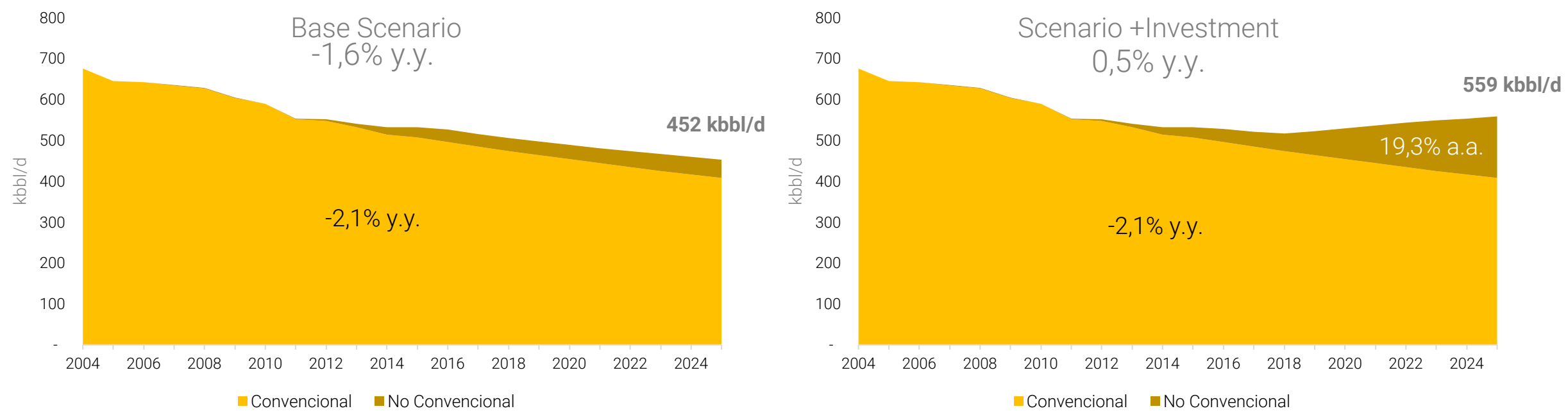


Chart 3	% y.y.	Demand	
	2015-2025	2015	2025
Aerokerosene (MMm³)	3,3%	1,7	2,3
Naphtha (MMm³)	3,3%	8,5	11,9
Gasoil (MMm³)	2,1%	13,3	16,4
LPG (MMtn)	-0,1%	1,8	1,8
Kerosene (Mm³)	-12,7%	21,6	5,6
Fueloil (MMtn)	2,1%	1,2	1,5

- Prices of fuels are aligned with crude oil prices
- Efficiency improvement in the number of motor vehicles on the road by means of the incorporation of technology .
- It is promoted the use of biofuels to replace imports, but with technical limitations.



Investments related to the development of unconventional gas

10.000 MMUSD accumulated to 2025



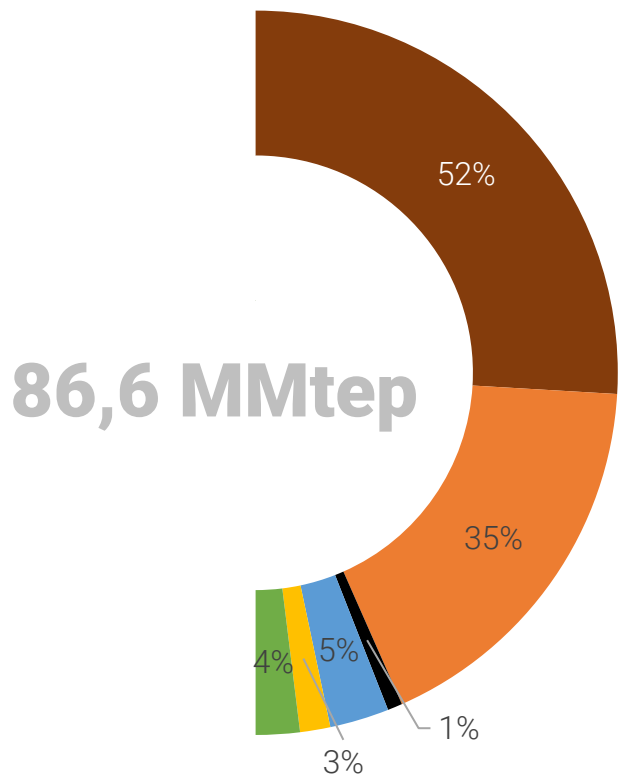
40.000 MMUSD accumulated to 2025

Results of the supply/demand balance

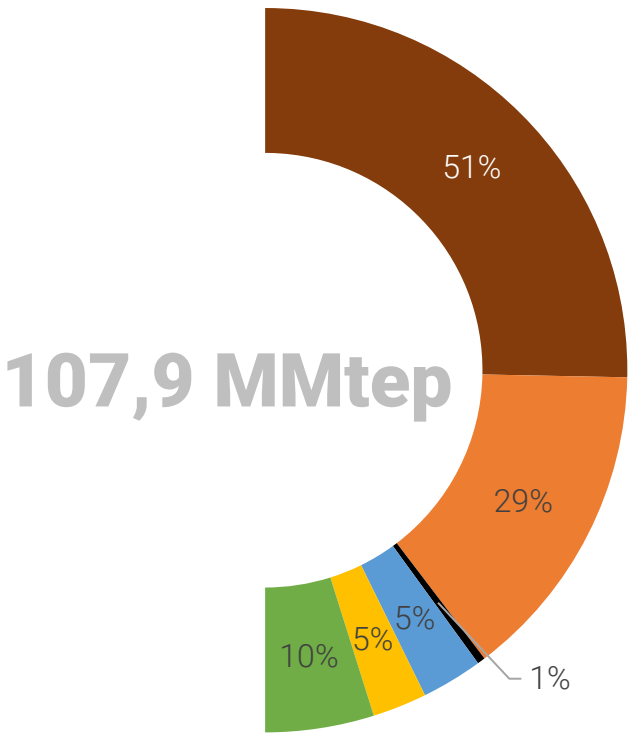


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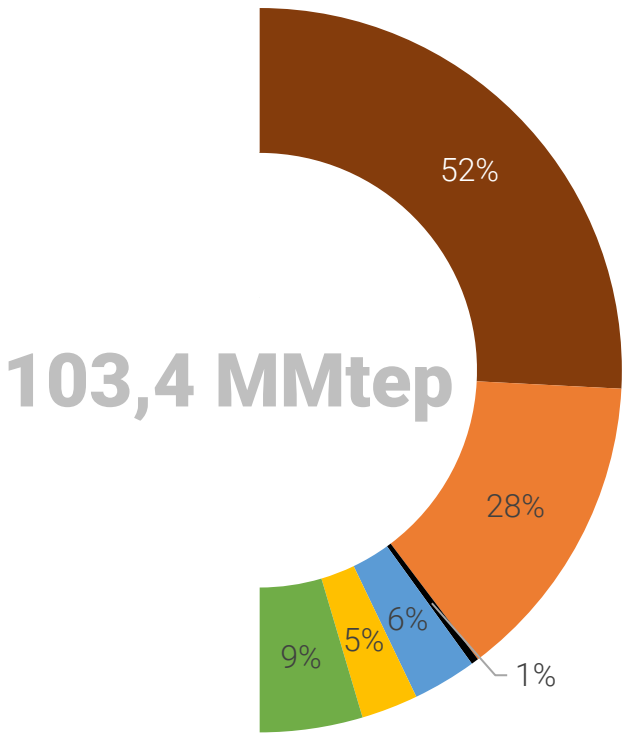
Total internal energy supply



Base Year
2015



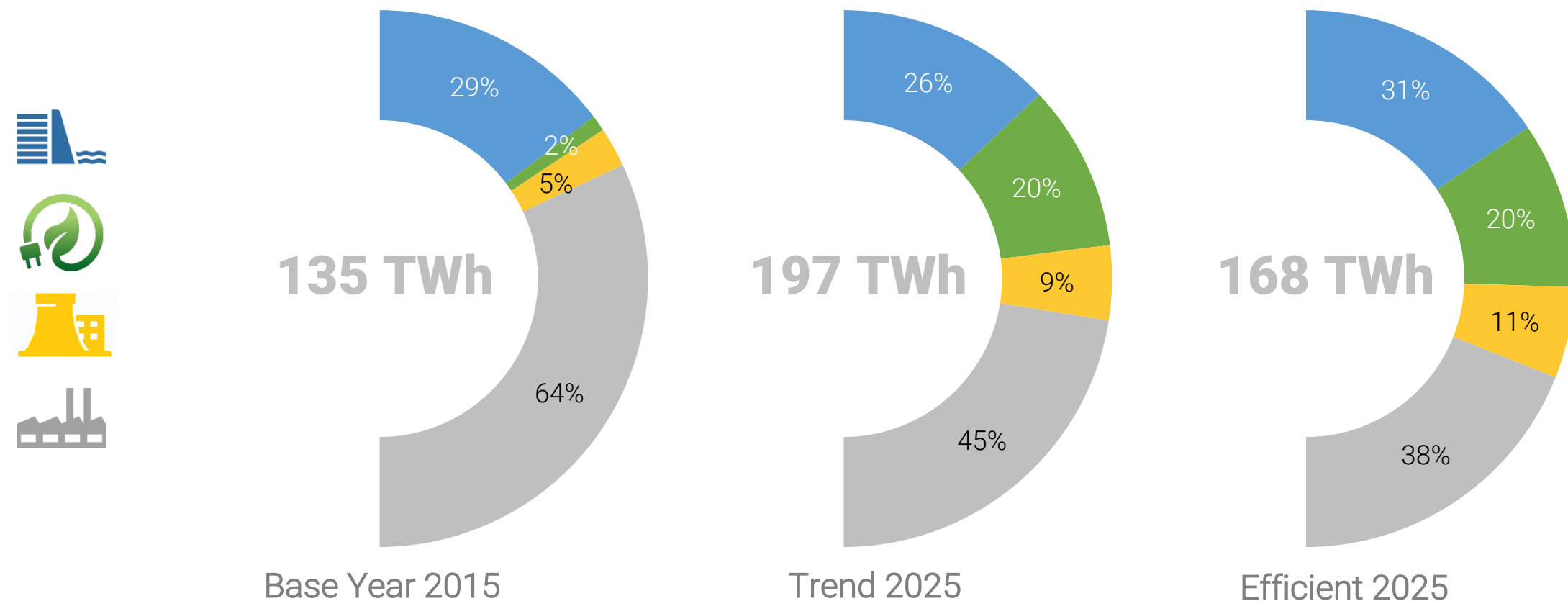
Trend Base 2025



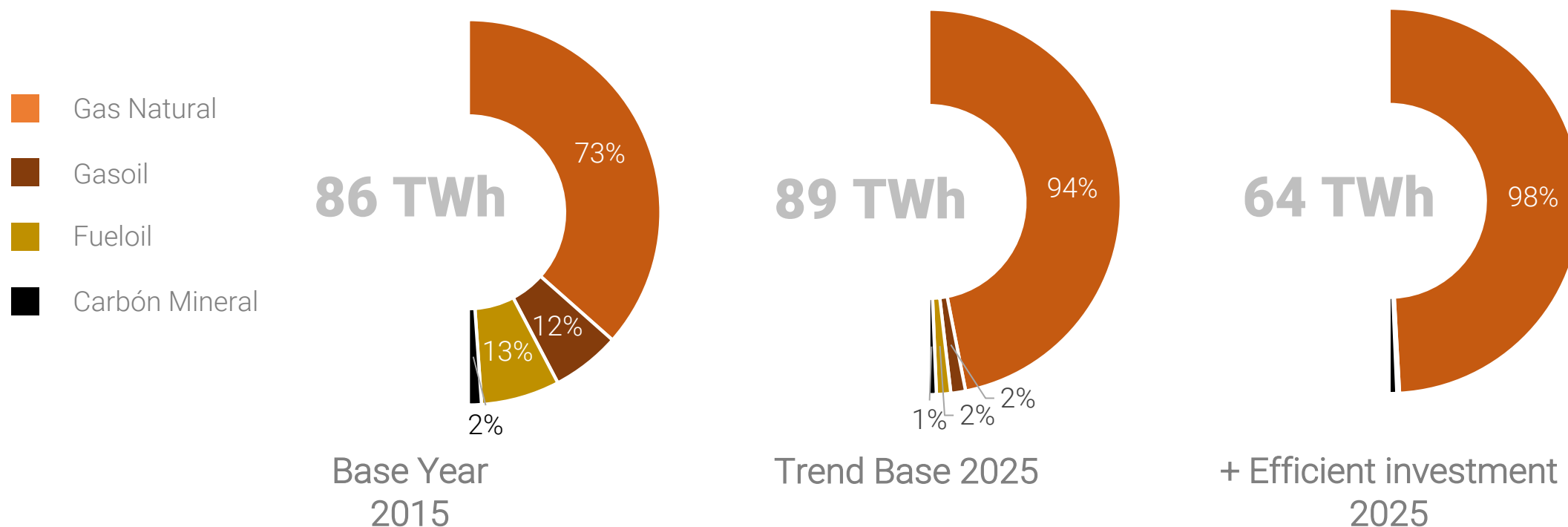
+Efficient Investment
2025

The growth of renewable energies diversifies the energy mix, despite the prevalence of hydrocarbons

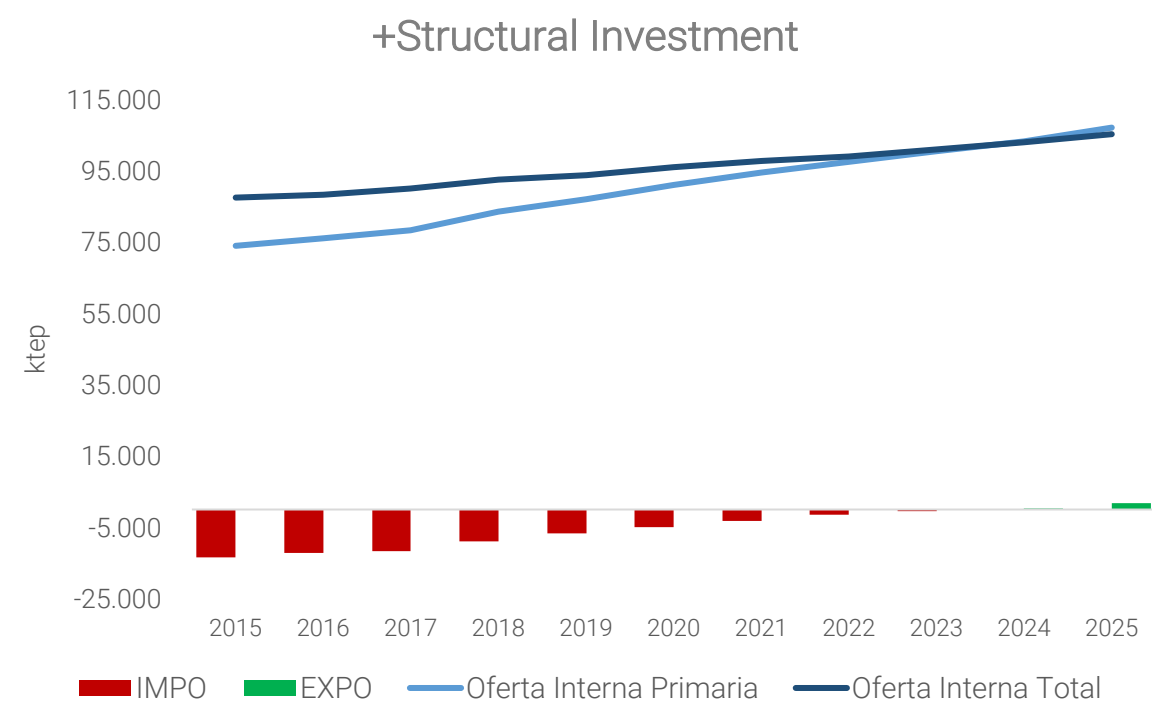
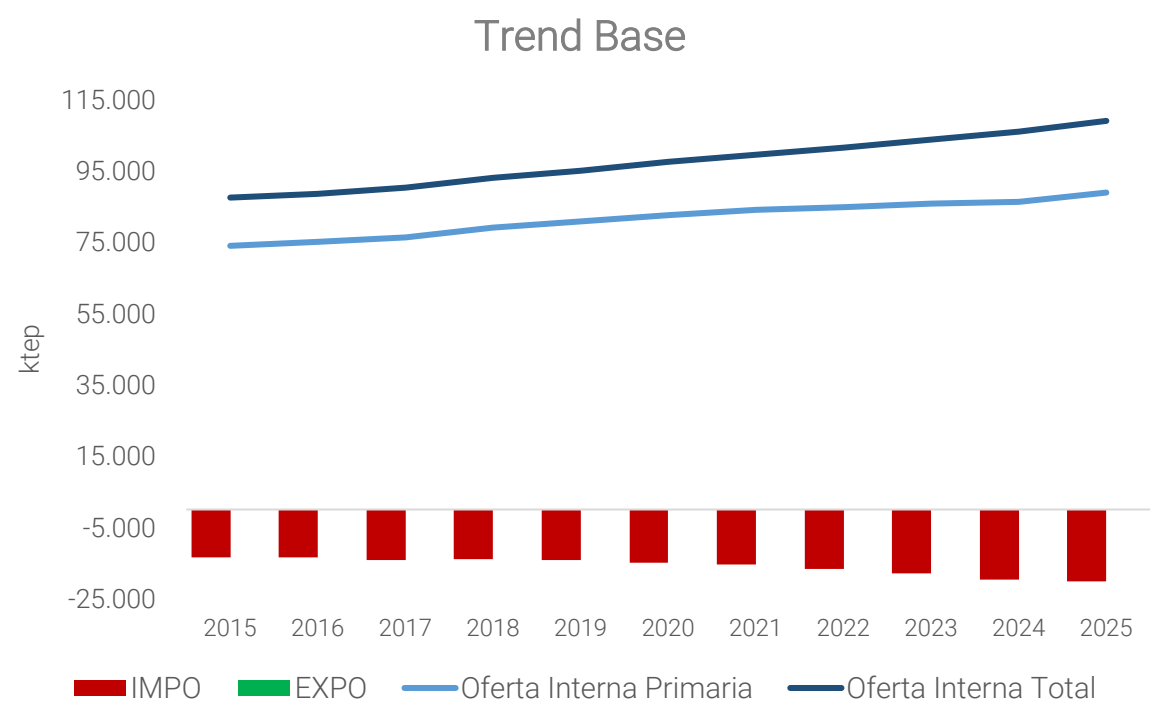
Total internal energy supply : Primary energy internal supply plus the effect of the secondary energy' trade balance.



- All the scenarios reach 20 % of electricity generation from unconventional renewable energies.
- The share of thermal generation is reduced, however, it continues to be significant.



- The increase in the availability of natural gas gradually displaces the liquid fuels consumption, and it further increases in winter.
- The scenario showing greater availability of natural gas and energy efficiency intensifies the trend towards 2020.
- During the summer and towards the end of the season there are natural gas exportable amounts.

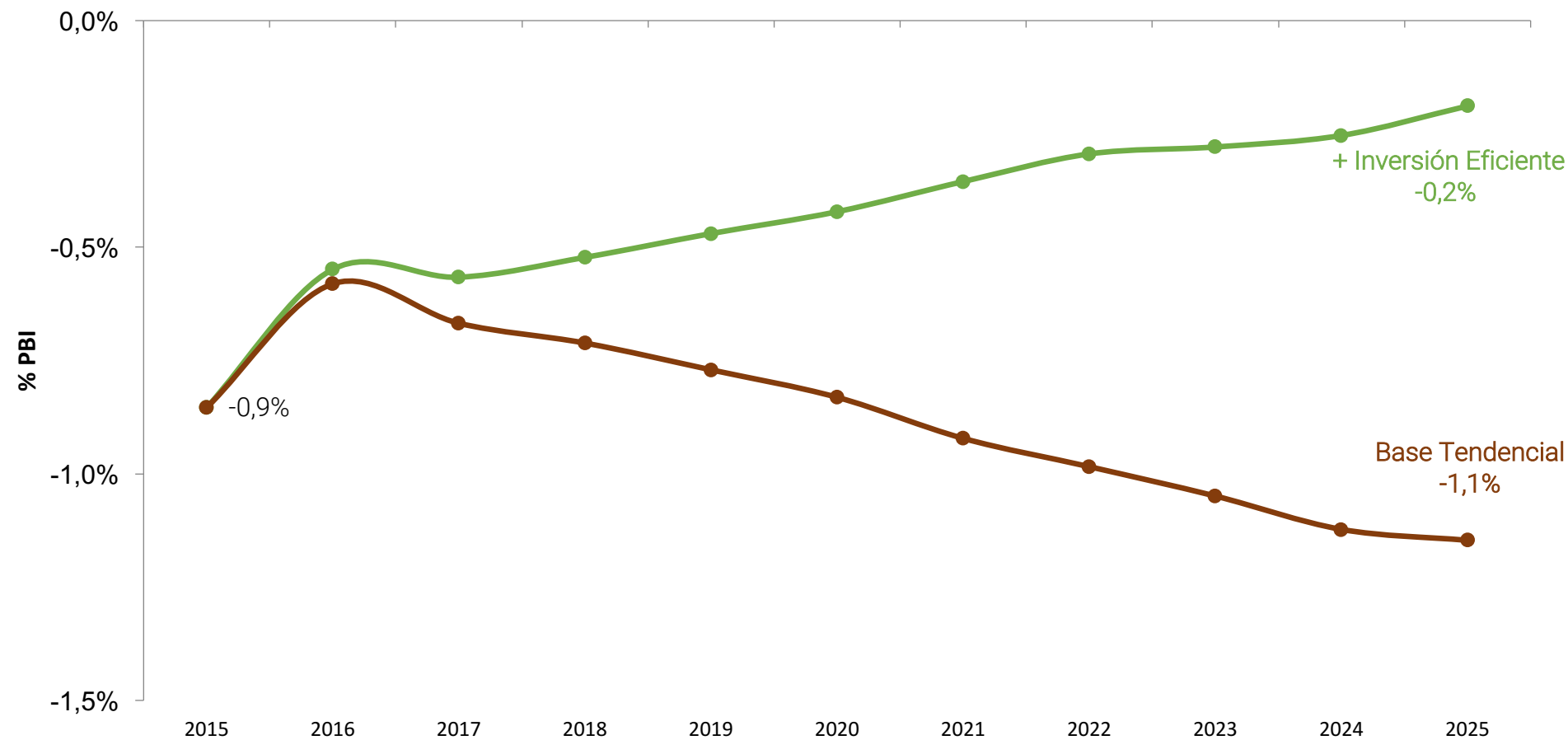


In 2023 an energy surplus is achieved in the scenario of strong investments and of energy saving and efficiency and efficient demand.

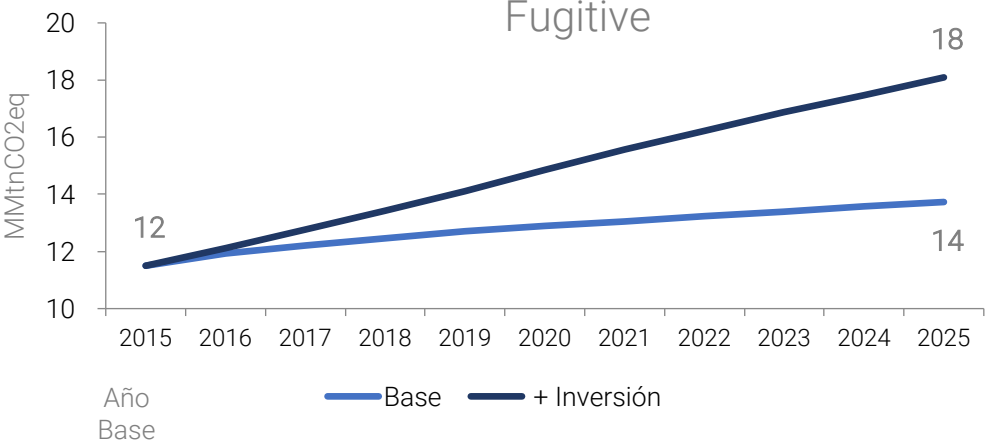
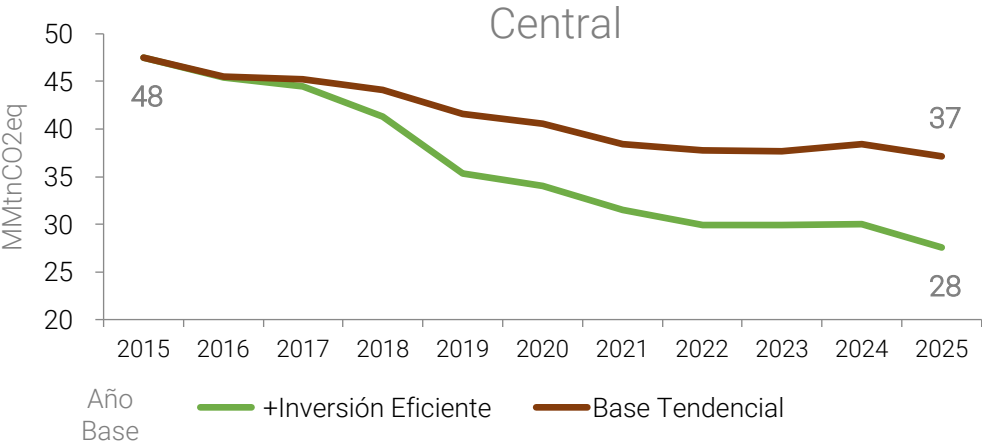
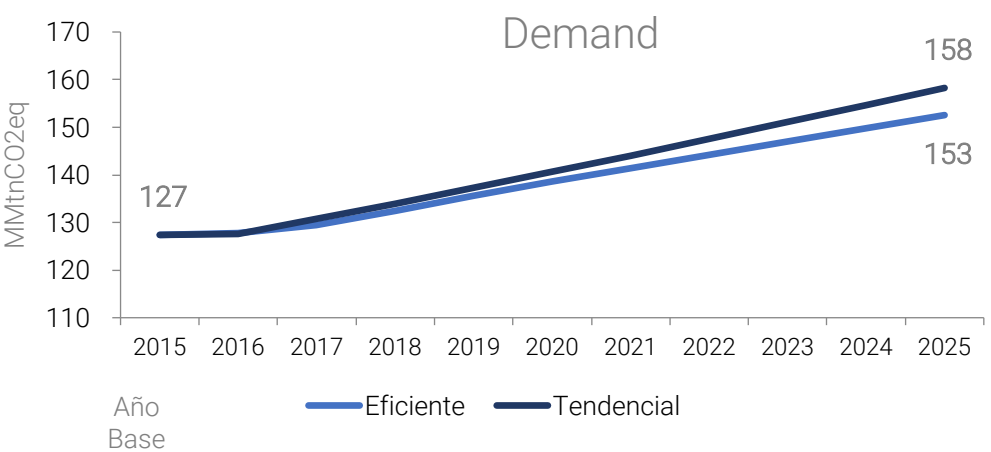
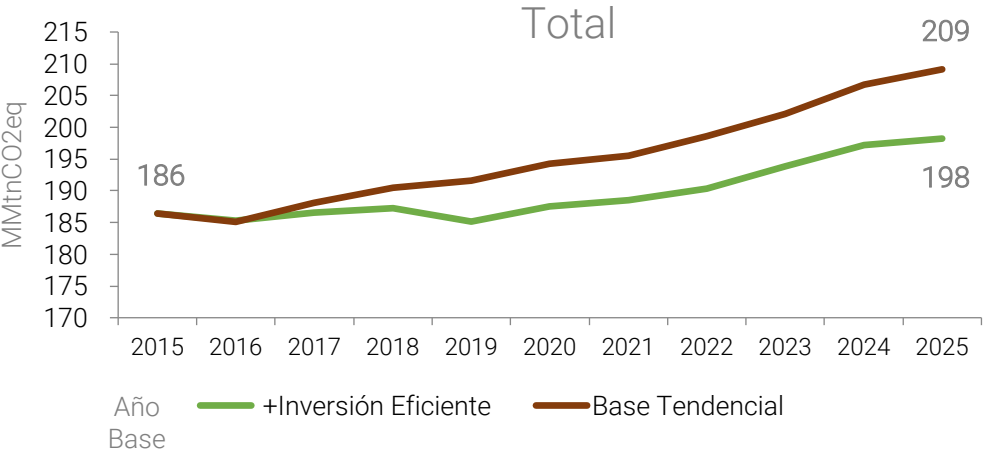
Economic and environmental impact



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Trade deficit strongly depends on the hydrocarbons production scenario and it has an impact on energy efficiency policies.



The diversification of the energy mix and the lower consumption of liquids generate a strong reduction of emissions in the power plants.

- For a 2.9 % y.y. GDP growth, if the productive investment was promoted and energy efficiency measures were implemented, the final energy demand would only increase 2.0 % y.y.
- The scenario with high investment and improvement of productivity shows that the production of natural gas would increase 57 % in that period. In this scenario:
 - There are still imports from Bolivia and LNG is required for winter peaks.
 - Seasonal exportable amounts are generated from the last five-year term.
- Crude oil production is recovered only in a high investment scenario with unconventional production of about 150 kbbl/d.
- In order to meet the electricity demand, it is necessary to install between 24 and 17 GW of additional generation capacity. Half of that additional capacity will be renewable capacity.
- Energy saving and energy efficient policies will allow for a 5.7 % reduction in the final energy consumption in 2025. There will be a greater impact on the electricity demand, where the energy saving will reach 15 %.



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