

Greece

as the potential
Balkans' Gas Hub

Gas exports almost quadrupled since Russia-Ukraine conflict started, making Greece critical to the supply of gas in Eastern Europe



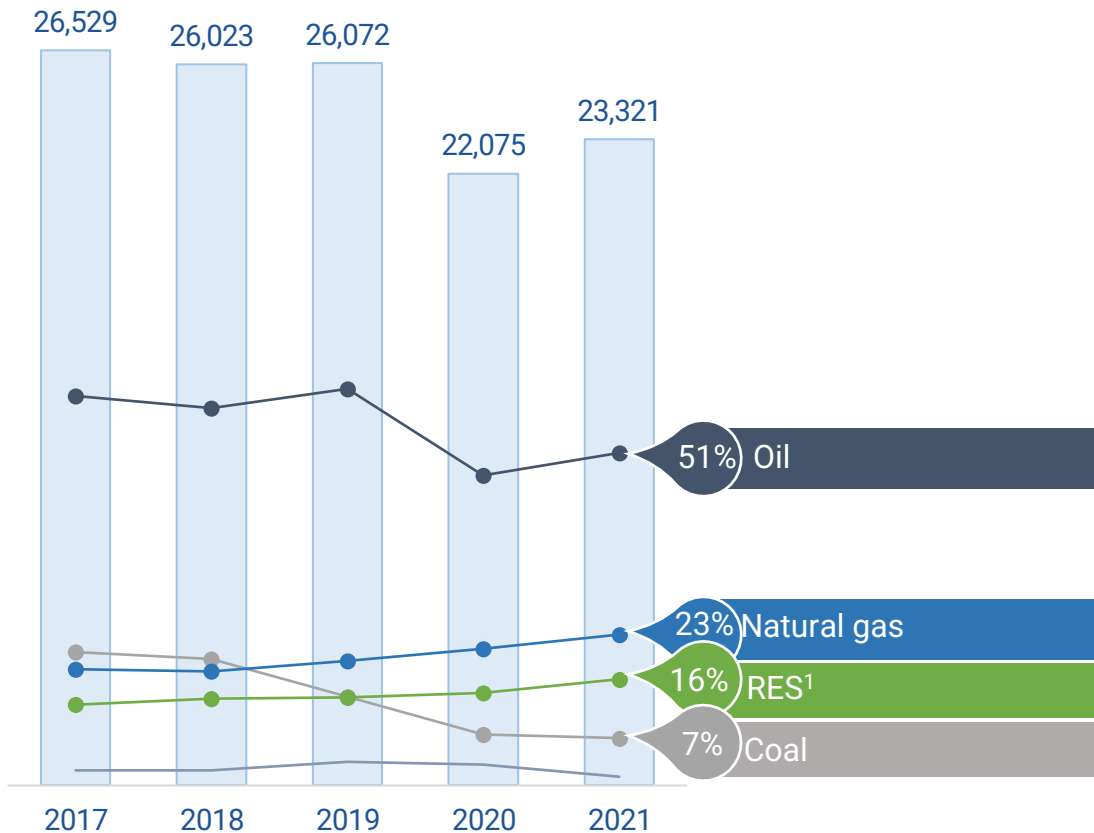
- The **Revithoussa LNG terminal** has allowed the Country not only to secure the necessary quantities of LNG during the energy crisis but also has become of increasing importance for other countries in the region (e.g., Bulgaria) to store their LNG strategic reserves
- In 2022, 29.5 TWh of Revithoussa LNG was exported (**+290% yoy**)
- The operation of the Alexandroupolis LNG and the Corinth FSRU (potentially another FSRU could be created in the port of Volos) will increase the country's capacity to store and export LNG to the region **making Greece critical to the supply of gas in Eastern Europe**
- Since the beginning of the Russia-Ukraine conflict, Greece **exported 20.41 TWh** of natural gas to other EU markets, compared with 5.17 TWh in 2021 (**+295%**)

Energy mix and outlook

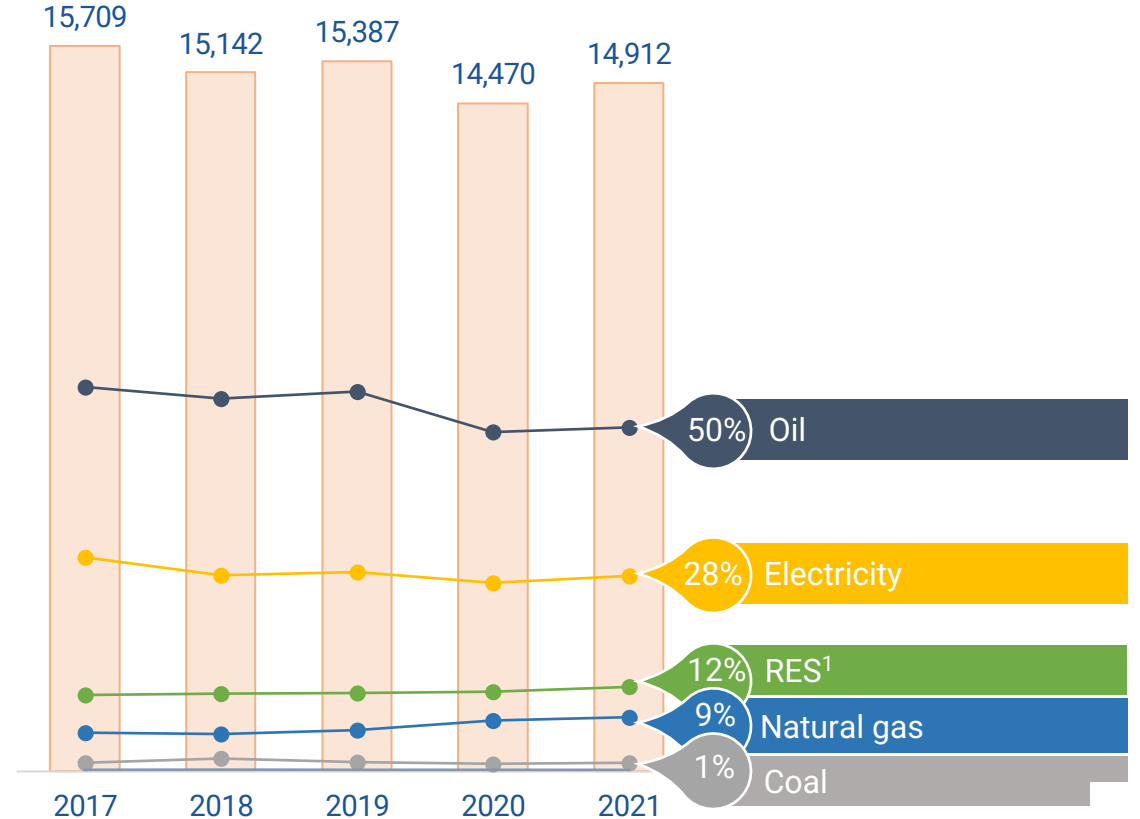
Energy consumption and sources mix

Oil is the dominant energy source in both primary and final energy mix. The decreasing use of coal drives down the carbon intensity of electricity generation, sustained by natural gas and renewables development

 Primary energy consumption
KTOE



 Final energy consumption
KTOE

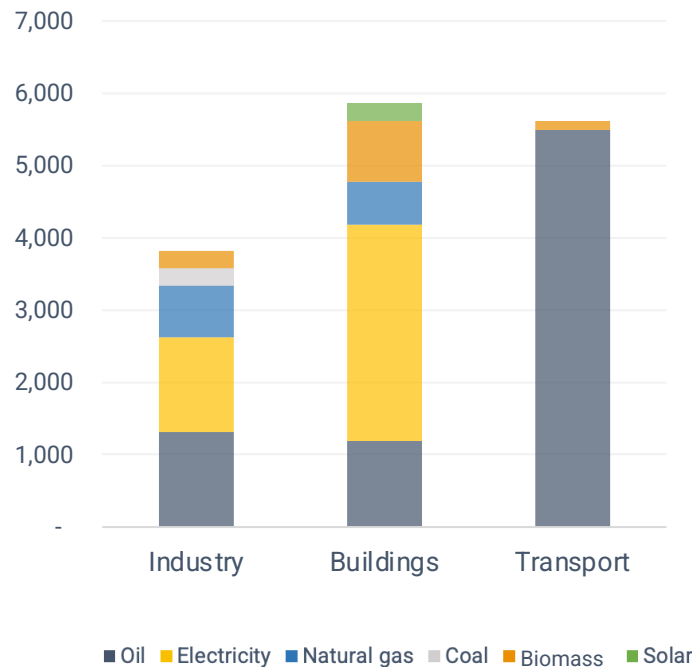


Final energy demand per sector

Buildings account for the highest share of Greece's energy demand, followed by transport and industry sectors

Energy demand per sector

2021 figures, kTOE



- **Industry** accounts for a relatively low share of total energy demand (~25% in 2021), reflecting the Greek economy's focus on the **service sector**
- ~50% of **buildings' demand** is covered by **electricity**, 21% by **oil** (ongoing shift from oil-fired to more efficient heating systems)
- Greece shows a relatively high share of buildings energy demand covered by **solar thermal** (**5.1% in 2021** vs the global average of 0.6%)
- **Transport** sector remains almost **completely reliant on oil**

Residential buildings

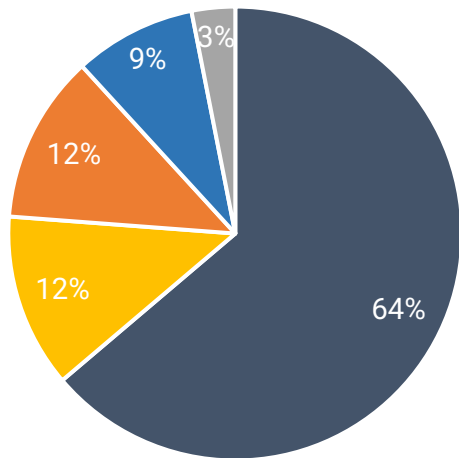
Thermal energy consumption by fuel

The most widely used fuel for thermal energy of households is oil, followed by electricity, mainly for hobs and boilers, and biomass



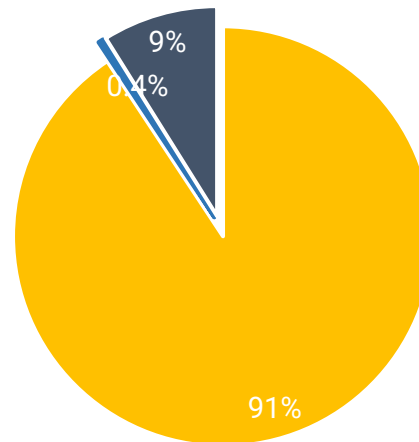
Heating system

85.9% share of thermal energy



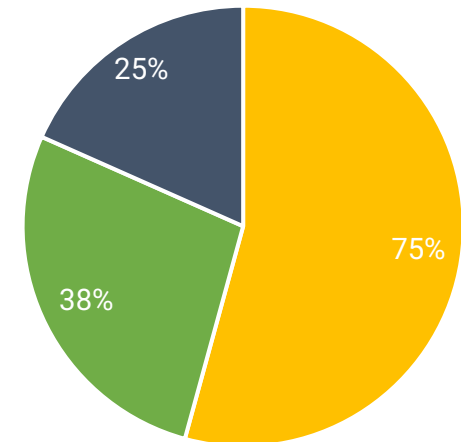
Cooking

9.7% share of thermal energy



Domestic hot water

4.4% share of thermal energy



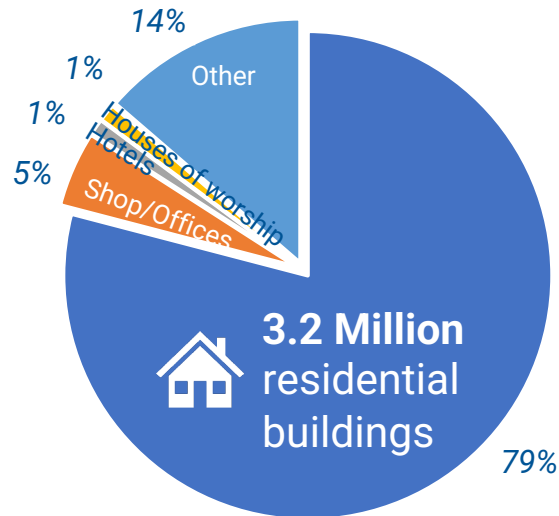
Oil Electricity Natural gas Biomass Solar

Greek buildings

~97% of Greek buildings are privately owned and just 3% are owned by the public sector. Also, most buildings are owner-occupied and that just 23% of buildings are rented

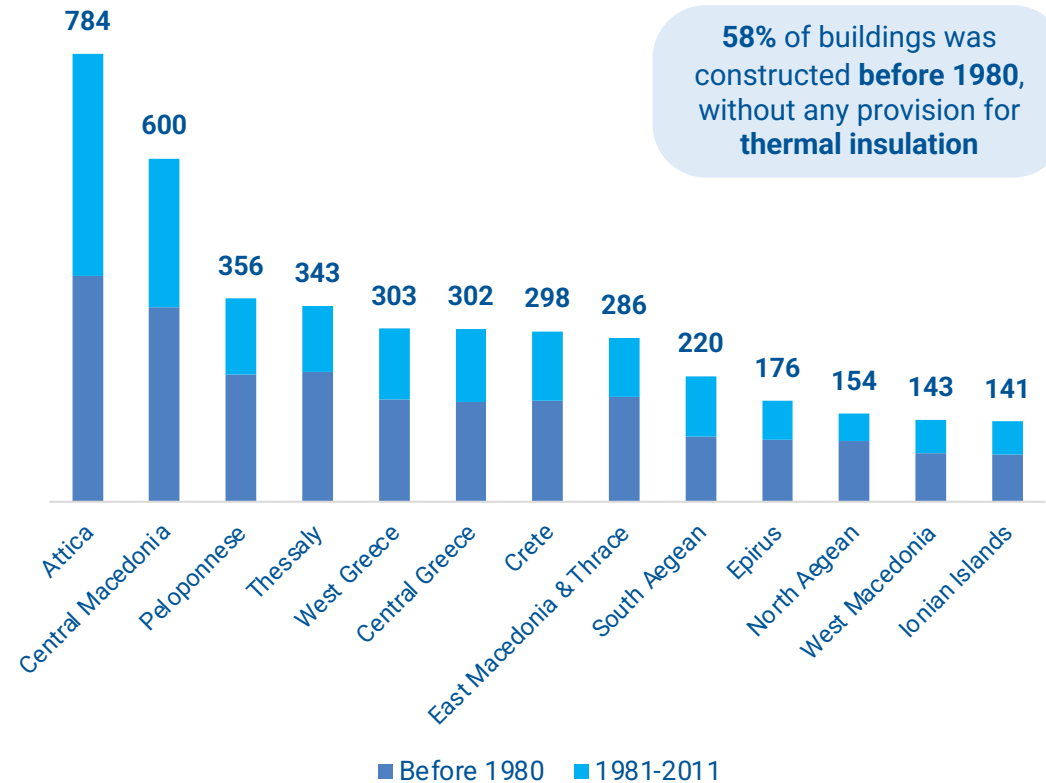


4.1 Million total buildings



Buildings by region and period of construction

Thousand buildings



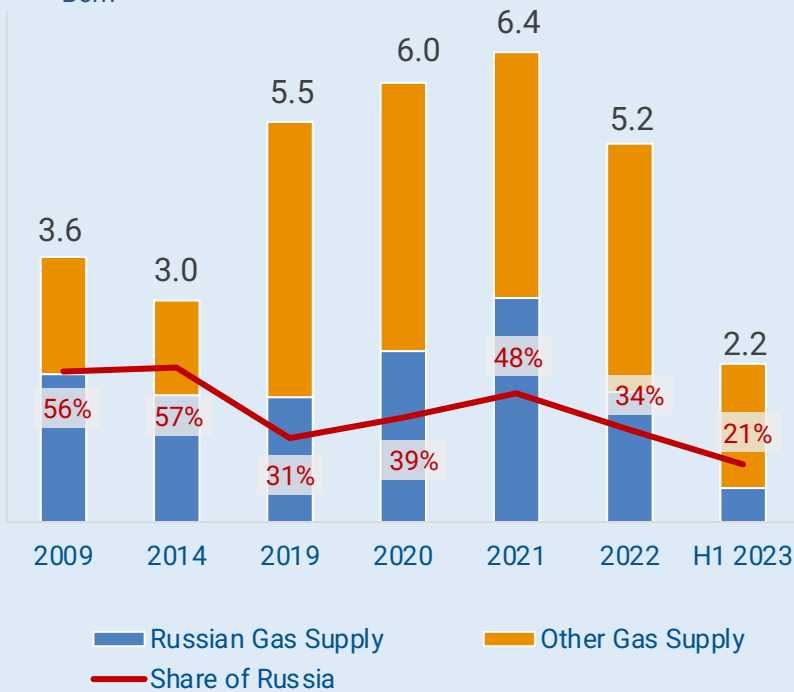
Greek gas supply

Reducing reliance on Russian gas

The first half of 2023 saw a 21% decline in domestic consumption vs the corresponding period of the previous year and a remarkable increase in natural gas exports of ~1 Bcm

Greece gas supply¹ and Russian %

Bcm



Note: (1) Excluding exports
Source: Eurostat, IEA - Reliance on Russian Fossil Fuels Data Explorer, Desfa



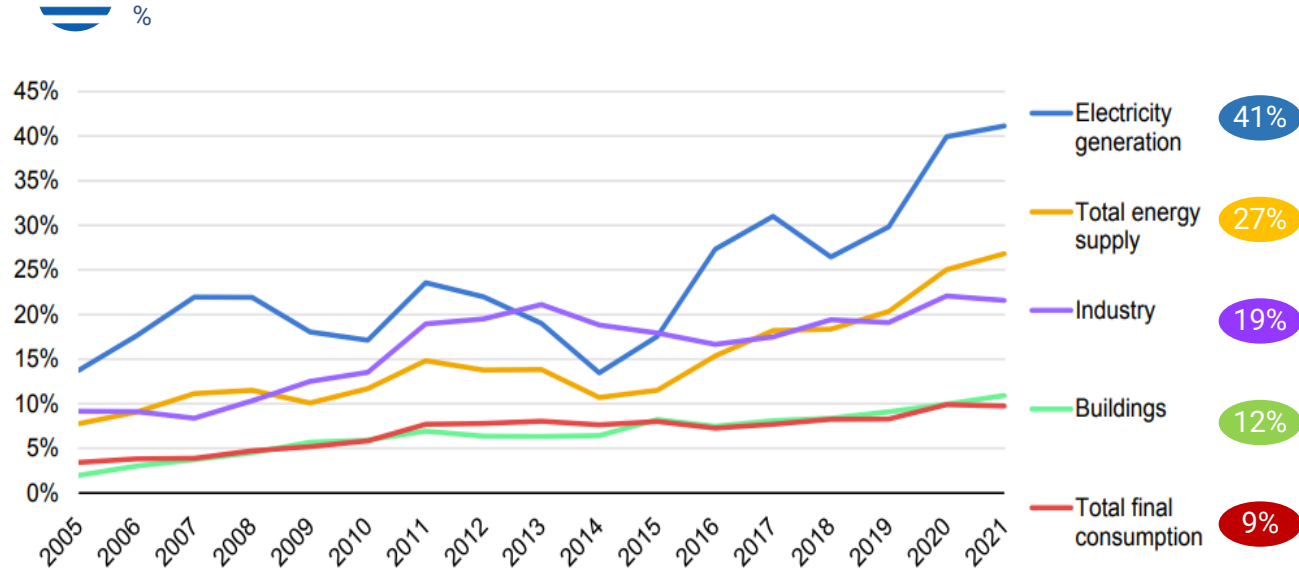
Greek gas demand

An increasing trend

Natural gas is playing an increasing role in the Greek energy system. The demand increased from 3 bcm to 5.2 bcm in less than 10 years, driven mainly by a transition from lignite to gas-fired generation, along with increased gas demand from industry and buildings.



Share of natural gas in Greece's energy system

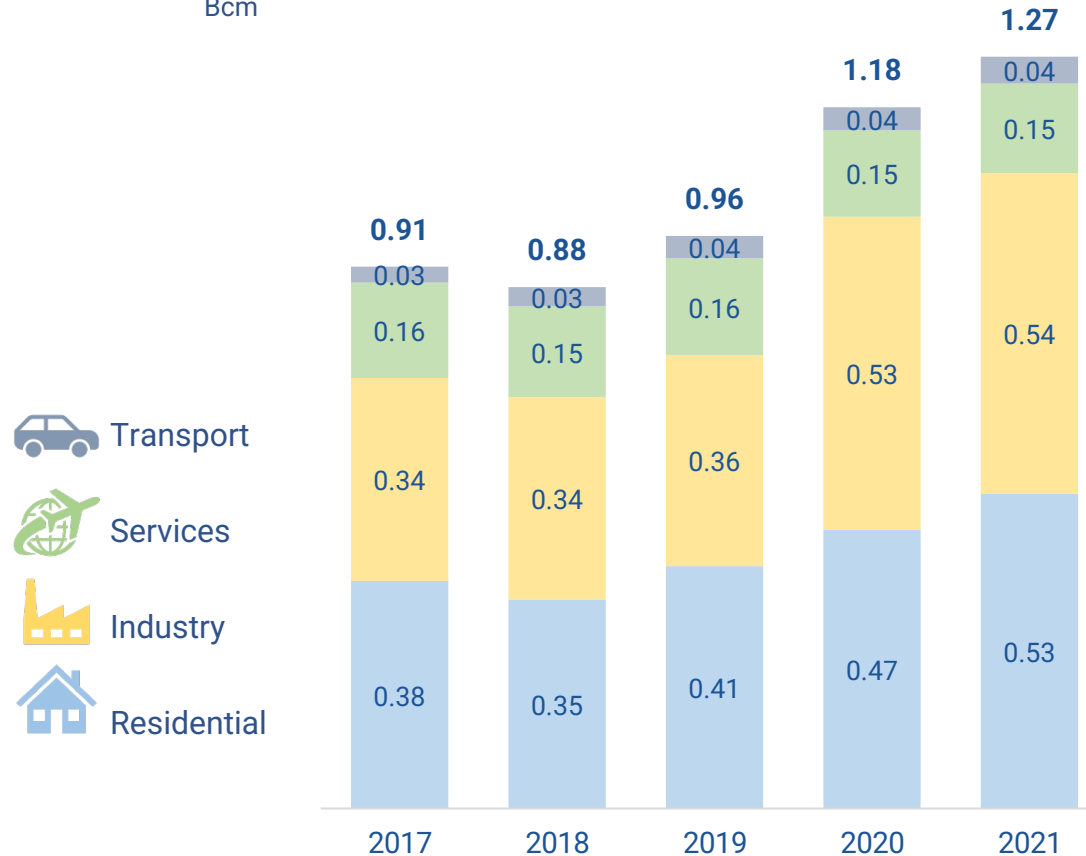


- Gas-fired power plants have a key role in **system balancing** and maintaining **security of electricity supply**
- Gas is almost **completely imported** via pipeline and **LNG** (44% in 2022, thanks to new contracts to substitute Russian gas)
- Important role in the path to cut emissions, by **reducing oil demand** of buildings heating and industry

Final gas consumption

Final consumption of natural gas has increased by 40% in the past 5 years and is expected to play an important role in decarbonizing energy demand

Final gas consumption per sector
Bcm



+40%
in 5 years

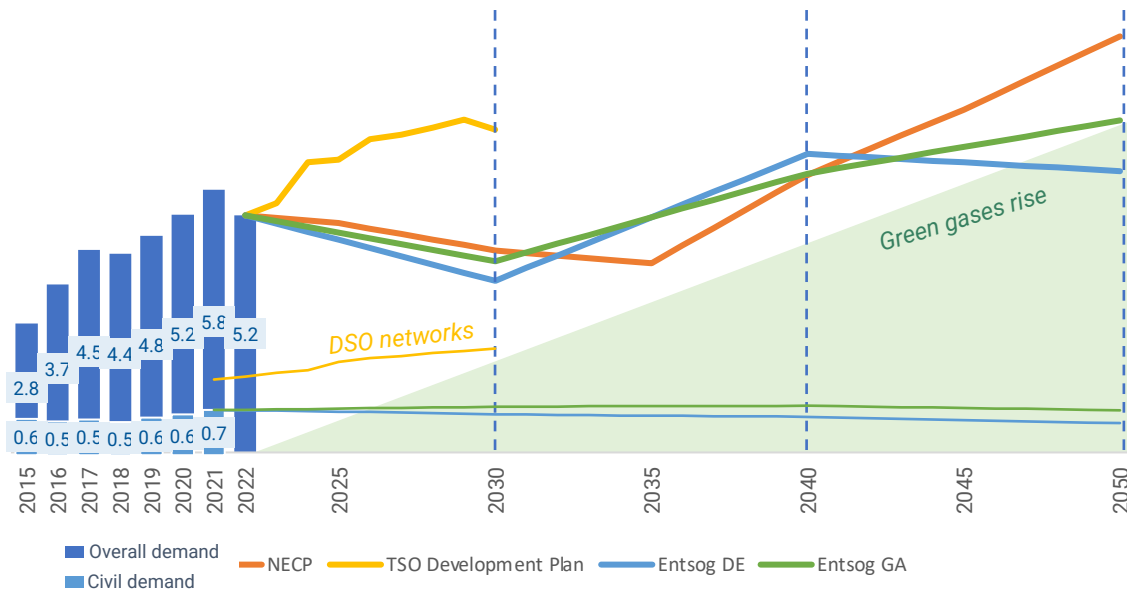
- Gas demand increases in **residential** (7% CAGR_{5years}) and **industry** sector (10% CAGR_{5years}), while it remains stable in **services** sector
- The gas distribution network is currently limited, with only **8.3% of buildings** having a natural gas connection
- **Higher** gas consumption is expected in the next years, thanks to the **development** of new gas networks and the entry of **renewable gases** into the energy mix

Greek Gas Demand Scenarios

Greek gas demand is expected to grow, pushed by the new methanizations and the future increase of green gases in the energy mix

Greek gas demand and civil outlook

Bcm



~20%¹

Gas incidence in final uses in 2030

(vs 8% in 2021)

+35%

Gas volumes in the distribution network by 2030

Vs 2022

- Latest scenario to 2030 foresees an **increase of gas demand**, due to the **gasification of new areas** (West Macedonia, West Greece, Peloponnese, Epirus) and increasing **SSLNG services**
- **Biomethane production potential of ~1 Bcm by 2030**
- **Hydrogen is expected to cover ~2-3 Bcm by 2040**, mainly addressed to the mobility sector

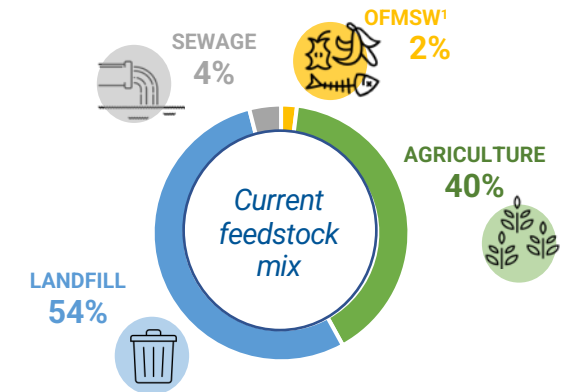
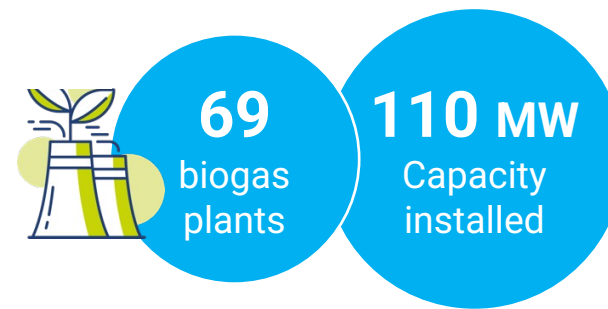
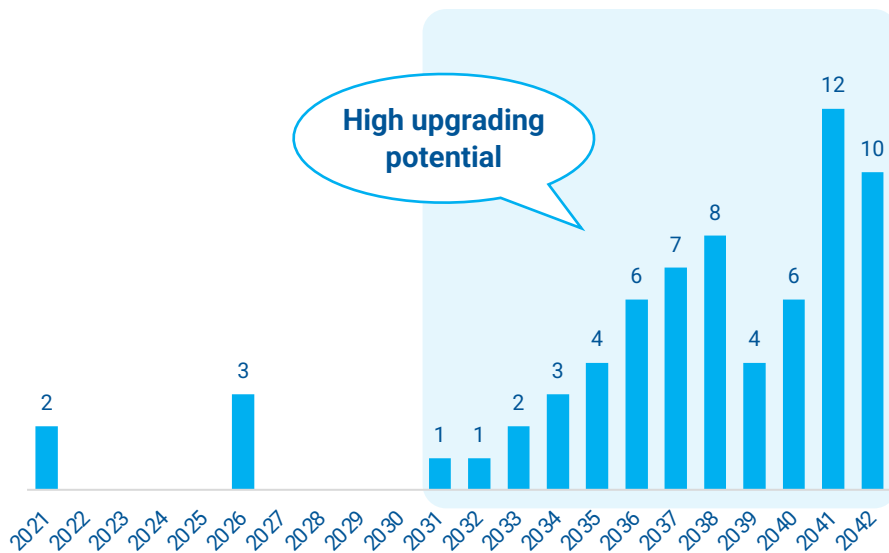
The overall **incidence of gas in final energy uses is expected to grow to ~20%** (more than double the historical values)

Biogas

Current footprint

In Greece, starting from 2011, 69 biogas plants have been constructed, with a capacity of more than 110 MW electricity, mainly from landfills and agriculture

Biogas plants ending the incentive period
Number



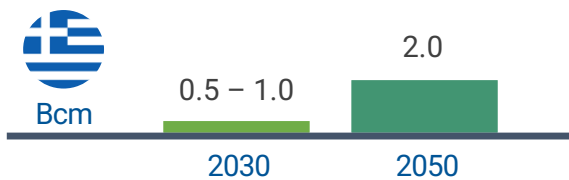
Incentive schemes

- **Feed-in tariff** of 100-220 €/MWh depending on the feedstock and the plant size
- **20 years** of incentive duration

Biomethane potentials

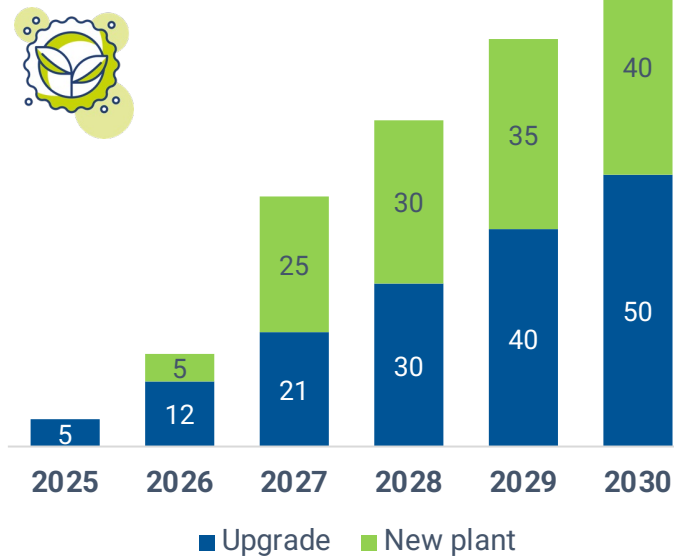
A significant scale-up of biomethane is expected by 2030 and 2050, but a well-defined incentive scheme is still missing

EBA projections for 2030-2050



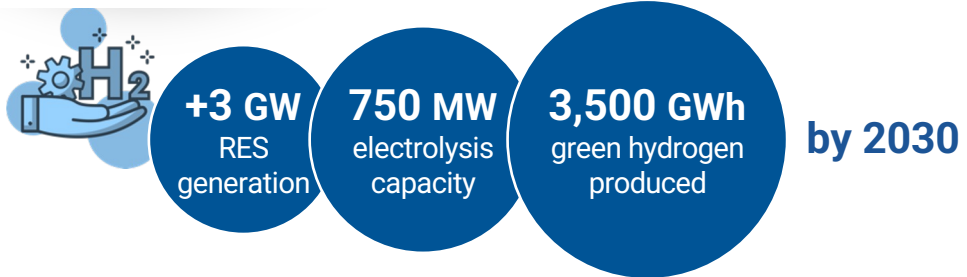
Upgraded and new biomethane plants to connect to the Greek DSO network¹

Cumulative numbers



Hydrogen

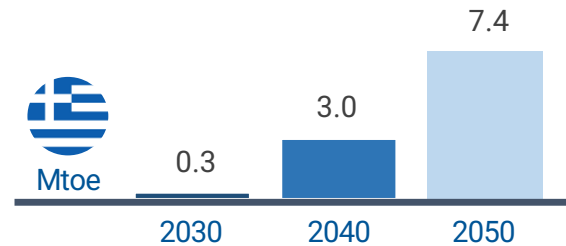
Need of 3-4 B€ investments to develop a domestic green hydrogen supply chain, considering new dedicated renewable generation and electrolysis capacity



Hydrogen applications

- Replacing oil in **industry** and **transport** sectors
- Penetration in the **shipping** sector
- Application for long-term **electricity storage**

Production projections for 2030-2050

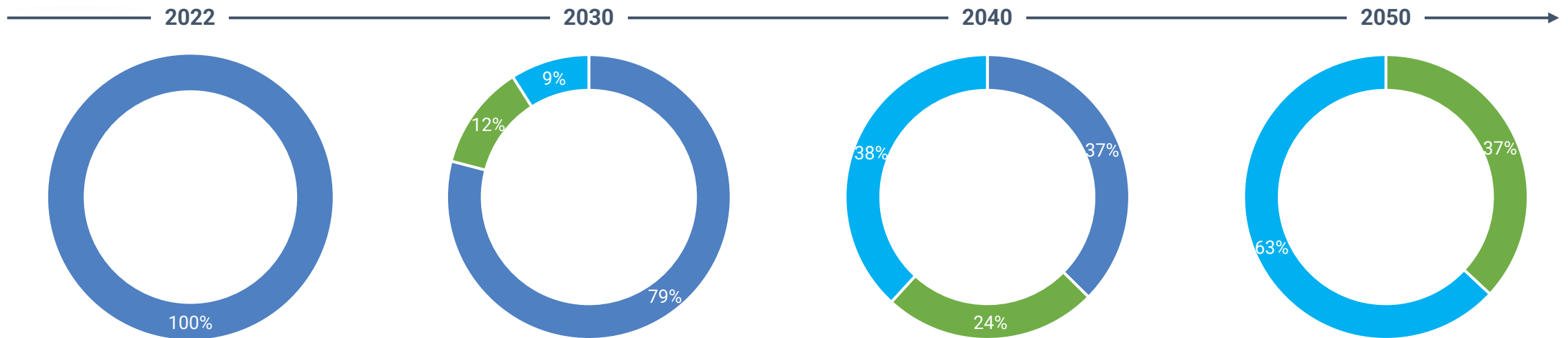


Currently Greek hydrogen strategy is in draft

Changes in the gas mix

The path to Net Zero 2050

From 2022 to 2050, biomethane and hydrogen take centre stage, progressively increasing their share in the energy mix to achieve EU Net Zero goals



- Natural gas
- Biomethane
- Hydrogen



Towards a **reimagined energy system**, where **biomethane** has a major role to decarbonize gas sector in **short-term**, while **hydrogen** will give its crucial contribution later (after reaching **economic competitiveness**).

National energy policies

Greek energy market revisions

New strategies for renewable gases

With adoption of RED II Greece intends to increase the share of biomethane and hydrogen injection into the grid, boosting the energy efficiency targets by 2030

National Climate Law

The National Climate Law (GG A' 105/2022), which was adopted in 2022, provides a general statement of intent regarding the **gradual substitution of natural gas with renewable gases such as biomethane and green hydrogen**, especially in the transport and industry sectors

RES gases In Natural Gas Distribution Grids

On March 28, 2023 Law 3747/2023 has been published on the Official Legislative Journal. Article 105 disciplines the access of renewable gases, among which biomethane, to natural gas grids. Specifically, where technically feasible and safe, natural gas infrastructures and distribution grids are allowed to receive biomethane. Furthermore, renewable gases will now fall under the Authority's scope (RAEWW).

National Strategies

The National Strategy for the Promotion of Technologies – Applications of Hydrogen and Renewable Gases has already been submitted to the Ministry of Energy & Environment and is expected to be published soon.

From December 2020 a Special Committee has been working to formulate a **National Hydrogen Strategy**. The initial draft Strategy was submitted to the Minister of Environment & Energy in summer 2022.

By 2040 Greece targets a production of about 3 Mtoe of green hydrogen and export 1 Mtoe. By 2050 ~7.4 Mtoe and export 2.3 Mtoe, which corresponds to an export value of 1.6 billion euros per year. The total turnover of the hydrogen supply chain in Greece will be in the order of €10 billion per year in 2050.

By then, approximately 60 gigawatts of renewable energy sources will be required to power electrolysis units (30 GW by 2040).

National Energy & Climate Plan

The National Energy & Climate Plan (GG B'4893/2019) is currently subject of a public consultation. The NECP in force includes general provisions and statements of intent targeted towards the **support of renewable gases**. The revised NECP is expected to be **supplemented with specific targets on production and injection of biomethane and hydrogen (% blend with natural gas)**

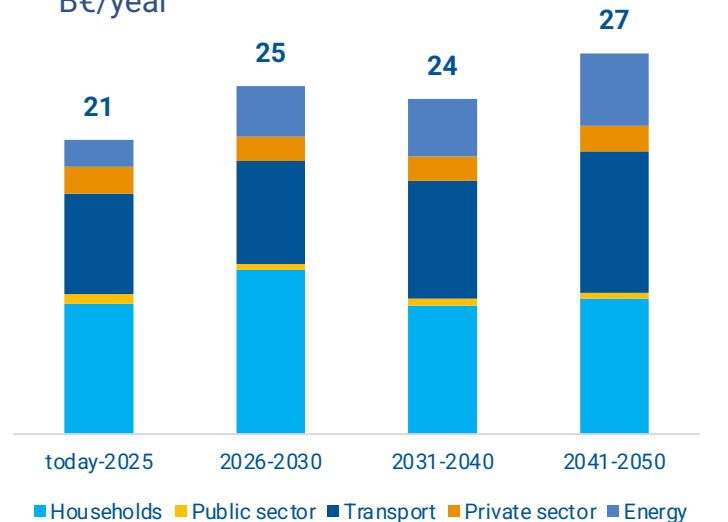
Green energy transition requires an increase in investments, corresponding to ~20% of GDP in 2030



- **44% RES** as a share of total gross energy consumption (vs 35% of previous plan); specific targets are assigned to different sectors (e.g., 79% RES in electricity consumption, 46% for heating and cooling, 29% in transport)
- **27.3 GW RES production** with 5.3 GW of storage capacity (~20% of total production)
- **5-7% energy efficiency** vs 2020 reference scenario (strong effort required to building sector – 15% reduction in consumption vs 2021 – thanks to heat pumps and lighting)
- **1.4% renovation rate** of residential buildings (vs current 0.8%)
- **2.1 TWh/y of biomethane produced**, corresponding to 10.8% share of total distributed gas
- **4.4 TWh/y of green hydrogen produced** with 1.7 GW of electrolysis capacity
- **5.8% share of hydrogen** in distributed gas

Average annual investment and consumer expenditure

B€/year



National Recovery and Resilience Plan

Among the 27 Member-States of the EU, the highest RRF Funds, as a % of GDP, have been allocated to Greece, with more than 18 B€ grants¹, of which 6.2 B€ dedicated to green transition

4 pillars

Green transition



Digital transformation



Employment-Skills-Social cohesion



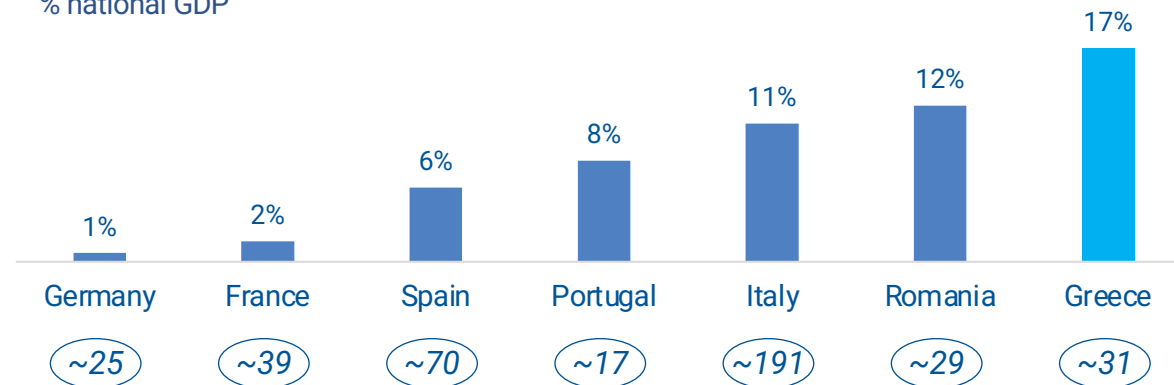
Private investments and transformation of the economy



- Improve energy efficiency and digitize, e-monitoring of energy consumption, including the **installation of smart meters**
- **Interconnect the islands** to the mainland's electrical grid (in particular the connection of the Cyclades Islands)
- **Phase out lignite**-based power production by 2028
- Contribute to an **enhancement of the energy supply security** and foster the optimum operation of the energy markets

Funding for Recovery and Resilience Plans²

% national GDP



Total amount of RRF plans, B€

~25

~39

~70

~17

~191

~29

~31