Infrastructure in Greece

Funding the future

October 2020

pwc

Content overview

The investment gap in Greek infrastructure is about

0.8pp of GDP

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Executive summary

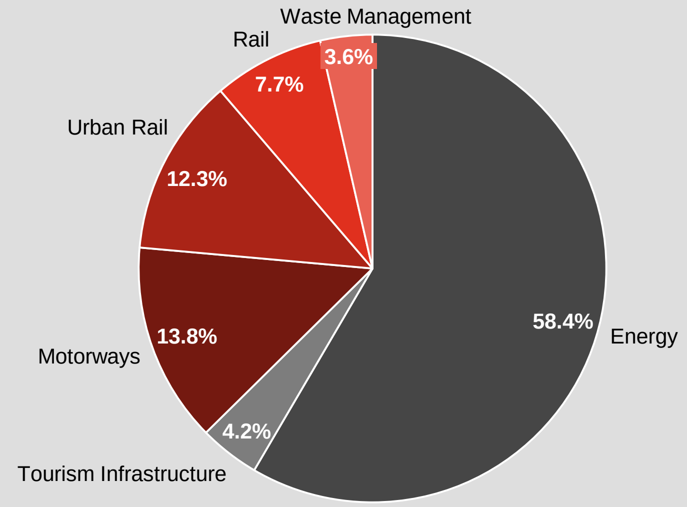
Executive Summary (1/2)

Funding the future

- Global infrastructure needs are expected to reach around $ 77trln by 2040
- Greece ranks 37th globally and 18th among the EU countries in terms of infrastructure quality
- There is an infrastructure investment gap of about 0.8pp of GDP (against the European average) translating into an average spending shortage of € 1.5bn per year
- Infrastructure investments have an economic multiplier of 1.8x, which boosts demand across the economy
- The infrastructure pipeline, i.e. projects in progress or prepared but not yet funded, amounts to 118 projects with a budget of € 43.4bn
- The pipeline is higher than in the past due to addition of new high cost projects in the preparation phase
- € 25.4bn of the budget refers to Energy projects, while € 8.7bn to Railways and € 6bn to Motorways. Tourist infrastructure and Waste management projects account for a small part of the remaining budget taking up only about € 1.8bn and € 1.6bn respectively
- The infrastructure pipeline is concentrated (58%) on energy interconnection and generation

€ 43.4bn total infrastructure budget

Infrastructure work in progress and upcoming projects

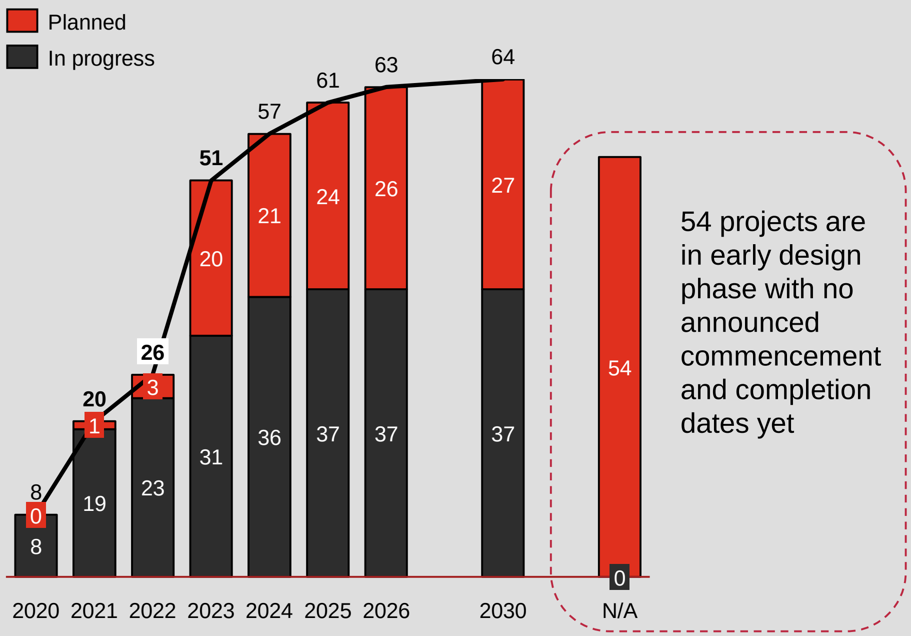


Source: Press, PwC calculations

Executive Summary (2/2)

- The current project portfolio is heavy on energy and transport but short on connectivity, tourism and the environment
- Investment on tourist product upgrading, as well as water and waste management have a significant impact on the development and improvement of the life quality
- The majority of the infrastructure projects are behind the starting line, either in the maturity phase or the bidding and contracting stage
- Only 37 projects are in the construction phase, while 81 are in the designing phase, with 54 of them not having a start/completion date
- The majority of the infrastructure projects funded by the NSRF are not completed yet, despite the fact that we are reaching the end of the current period, with the level of payments still at very low levels
- In order to accelerate the infrastructure projects in the following years, the private sector's contribution could be actively used, through the mechanism of unsolicited proposals and the creation of the correct institutional framework

Estimated Completion year (cumulative)
Number of projects



Source: Press, PwC calculations

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Infrastructure investment

Definition of infrastructure

- **"Infrastructure is the system of public works in a country, state or region, including roads, utility lines and public buildings"**

  OECD

- **"Infrastructure is "the basic framework for delivering energy, transport, water & sanitation and information & communication technology (ICT) services to people affecting directly or indirectly their lives"**

  World Bank

In the study, we have included projects with regards to **transport** (airport, ports, roads & rail), **energy** (electricity, oil & gas) as well as **water & sewage**, whilst ICT and Social Infrastructure (e.g. Hospitals, Schools, Public Buildings, Sport Structures and Green Areas) have been excluded

Information & Communications Technology, according to the World Bank, refers to physical telecommunications systems and networks (cellar, broadcast, cable, satellite, postal) and the services that utilize them (internet, voice, mail, radio, and television)

Global Megatrends

11 Megatrends have emerged as the main challenges that will affect both growth models and way of living in the future

Megatrends are defined as the long-term and irreversible processes that will affect specific sectors as well as the realm of public policy

The 11 Megatrends

1. Ageing of population
2. Urbanization
3. Diseases transmission
4. Technological change
5. Sustainable economic growth
6. Global competition for resources
7. Emergence of new economic powers
8. Growing pressure on ecosystems
9. Climate change
10. Environmental pollution
11. Diversifying approaches to governance

Investments in Infrastructure

- **Urban Transport Infrastructure**
  - urban rail lines
  - urban roads
- **Waste Management Infrastructure**

- **Transport infrastructure at national level**
  - road & rail network
  - ports
  - airports

- **Interconnection of Infrastructure & Transportation Network** and integration in the new global trade flows

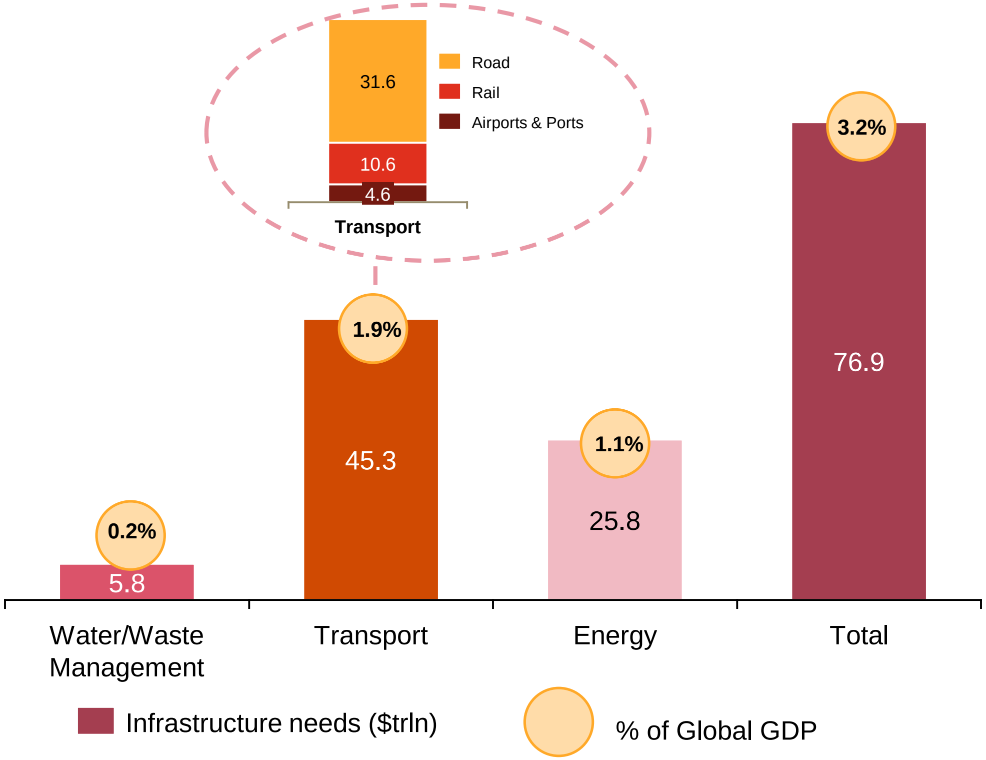
- **Energy Infrastructure**
  - gas distribution & storage network
  - RES
  - island & mainland electricity interconnection

Source: The European Environment, State and Outlook 2015, Assessment of Global Megatrends

Global infrastructure could require up to $ 77trln of investment by 2040

In the period 2019-2040, **3.2% of global GDP** needs to be invested in water infrastructure, road & rail transportation, airports and ports, energy

Traditional funding sources are no longer enough to cover the rapid increase in infrastructure projects, which are expected to reach $ 3.5trln p.a. until 2040

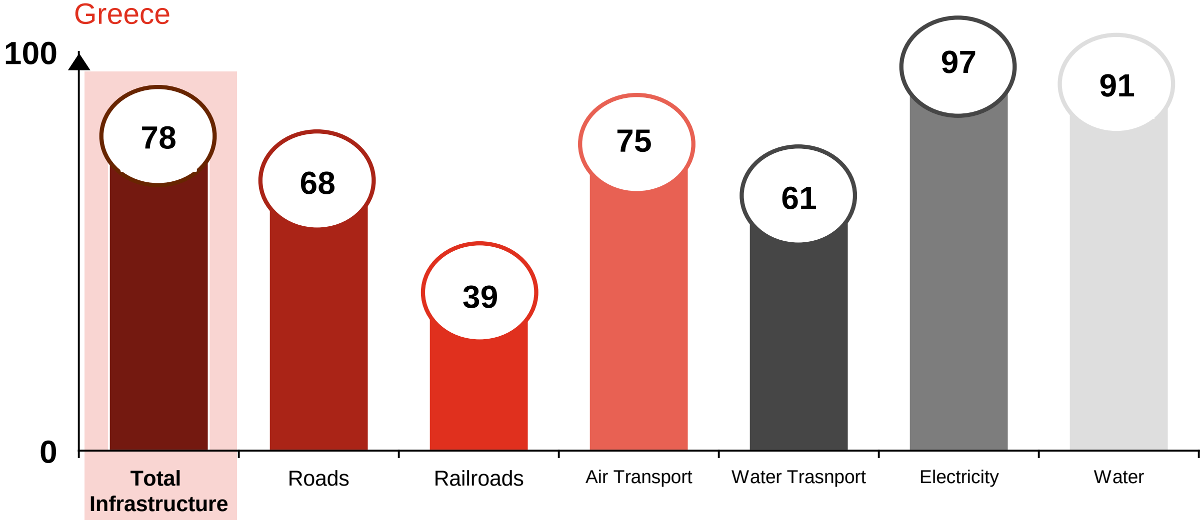


Source: Global Infrastructure Outlook, Oxford Economics

Infrastructure extent and quality index

Greece ranks low relatively to its global peers

Infrastructure index (scale:0-100*)
Greece



Source: The Global Competitiveness Report 2019

* Indices are expressed on a 0 to 100 scale and are interpreted as "progress scores", indicating how close a country is to the ideal state

Ranking in infrastructure (141 countries)

Best performer (1st)	Singapore	Singapore	Japan	Japan	Singapore	9 countries**	Iceland
Ελλάδα	37th	51st	51st	26th	26th	33rd	37th

** Bahrain, Chile, Finland, Hong Kong, Iceland, South Korea, Luxembourg, Singapore, Taiwan

The **infrastructure index** captures the quality and extent of transport and utility infrastructure

Transport Infrastructure

I. Road
- Quality of road network
- Quality of road infrastructure

II. Rail
- Railroad density
- Efficiency of train services

III. Air
- Airport connectivity
- Efficiency of transport services

IV. Sea
- Shipping connectivity***
- Efficiency of seaport services

Utility infrastructure

I. Electricity
- Electricity access
- Electricity quality

II. Water
- Exposure to unsafe drinking water
- Reliability of water supply

*** For landlocked countries, this indicator is not included in the computation and the Sea component score only corresponds to the score of "Efficiency of seaport services"

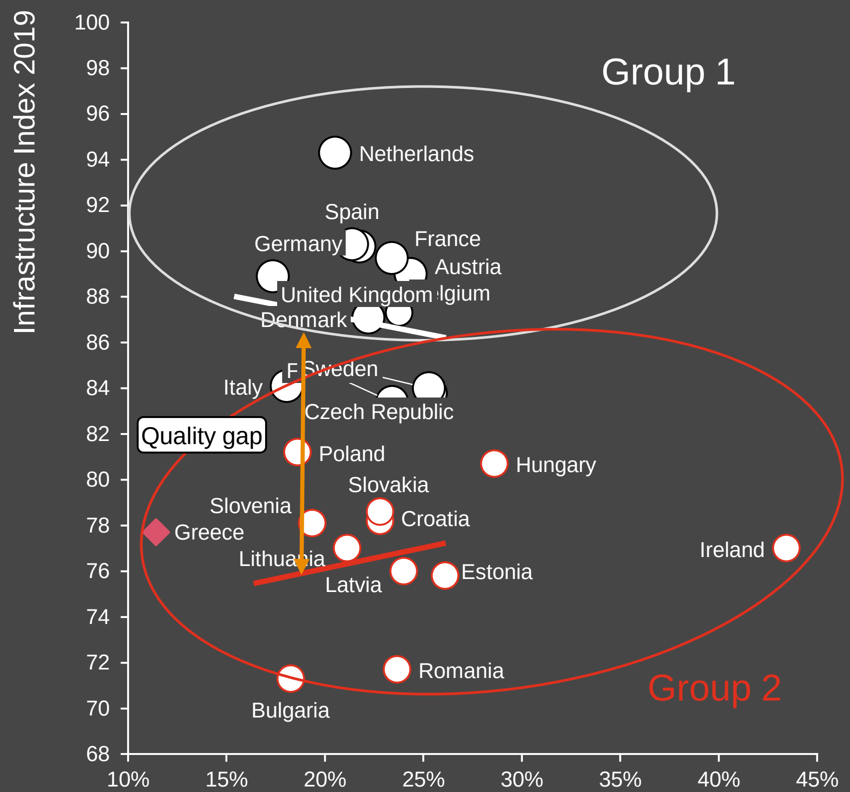
There are two statistically distinct levels of infrastructure extent and quality, whose difference cannot be explained by the level of GDP

Greece ranks 37th globally and 18th among the EU countries in terms of infrastructure, revealing also a quality gap for the current level of GDP per capita

The **differences in infrastructure extent and quality** between Western and Northern European countries, compared to the Central and Eastern European countries, cannot be explained by the level of relative investment

Infrastructure investments, measured through the Gross Fixed Capital Formation (GFCF), appear to have a **different impact on infrastructure quality in each group**

In **Greece**, the average infrastructure investment level during 2009-2019 corresponded to only 14% of GDP, **lowest among all E.U. countries**, undermining country's upcoming infrastructure quality

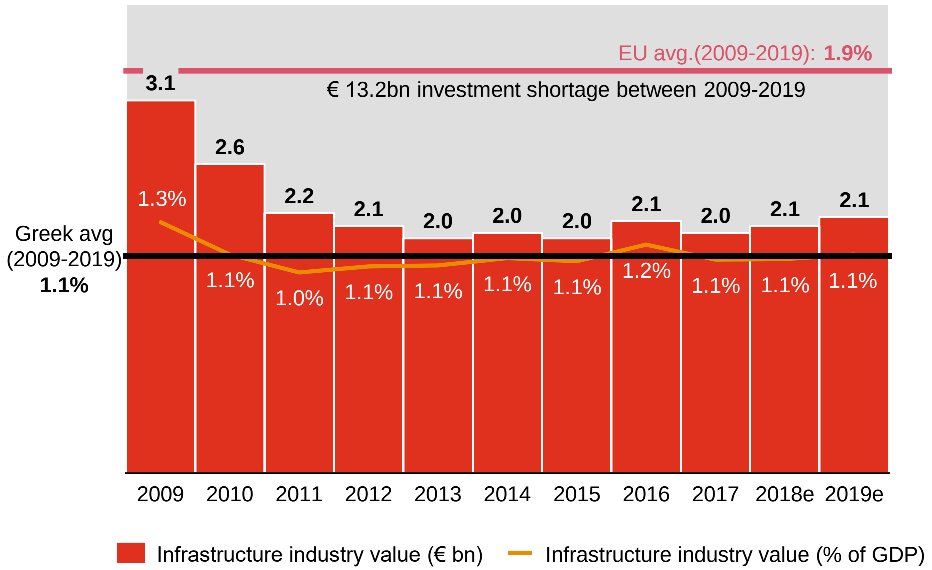


Gross Fixed Capital Formation / GDP

Source: World Economic Forum - The Global Competitiveness Report 2019, Fitch

There is a systematic investment gap of 0.8pps of GDP (or ca. € 1.5bn p.a.) in Greek infrastructure over the past 10 years

Infrastructure investment*



Source: BMI International

Infrastructure in Greece has been severely affected by the deep recession. **Total value of infrastructure** projects has decreased by as much as 31% after 2009 but has rebounded since

The current **rate of infrastructure investment** is around 1.1% of GDP, falling short of the historical pre crisis average of 3.0% and the European average of 2.1% of GDP in 2019

The erosion of infrastructure investment from 2009 to 2019 resulted in a **€ 13bn permanent shortage**** against the EU average

The infrastructure investment gap is between 0.8 pp of GDP (against the European average) or 1.9 pp of GDP (against Greece's pre-crisis levels)

Infrastructure investments in Greece have an **economic multiplier of around 1.8x*****. The industry employs ca 925k people

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Greece's pre-crisis rate (2000-2008):
3.0%

Greece's historic rate (2009-2019):
1.1%

European rate (2009-2019):
1.9%

BMI Infrastructure Investment incudes: Transport Infrastructure (Roads, Bridges, Railways, Airports, Ports and Waterways) and Energy & Utilities (Power Plants, Transmission Grids, Oil & Gas, Pipelines and Water infrastructure)

*Infrastructure Investment data is derived from GDP by output figures from ELSTAT. Specifically, it measures the output of the Infrastructure industry over the reported 12-month period in nominal values. As it is derived from GDP data, it is a measure of value added within the industry , hence it does not measure the nominal value of all inputs used in the infrastructure industry

** Infrastructure gap= (European Average-Greek Average) * $Years_{(2009\text{-}2019)}$*Average Greek $GDP_{(2009\text{-}2019)}$

***for every Euro spent on infrastructure, GDP is further increased by € 0.8 (IMF Working paper "The welfare multiplier of Public Infrastructure Investment, 2016)

There is need for more investment in infrastructure

- There is a **large need for further infrastructure investment globally** until 2040, estimated at $ 3.5trln per annum or 3.2% of global GDP

- The **average annual level of infrastructure investment** in Greece between 2009 and 2019 stands at € 2.2bn, 61% lower than the historical average of 2000-2008

- In Greece, there is a systematic **infrastructure investment gap of 0.8pps of GDP** (ca. € 1.5bn p.a.) or about € 13bn in total, over the past 10 years

- The **quality of infrastructure** in Greece is **substantially inferior** than the level of wealth would predict

- **The need for infrastructure investments in Greece in terms of both capacity expansion and quality improvement is evident**

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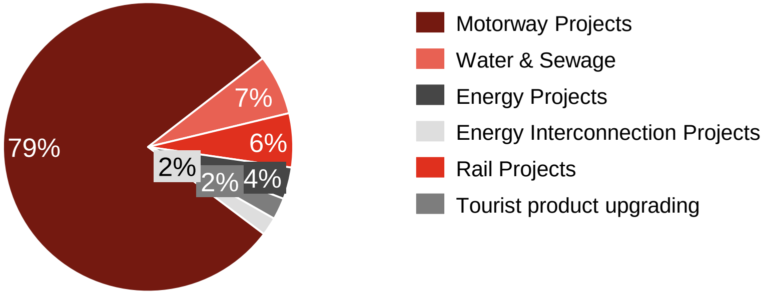
Greek infrastructure projects pipeline

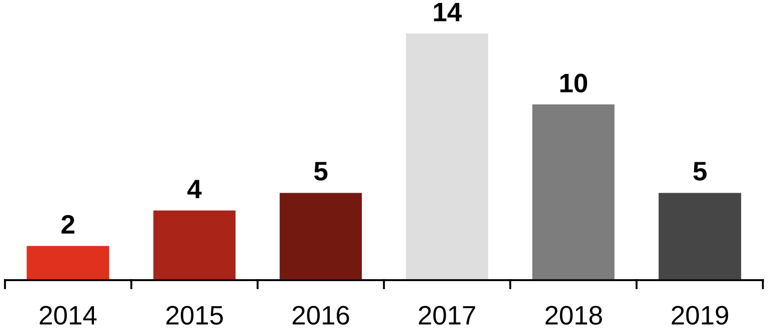
Between 2014 and 2019, 40 infrastructure projects were completed totaling € 8.9bn

Budget of completed projects
(2014-2019)



Source: Press, PwC calculations

Number of completed projects



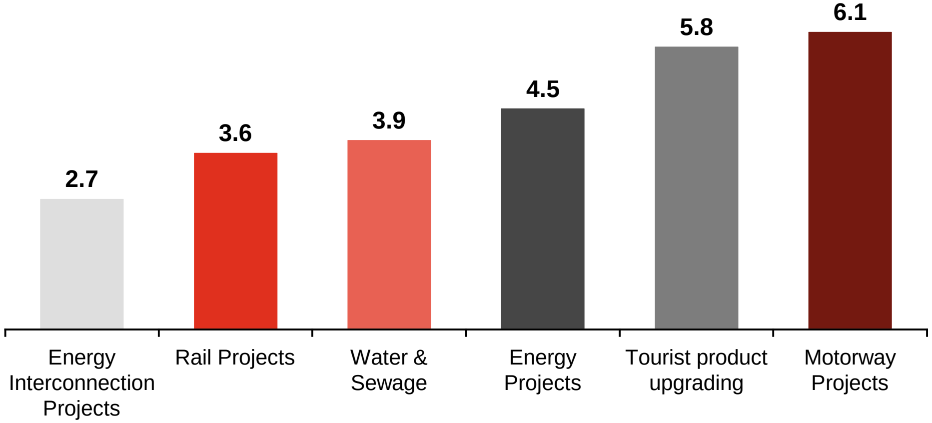
Source: Press, PwC calculations

During 2019, 5 projects were completed with a total budget of € 566m. In more detail:

- in the railway sector, the construction of the new line in the section Tithorea-Domokos was completed
- in tourist product upgrading, the construction of the new terminal at Ioannina airport was completed
- in the waste management sector, two waste management projects were completed in Serres and Epirus
- in the energy sector, the gas compression station in Kipoi was completed

The average construction duration of infrastructure projects in Greece is about 5.3 years

Average construction duration
(in years)



From the projects that have been already completed since 2014:

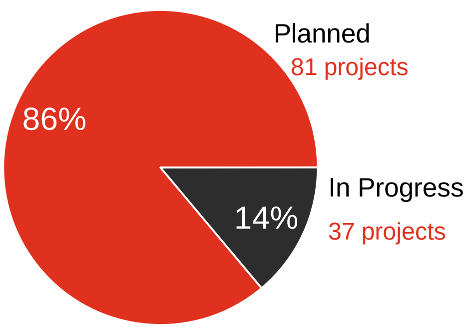
- Motorways have the longest construction duration at 6.1 years
- The long construction duration of tourist upgrading projects is mainly attributed to delays in the execution of the projects
- Energy interconnection projects are completed faster mainly because of the smaller scale of the projects completed so far

Infrastructure projects pipeline amount to € 43.4bn

Most of energy and rail projects are in progress, 3 waste management projects are about to be delivered, while **tourist product projects** are still **in initial development stage**

Rail, energy and motorways require **higher investment per project,** compared to tourist infrastructure and waste management projects

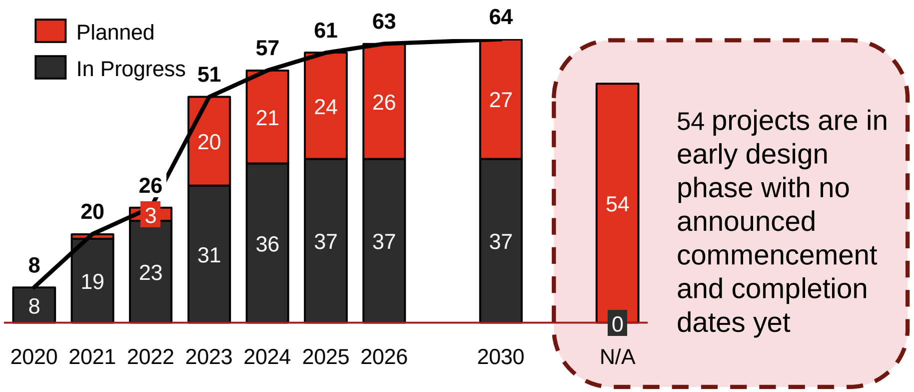
Pipeline budget* breakdown



Source: Press, PwC calculations

Estimated Completion year (cumulative)

Number of projects



Source: Press, PwC calculations

14% of the pipeline budget represents projects that have already commenced

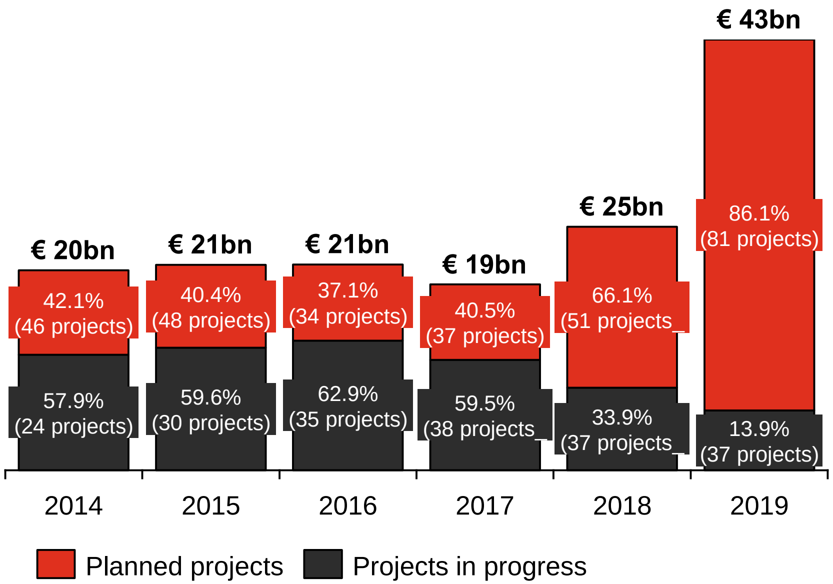
7% of the projects, with a remaining budget of around €0.3bn, are estimated to be delivered in 2020

The commencement/ completion dates of 54 projects in early planning phase, with a € 13.5bn budget, are unknown

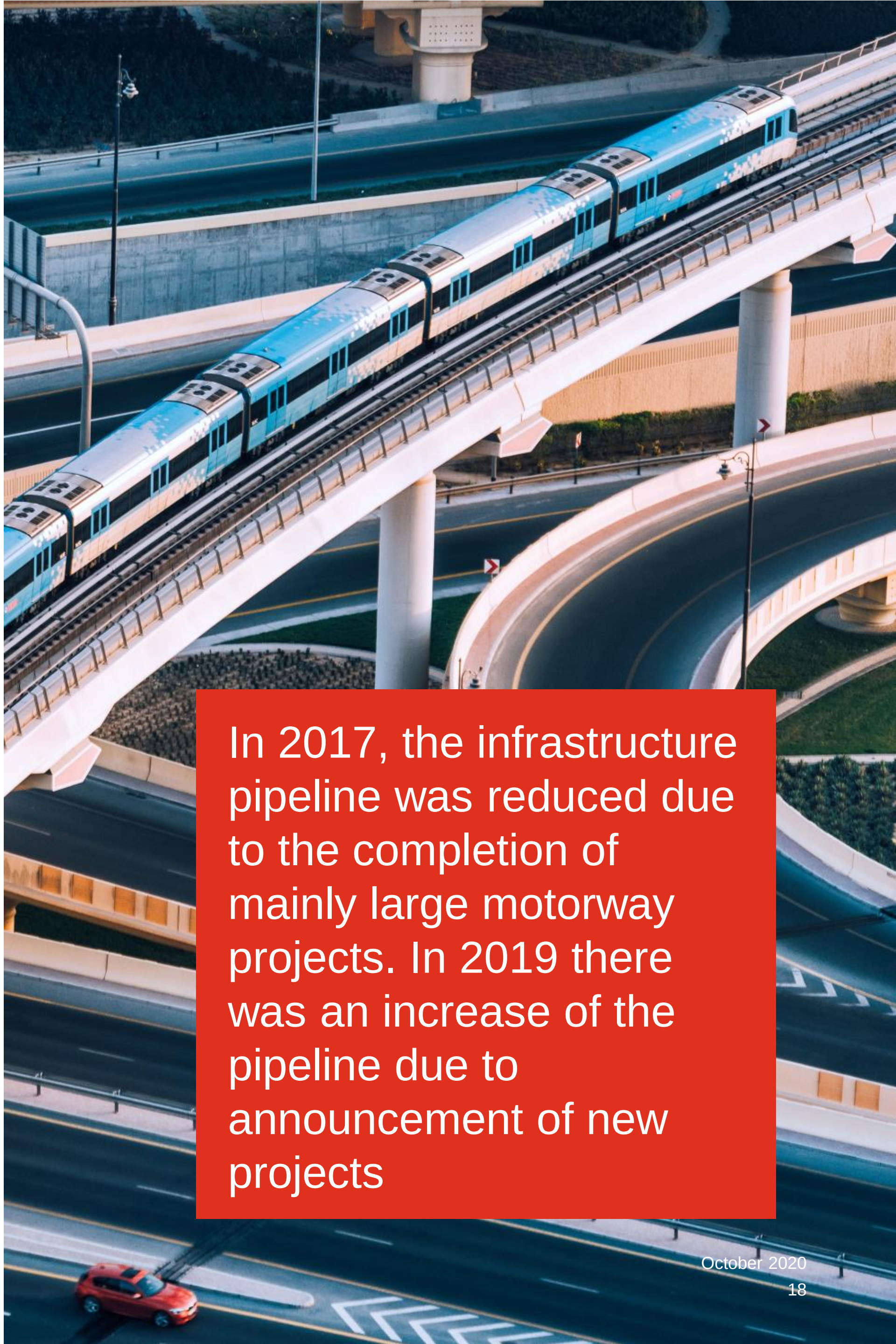
* Infrastructure projects backlog and total budget of upcoming projects

Higher infrastructure pipeline mainly due to the addition of new high projects in the preparation phase

Evolution of 6-year infrastructure pipeline
(2014-2019)



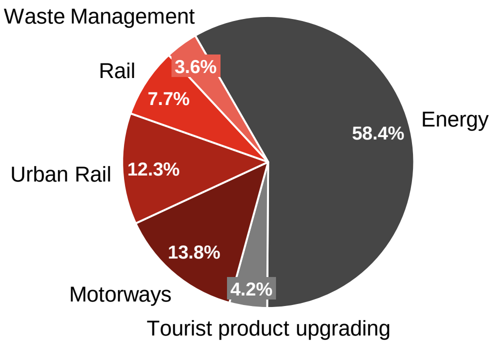
Source: PwC calculations



In 2017, the infrastructure pipeline was reduced due to the completion of mainly large motorway projects. In 2019 there was an increase of the pipeline due to announcement of new projects

Energy projects account for 58% of the total budget

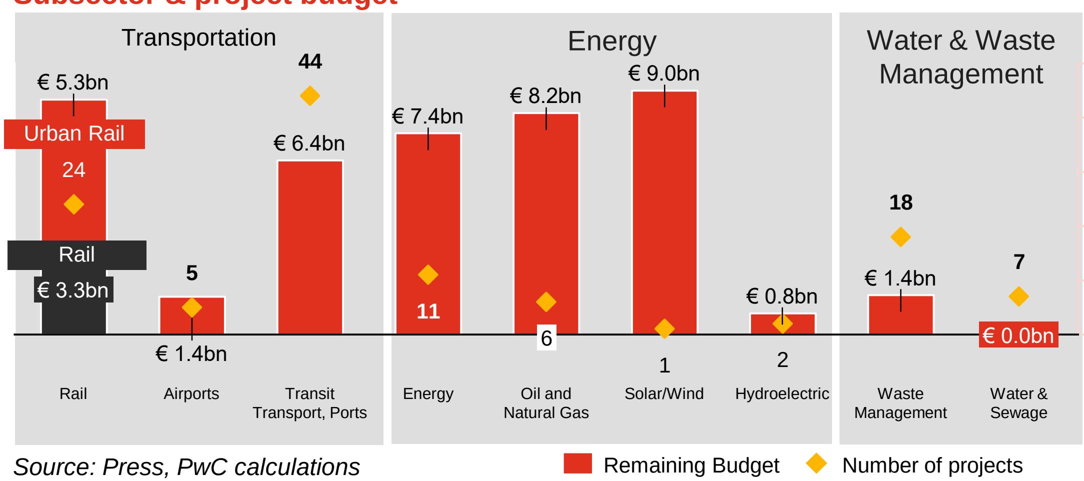
Total remaining budget*



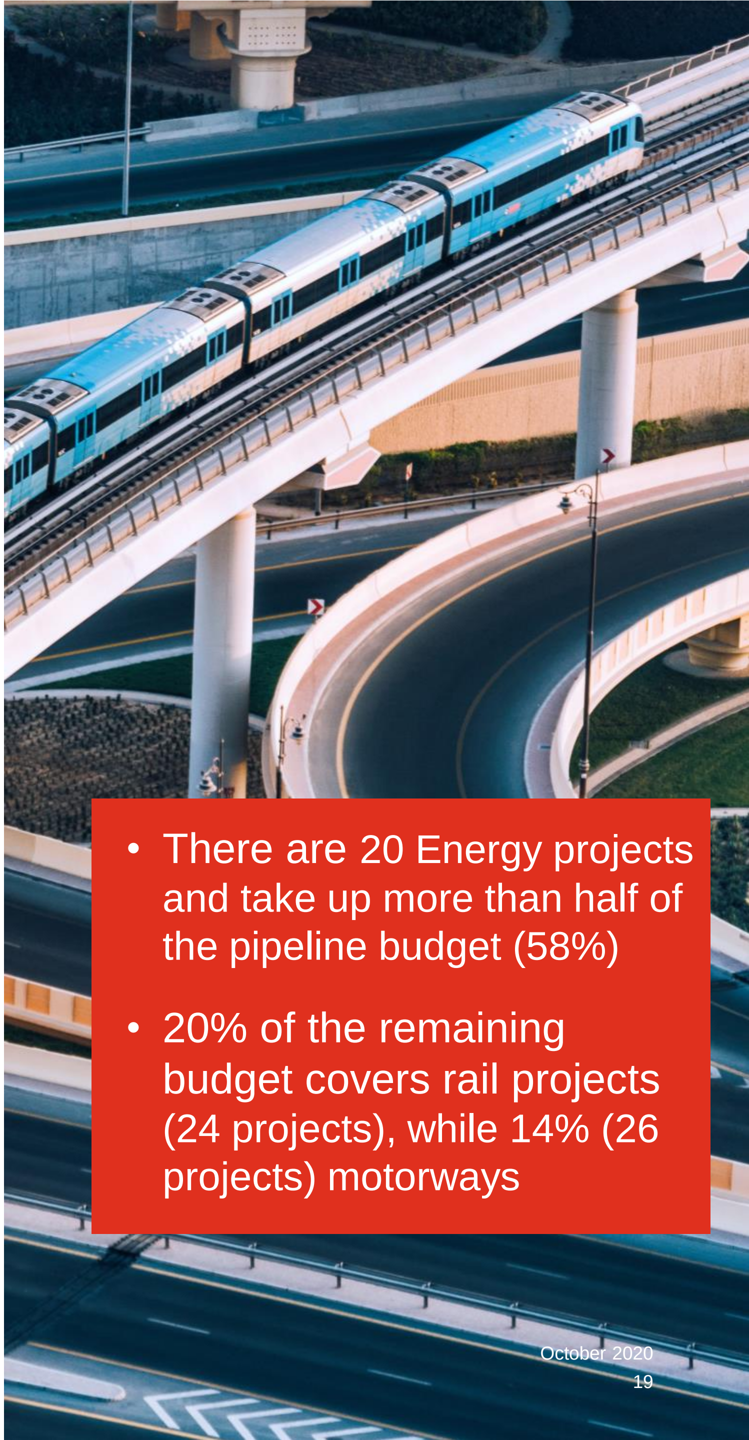
- Waste management and water supply get very little attention
- The share of rail projects stands at 7.7%

* Infrastructure backlog and total budget of upcoming projects
Source: Press, PwC calculations

Subsector & project budget



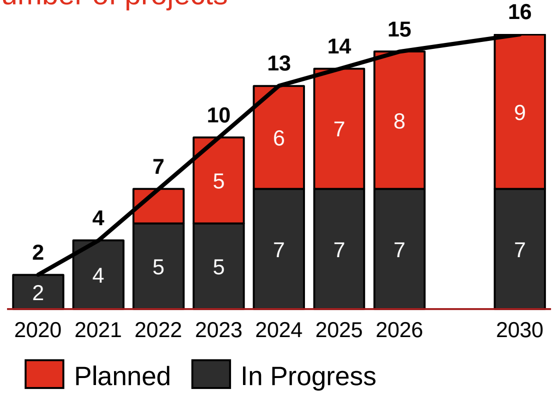
Source: Press, PwC calculations



- There are 20 Energy projects and take up more than half of the pipeline budget (58%)
- 20% of the remaining budget covers rail projects (24 projects), while 14% (26 projects) motorways

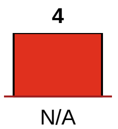
Energy projects amount to ca. € 25.4 bn

Estimated Completion year (cumulative)
Number of projects



Source: Press, PwC calculations

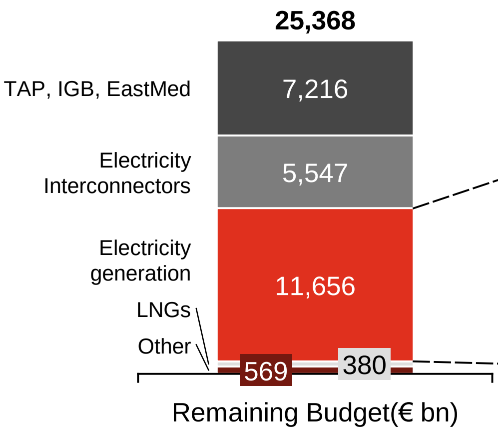
Number of projects with no announced commencement/completion dates



- 60% of the number of energy projects are **interconnections** (TAP, IGB, EuroAsia, Ariadne, EastMed), while the remaining 40% refers to **electricity generation** (Wind and solar parks, Power plants)
- 54% of the remaining budget is earmarked for energy interconnections and the rest for electricity generation
- **More than half of the total energy projects have not yet started**

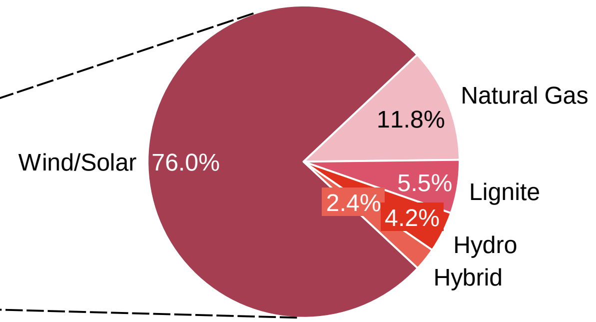
Electricity interconnection projects account for 32% of the budget while electricity generation projects for 27%

Energy projects
Remaining budget 2019 (€ mn)



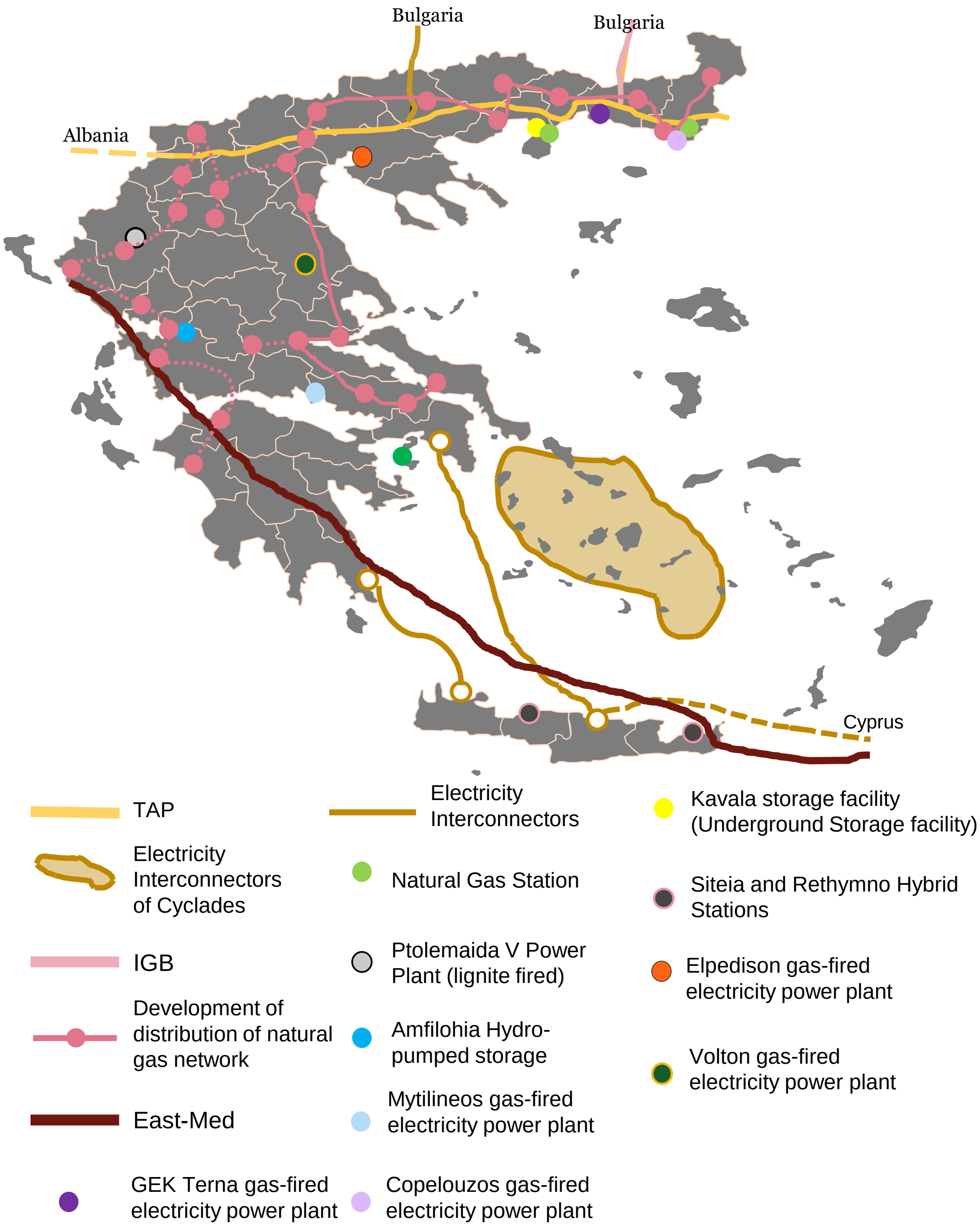
Source: Press, PwC calculations

Electricity generation sources
% of remaining budget 2019



Source: Press, PwC calculations

- Natural gas and electricity interconnectors take up **about 54% of the remaining budget**
- About 84% of the total remaining budget of scheduled electricity generation projects refers to **renewable energy**
- The average cost per new MW installed is about € 1mn.

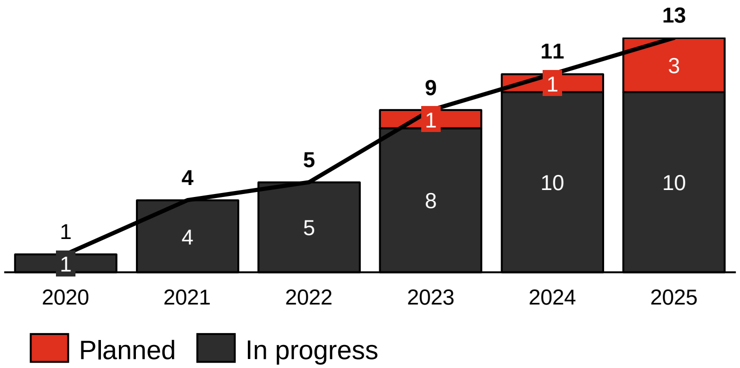


Energy projects geographical distribution

- **East-Med pipeline,** with a total length of 1,900 km, will directly connect the energy sources of the Eastern Mediterranean with Greece's mainland via Cyprus and Crete, with a capacity of 10 bn m³ per year
- **Trans-Adriatic Pipeline** of 878 km in total will supply Europe with natural gas from Azerbaijan through Greece, Albania and Italy, with a capacity of 20 bn m³ per annum
- **Ptolemaida V Power Plant:** New single lignite power plant of 660 MW and 140 MW for district heating (PPC)
- **Attica – Crete and Peloponnese – Crete Interconnectors:** Underwater electric cables connecting Crete with mainland with a capacity of 1,000 MW and 400MW respectively
- **IGB:** Natural gas pipeline of 182km length will connect the Greek and Bulgarian existing networks, with daily transport capacity of 13,7 mn m³ and approximately 3-5 bn m³ per year
- **Alexandroupoli Independent Natural Gas System**: New offshore LNG with 28 km length of subsea and onshore pipeline (4 km onshore and 24 km offshore), with storage capacity of 170k m³ and pumping capacity of 6,1bcm per year

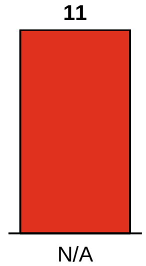
Rail projects amount to € 8.7bn

Estimated Completion year (cumulative)
Number of projects



Source: Press, PwC calculations

Number of projects with no announced commencement/ completion dates

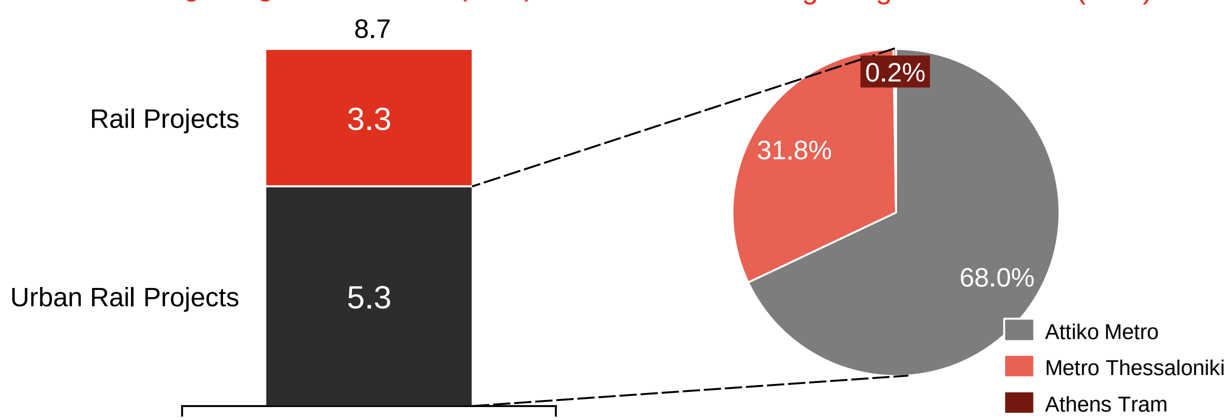


- 32% of the rail projects account to **urban rail interconnections** (Attiko Metro, Tram, Metro Thessaloniki), while the remaining 68% to regional rail projects
- **Less than half of the rail projects** have already started with further Attiko Metro and Thessaloniki Metro extensions and some Ergose upgrades in planning
- **In 2020, the Kiato-Rododafni section was completed,** while the extension of tram to Piraeus is expected to be delivered within this year
- The percentage of **electrified lines in Greece is only 30%** compared to the European average of 58% (International Union of Railways, 2018). However, Greece is making progress in **rail electrification** by converting and adding **about 753 km of electrified** lines to the national network

Urban rail are the main part of the total rail investment and account for 62% of the remaining rail budget

Rail projects and Urban Rail projects
Remaining budget breakdown (€ bn)

Urban Rail projects
Remaining budget breakdown (€ bn)



Source: Press, PwC calculations

Source: Press, PwC calculations

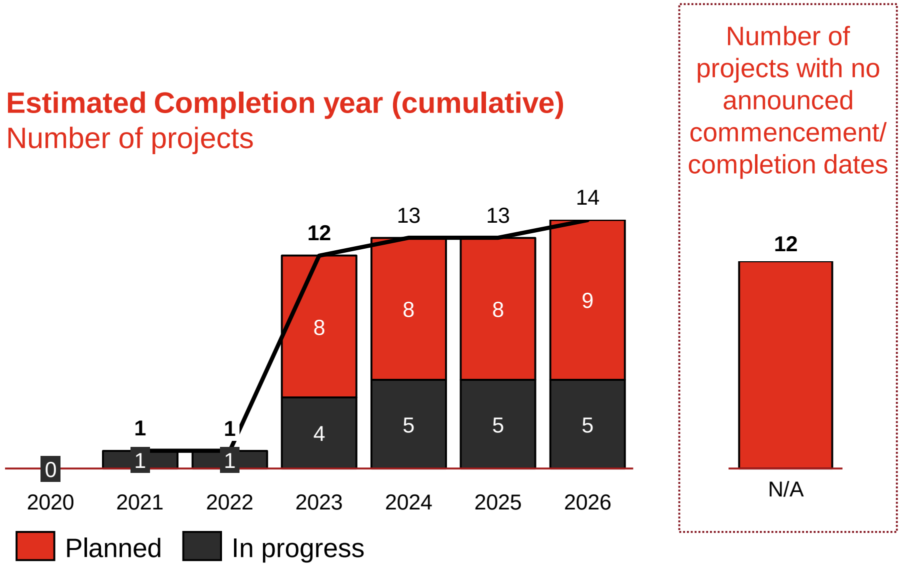
- 38% of the remaining budget accounts to rail projects, while the remaining 62% to urban rail
- Attiko Metro's new lines and extensions are the largest urban rail projects, with a total budget of € 3.6bn taking up about 68% of the remaining budget of the urban rail projects
- The average investment in railway projects is estimated at € 7.8mn/km, while the respective investment in urban railways stands at € 93.2mn/km

Rail projects geographical distribution

- The completion of the **Thessaloniki metro** and its extension to Kalamaria (14.3 km) will serve about 300 thousand passengers per day
- The new **Metro Line 4** in Athens with 33km length (31 new stations) is expected to serve around **500k passengers** daily, especially at densely populated areas (Kipseli, Pagrati, Zografou)
- The **extension of the Athens metro to Piraeus** (3 new stations) that **connects Athens International Airport with the port of Piraeus** will increase the current capacity to about **120 thousand passengers per day**
- **Tram extension from N. Faliro to Piraeus** (5.3km) will have a daily capacity of 100k passengers
- Construction of double rail tracks and upgrading of signaling and electrification of the main OSE network to **improve customer service** and **time of travel** rendering rail an efficient alternative for **long distance travel**
- The construction and electrification of the **Kiato to Patras** will connect Athens to Patras and Northern Peloponnese again after a long time

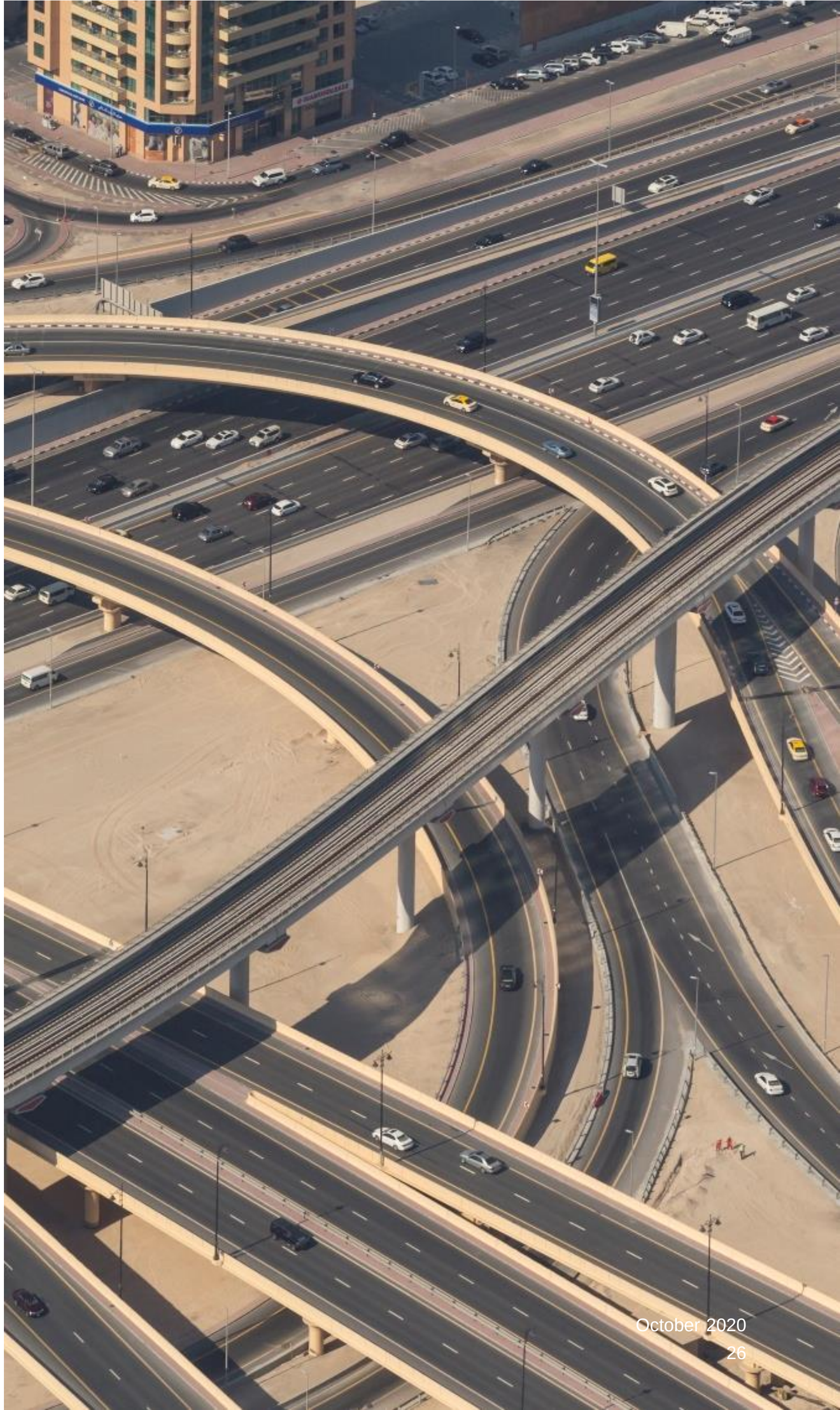
Motorways investment pipeline is about € 6bn

Estimated Completion year (cumulative)
Number of projects

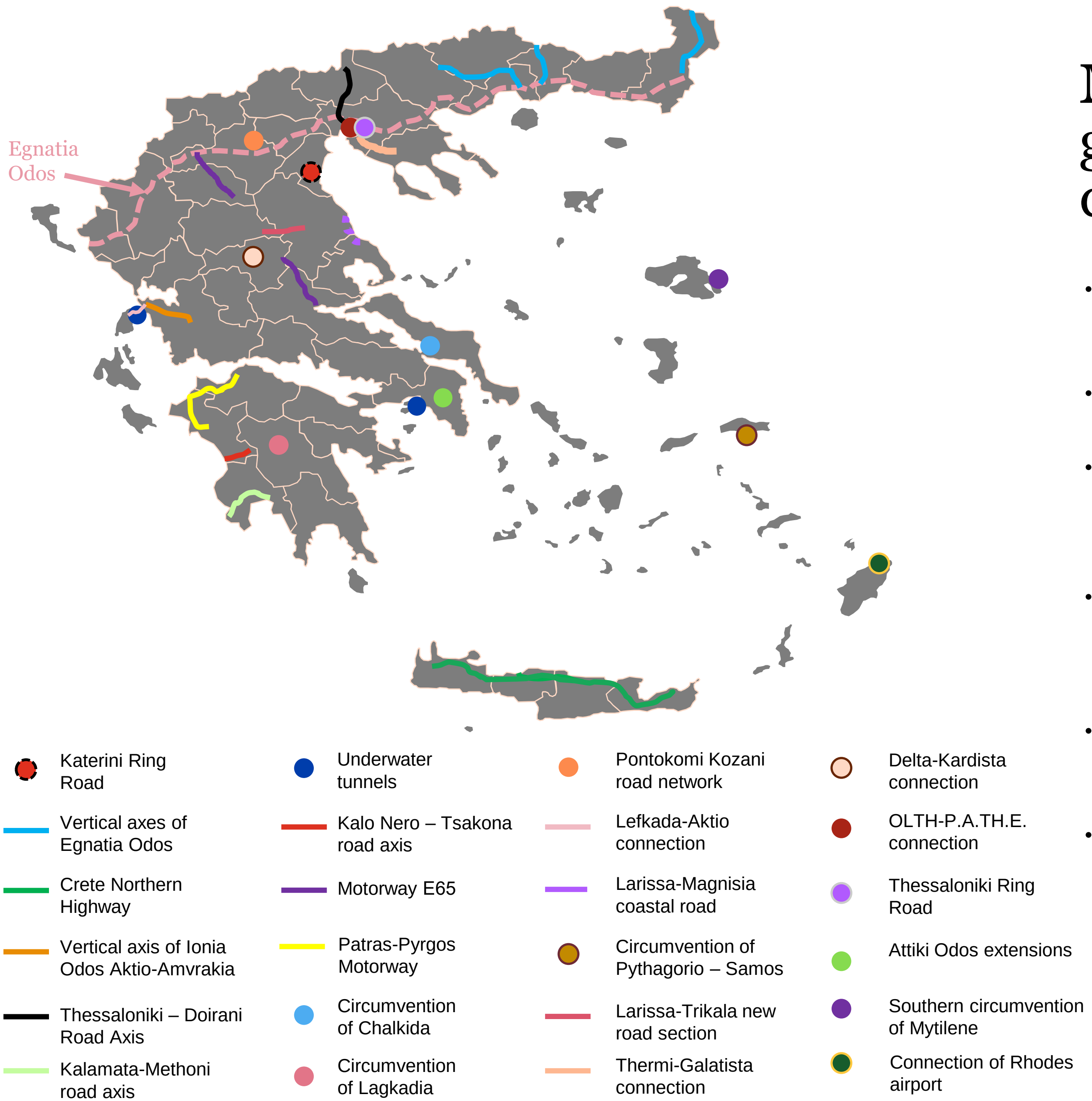


Source: Press, PwC calculations

- After the completion of many large motorway projects in 2017, the only major road projects in the pipeline are the **Crete Northern highway,** the southern and northern parts of **E65** and the **Patras-Pyrgos** link
- The total motorway kilometers of planned and in progress projects in Greece amount to 1,184 km, **of which only 9% has already been constructed**
- The average cost of motorway construction in Greece **is € 4.7mn per km**
- Most of the motorway projects are still in the designing phase

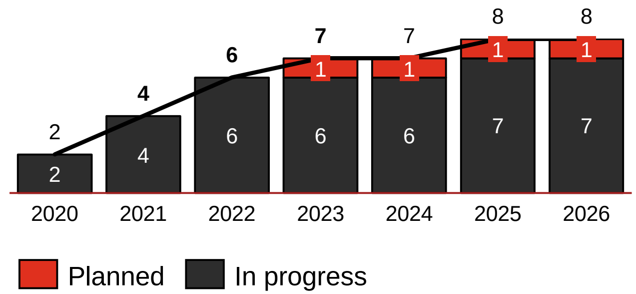


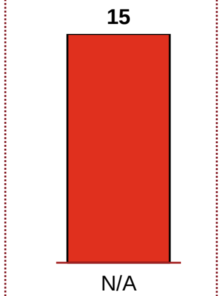
Motorway projects geographical distribution



- **Egnatia Odos vertical Axes** will connect the main part of Egnatia Odos with **Bulgaria** and **Serres with Drama and Kavala**
- **Ionia Odos side Axis,** with a length of 48.5km will connect **Aktio to Amvrakia**
- The Central Greece Motorway (part of the E65 Motorway) is under construction with a total length of 17 5km and will connect Lamia, Karditsa and Trikala to Egnatia Odos
- The **Patras-Pyrgos Motorway** is a physical extension of Olympia Odos with a total length of 75 km and **will establish a better connection between the two cities**
- **Crete Northern highway** is one of the largest projects that was announced in 2018, with a total length of 300km
- **The total motorway construction cost** in Greece in 2016 was **€ 3.4bn,** while the rest of the EU averaged **€ 6.6bn** (Overview of transport infrastructure expenditures and costs, EC, 2019)

For the upgrading of the tourist product around € 1.8bn have been scheduled

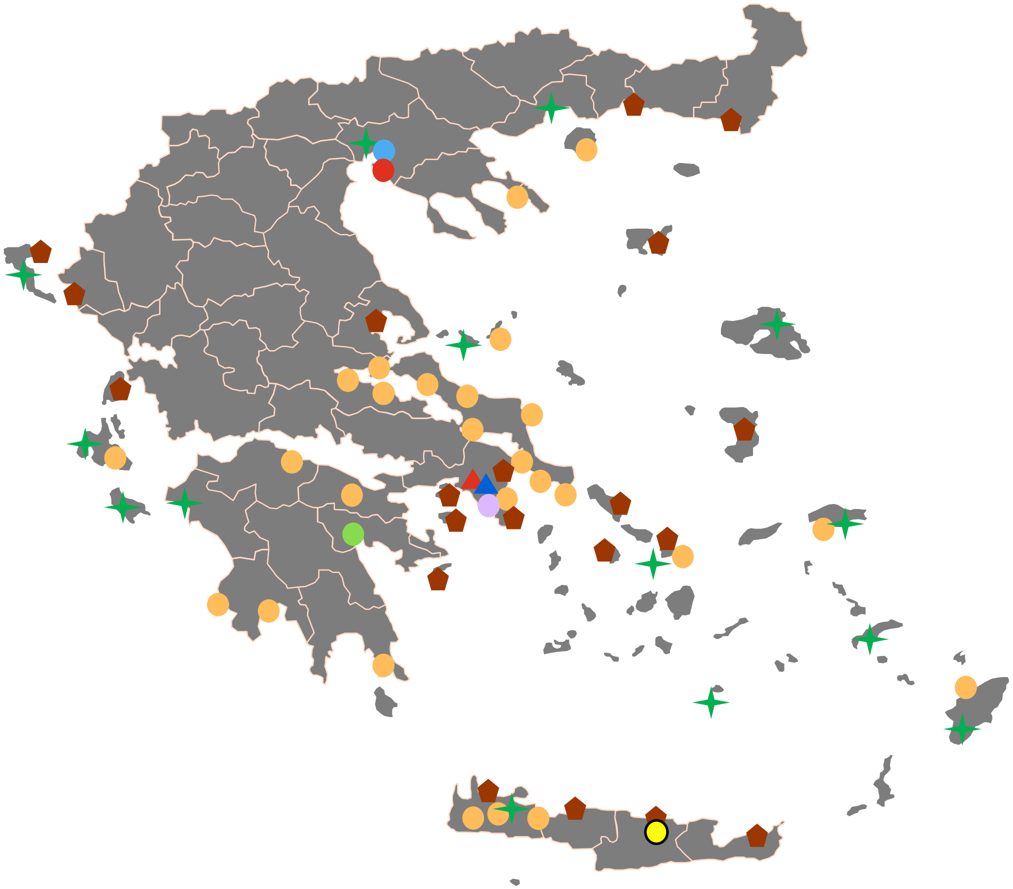




Source: Press, PwC calculations

- **65% of the tourist infrastructure projects are not even fully planned** except from the new dock at the Port of Thessaloniki which is scheduled to be completed by 2023
- There is no information on the construction of the key marinas (Katakolo & Zakynthos, Glyfada hub, Patra hub, Chios hub, Crete hub, Pylos hub and Aretsou Kalamarias hub) except for the marina of Symi which was delivered in 2018
- The **average budget** for tourist infrastructure amounts to **€78.7mn per project**

Tourist infrastructure geographical distribution



Regional Airports (Joint venture Slentel-Fraport)

Marinas Upgrade

Ports Upgrade

Marina of Nafplio

Metropolitan Water Airport (Port of Thessaloniki)

Athens International Airport Small expansion

Athens International Airport Large expansion

Kasteli Airport

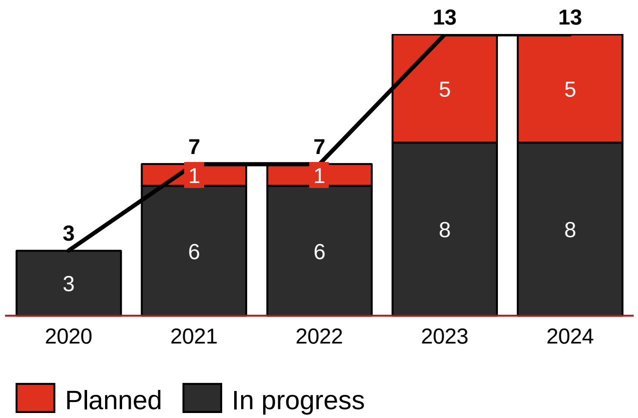
Cruise dock expansion in OLP

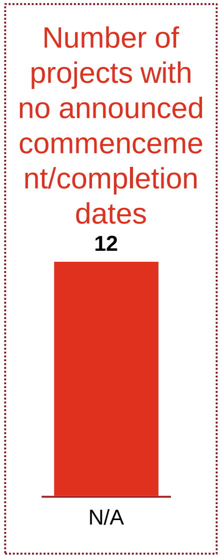
Upgrade of OLTH

- Greece is a significant global tourist destination, attracting 34mn arrivals in 2019, and € 18bn in tourist receipts
- Despite being a global tourist attraction, the tourist infrastructure quality in Greece is of low quality
- For Greece to remain a top global tourist destination it is necessary to:
  - **complete the upgrade** of the 14 regional **airports** acquired by the Slentel-Fraport joint venture and upgrade the second wave of airport privatizations as well as the construction of the new airport in Kasteli
  - **upgrade vital ports** to serve as transit terminals and facilitate interconnection with neighbor countries
  - **modernise key marina hubs** (Alimos, Kalamaria, Chios, Crete, Glyfada, Zakynthos & Katakolo, Patra, Pylos and Rhodes & Kos) to meet the increasing demand in marine tourism

Waste management projects need about € 1.6bn

Estimated Completion year (cumulative)
Number of projects

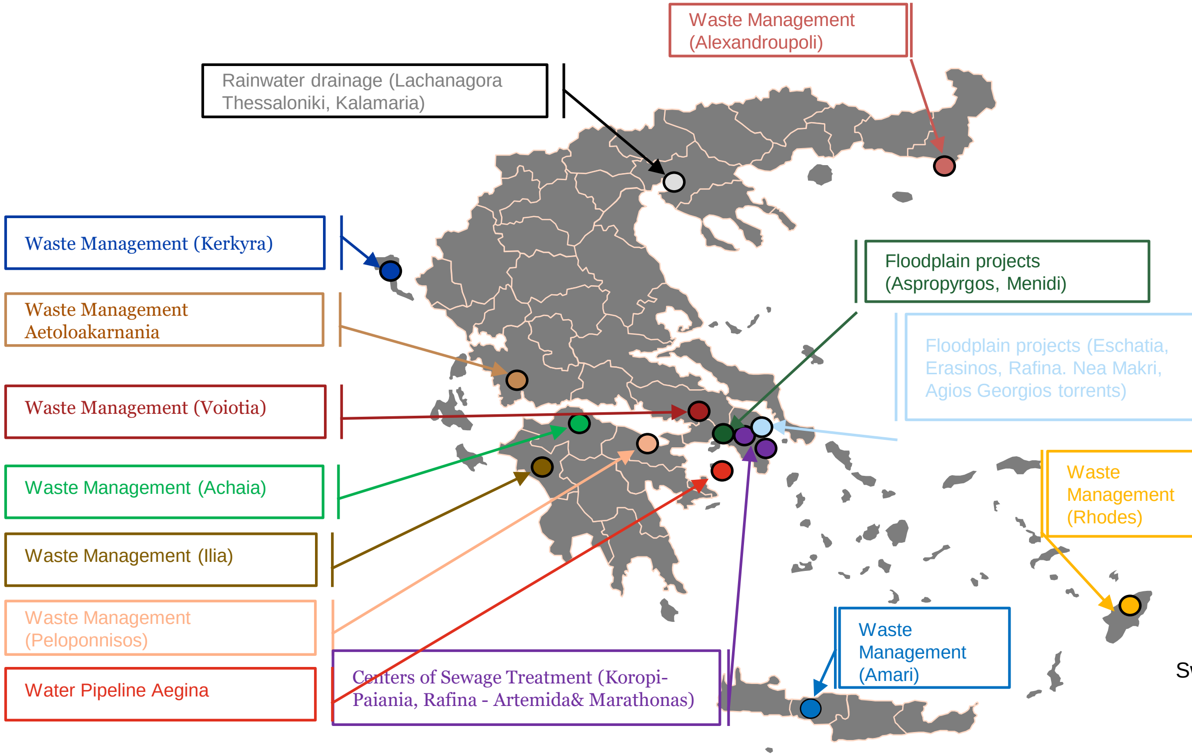




Source: Press, PwC calculations

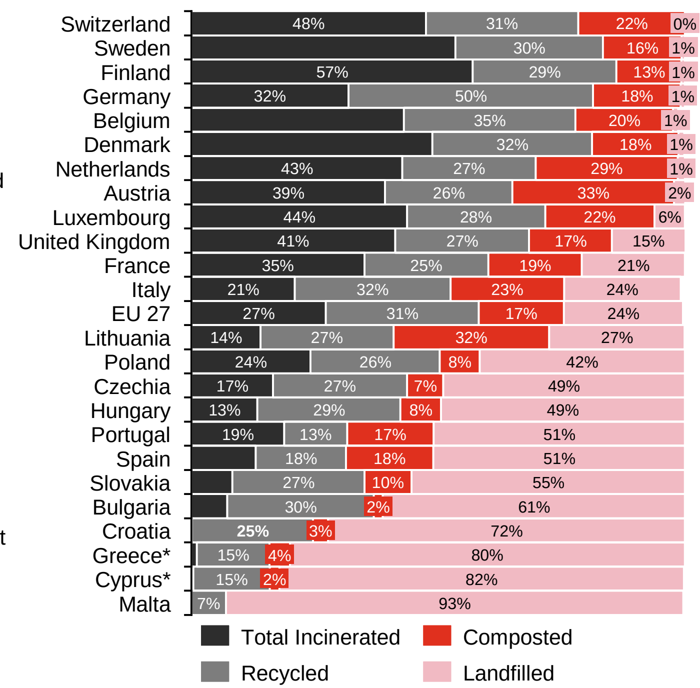
- During 2019, **2 PPP** waste management projects **were completed in Serres and Epirus**
- Also, **3** waste management projects are expected to **be completed in 2020** (Voiotia, Alexandroupoli and the center of sewage treatment in Koropi-Paiania)
- The **average budget** of waste management projects amounts to **€ 62.4mn per project**

Waste management projects geographical distribution



- The new **National Waste Management Plan (NWMP) 2020-2030 was voted to manage all of the waste generated in Greece, which sums up to 31 mn tonnes per year**. Furthermore, it emphasises on **recycling** and **separation at source**. More specifically, it provides for the universal separate collection of bio-waste for the total of the country by the end of 2022, a year earlier than the community directive. At the same time, it provides for the acceleration of the attempts for the separate collection of 4 streams for recycling and also for the priority of the support of the recyclable material collection network. Moreover, it sets high recycling targets, in the frame of community responsibilities
- **Another major aim of the new NWMP is the recovery and the use of the Non Dangerous Industrial Waste (NDIW)** from the waste management units. The adoption of cyclical economy principles is advocated for the utilization NDIW as secondary raw material and/or alternative fuels
- The main **targets of the new NWMP 2020-2030 are**:
  - Decrease of the landfill percentage to 10% until 2030
  - Put a stop on the uncontrollable waste disposal and the rehabilitation of illegal landfills by 2022
  - Increase of recycling to 55% by 2025 and to 60% by 2030
  - Separate the collection of organic waste (brown bins) and development of the required infrastructure throughout the country by 2022
  - Total coverage of the country until 2030 with 43 Waste Management Units and 43 -46 Bio-waste Management Units
  - Four power generation units with energy recovery form the residues of the Waste Management Units

Municipal waste treatment
2018



*Source: Eurostat, *(2017 Data)*

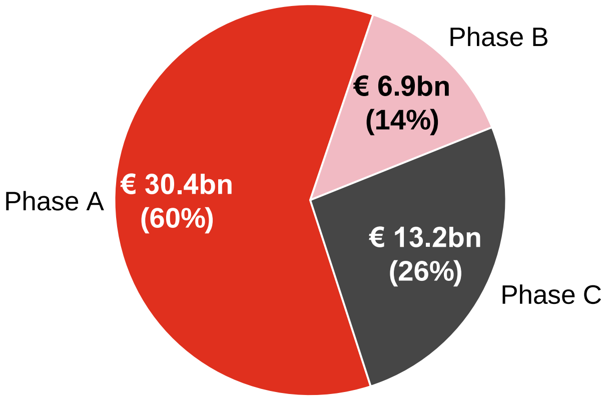
The current project portfolio is heavy on energy and transport and short on non electricity connectivity and tourism

- The value of **118 infrastructure projects** in progress or planned is standing at € 43.4bn
- **Projects in progress** account for **14%** of the estimated investment
- For 46% of the projects, commencement and completion dates are not known

- The **energy** sector accounts for almost 58% of the pipeline of all projects, while the **transport** sector accounts for about 34% of the remaining budget. The smooth evolution of those investments will have a very positive impact in economy
- **Investments** in tourism product upgrade (4%), as well as in waste management and water supply (4%) are **important for tourism growth and the upgrade of life quality**

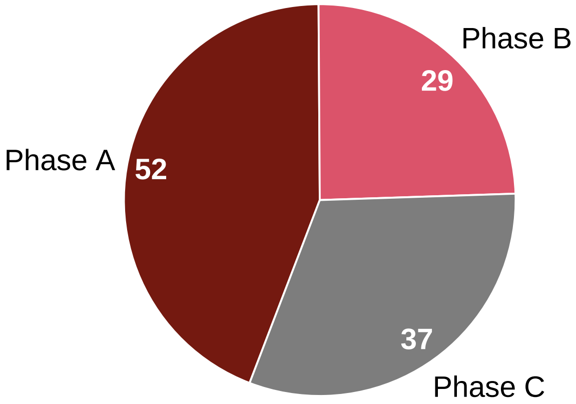
In total, 37 infrastructure projects are already in progress, while the majority of the projects are in the process of planning and maturing, with 52 still in early stages

Projects per phase
Total Budget



Source: PwC Analysis

Projects per phase
Number of projects



Source: PwC Analysis

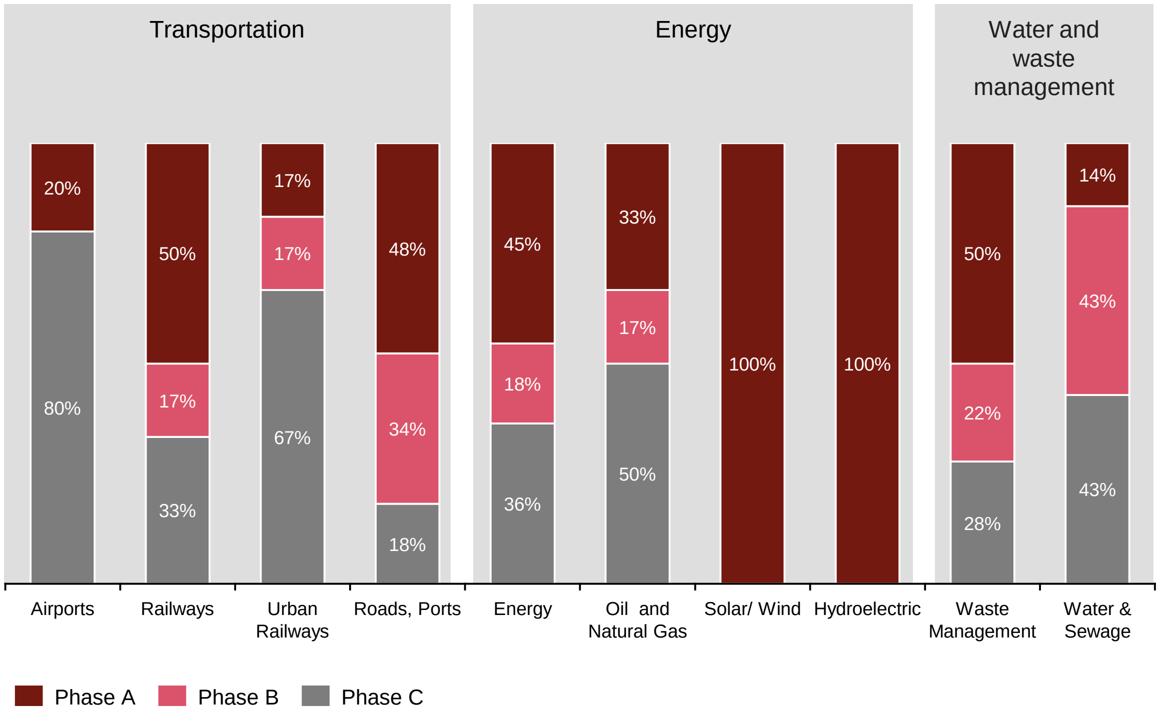
60% of the total budget is accounted for projects that are still in the planning and maturity phase, 14% refers to projects that are in the bidding and contracting phase, while 26% of the total budget refers to projects already in progress

In absolute numbers, from the total of infrastructure projects 52 are in early phases, 29 in Phase B and 37 in progress

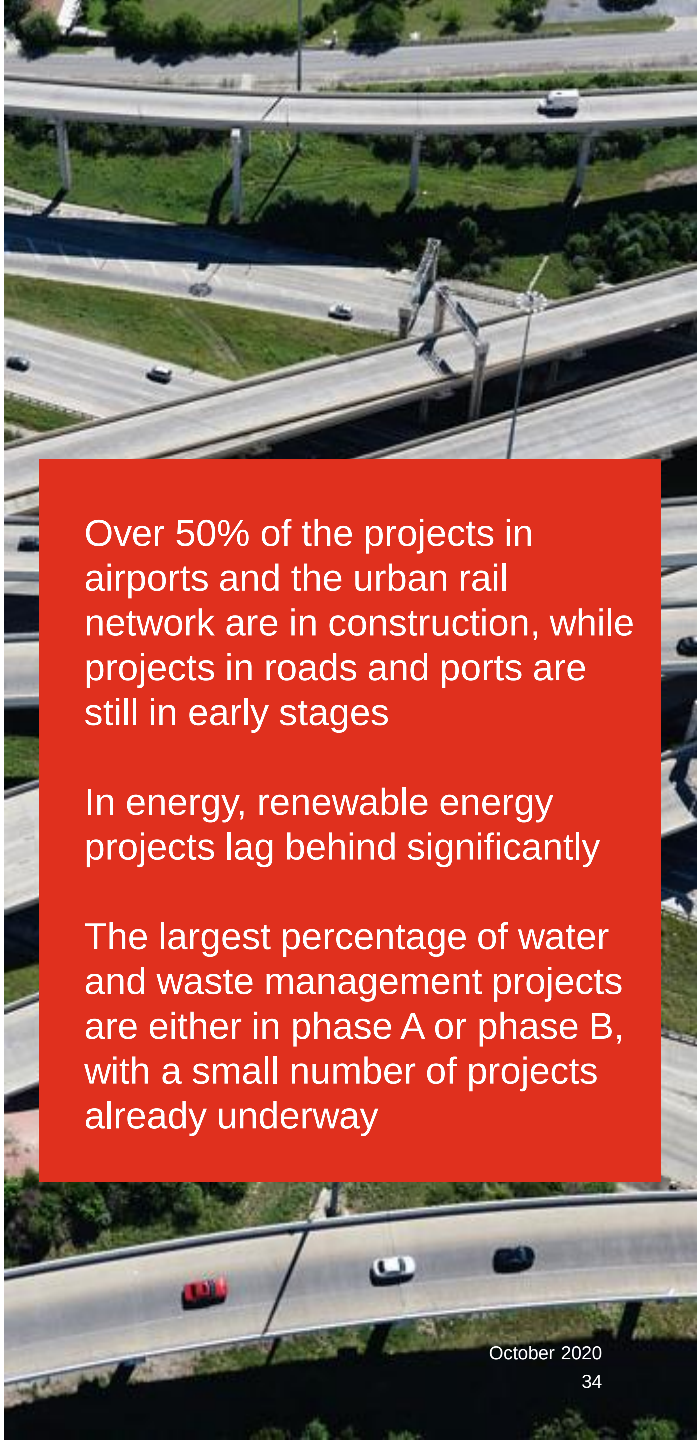
Phase A: Refers to projects that are in the process of planning, designing and maturing
Phase B: Refers to projects that are in the process of bidding and contracting
Phase C: Refers to projects that are already in construction

The majority of airport and urban rail projects are in the construction phase, while most of the road and port projects as well as energy and waste management projects are behind the starting line

Projects by subsector and phase
Number of projects



Source: PwC Analysis



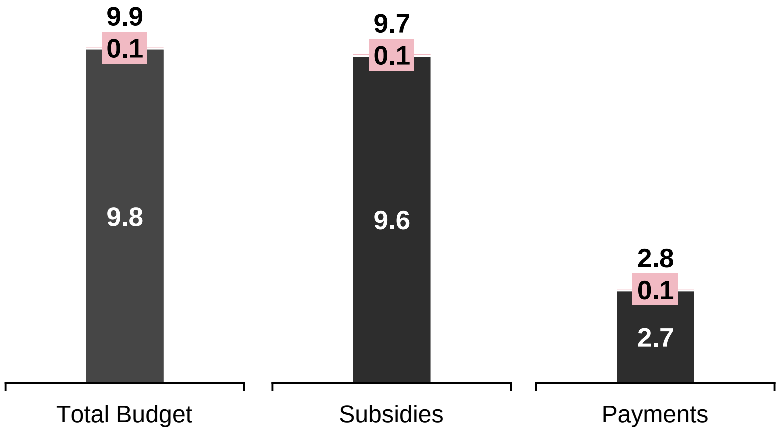
Over 50% of the projects in airports and the urban rail network are in construction, while projects in roads and ports are still in early stages

In energy, renewable energy projects lag behind significantly

The largest percentage of water and waste management projects are either in phase A or phase B, with a small number of projects already underway

The majority of infrastructure projects that are fund by the NSRF have not been completed yet, with the level of payments still at very low levels

NSRF Funding (2014-2019)
€ bn

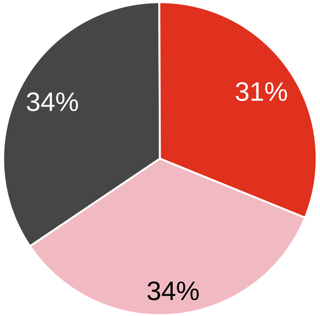


Completed projects:
Refers to projects that have been completed until 2018

Active projects:
Refers to projects that have not been completed until 2019

Source: Ministry of Development and Investments

NSRF Funding (2014-2019) by theme*



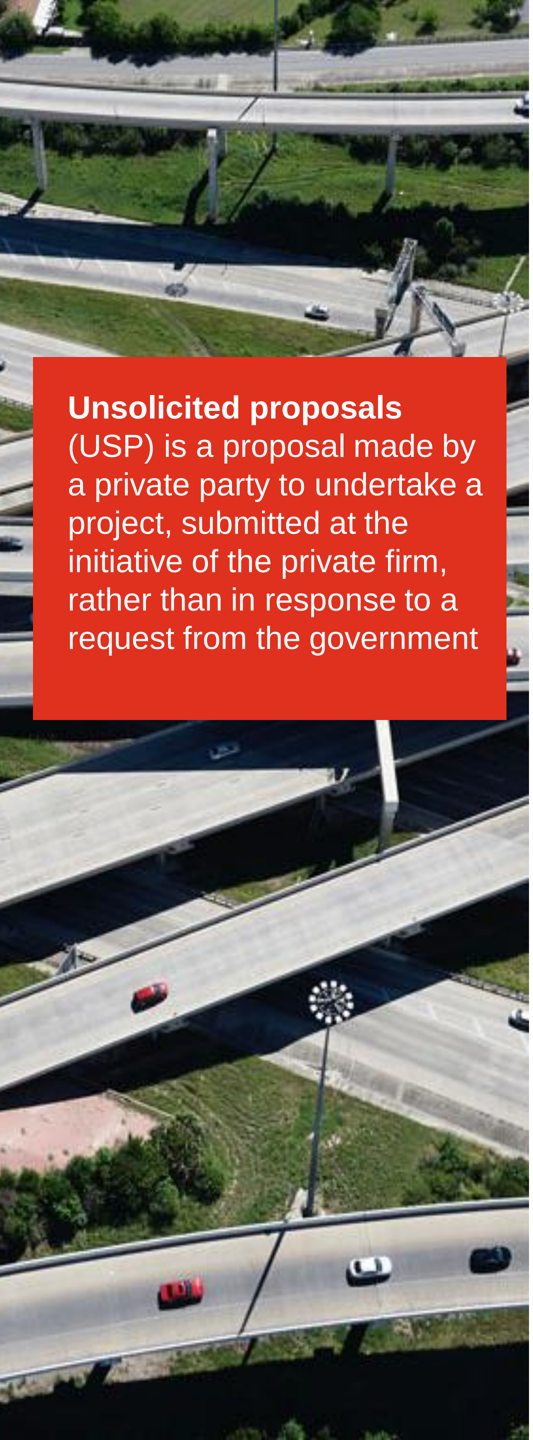
Sustainable Transportation:
Includes motorway, rail and port projects etc.

Low Emission Economy:
Includes urban railway and energy network projects as well as energy upgrading of public buildingσ

Environment protection:
Includes waste management projects, water supply and sewage networks as well as the preservation and restoration of the cultural heritage

*Based on the total budget of the projects

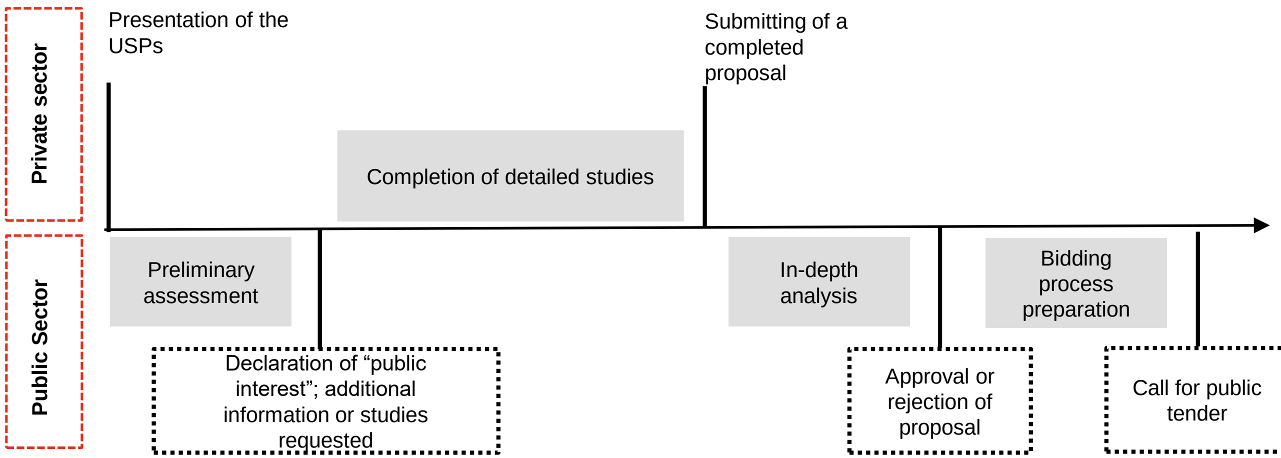
Source: Ministry of Development and Investments



Unsolicited proposals (USP) is a proposal made by a private party to undertake a project, submitted at the initiative of the private firm, rather than in response to a request from the government

Infrastructure projects in Greece could be accelerated significantly, if the private sector's contribution could be actively used, through the mechanism of unsolicited proposals

Approval stages of unsolicited proposals



Projects assignation mechanisms through unsolicited proposals

1 Bonus Mechanism

- Bonus offering to the private firm that proposed the USP during the proposal assessment
- The bonus is not significant so that the competition is increased

2 Automatic promotion to the 2nd phase

- The private firm that submitted the proposal is directly promoted to either the binding offer stage or the final selection stage

3 Right to Match

- The firm that submitted the unsolicited proposal can match a more competitive offer to win the tender

4 Direct Negotiations

- In outstanding occasions, direct negotiations with the firm that submitted the USP are justified, for example in the case of a strategical advantage (e.g. property ownership)

Appendix I– Infrastructure projects* in Greece

- 15 Energy projects
- 21 Rail projects
- 11 Motorway projects
- 15 Tourist infrastructure projects
- 25 Waste management projects

* Some projects have been grouped together and thus projects depicted at the tables do not add up to 118 projects

Infrastructure pipeline for the energy sector reaches € 25.4bn of investments (1/2)

No	Power Generation	Capacity (MW)	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date*
1	**Ptolemaida 5 Power Plant (lignite fired)**	660	1,400	600	2015	2022
2	**Mytilineos gas-fired power plant**	665	300	120	2019	2021
3	**Elpedison gas-fired power plant**	826	400	400	2021	2023
4	**Copelouzos Group gas-fired power plant**	660	350	350	N/A	N/A
5	**Volton power plant**	660	350	350	N/A	2024
6	**Amfilochia Hydro-pumped storage**	680	502	502	N/A	N/A
7	**Hybrid Stations in Siteia and Rethymno**	139	280	280	N/A	N/A
8	**Renewable Energy sources (Wind, Solar)**	8,500	9,000	9,000	2020	2030
	Total Budget		**12,582**	**11,602**		

*Commissioning date

Source: Press, PwC calculations

Infrastructure pipeline for the energy sector reaches € 25.4bn of investments (2/2)

No	Interconnection Projects	Capacity (MW)	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date*
1	**TAP (Trans - Adriatic Pipeline)**	N/A	1,500	120	2016	2020
2	**Electricity Interconnectors** (Ariadne Interconnection, Cyclades, Maritsa East (BG) - Nea Santa (GR),Aegean Project, EuroAfrica Inteconnector)	4,652	6,141	5,547	2018 | 2014 | 2020 | N/A | N/A	2020 | 2024 | 2022 | 2026 | 2023
3	**Alexandroupoli LNG**	N/A	380	380	2020	2022
4	**Kavala storage facility** (Undeground Storage facility)	N/A	400	400	N/A	N/A
5	**IGB** (GR-BG Natural Gas pipeline)	N/A	240	96	2019	2021
6	**Development of natural gas distribution network** in the regions of Macedonia, Thrace, Western Greece, Epirus and Sterea Ellada	N/A	270	169	2020	2023
7	**East-Med Pipeline**	N/A	7,000	7,000	2022	2025
	Total Budget		**15,931**	**13,712**		

*Commissioning date

Source: Press, PwC calculations

Rail projects amount to € 8.7bn, with 62% coming from urban rail projects

No	Upcoming Projects	Details	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date
1	**Attiko Metro**	Extension of Line 3 to Piraeus, New Line 4, Line 4 Extension to Perissos and Lykovrisi	4,050	3,630	2012|N/A	2022|N/A
2	**Thessaloniki Metro**	Main line & Extensions to Kalamaria and Western suburbs	2,660	1,698	2006|N/A|2014	2023|N/A|2023
3	**Athens Tram**	Extension to Piraeus	62	13	2013	2020
	Total		**6,772**	**5,341**		

No	Upcoming Projects	Details	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date
1	**Ergose Palaiofarsalos**	Palaiofarsalos - Kalambaka (electrification of railways)	54	54	N/A	N/A
2	**Ergose Volos**	Volos – Larissa (electrification of railways)	66	66	2020	2023
3	**Ergose Polikastro**	Polikastro - Idomeni	113	24	2007	2021
4	**Ergose Port of Kavala**	Connection of the Port of Kavala to the existing Thessaloniki-Alexandroupoli line	250	250	N/A	N/A
5	**Ergose Central Macedonia**	Upgrade of the network in Central Macedonia	35	14	2019	2021
6	**Ergose Athens**	Upgrade of Athens Train Station	44	44	2020	2024
7	**Ergose Promachonas**	Upgrade of existing line Thessaloniki-Promachonas	150	150	2022	2025
8	**Ergose Patras**	Rhododafni-Psathopyrgos, Psathopyrgos-Patras and electrification of railways	1,913	785	2006	2023
9	**Ergose Xanthi**	Thessaloniki-Kavala-Xanthi new line	1,000	1,000	N/A	N/A
10	**Ergose Sepolia**	Ergose: Upgrade of the network in Sepolia	67	67	2020	2024
11	**Ergose Loutraki**	Upgrade of the existing line Isthmos-Loutraki	6	3	2019	2021
12	**Ergose Mouries**	Upgrade of the existing line Thessaloniki-Mouries	65	65	N/A	N/A
13	**Ergose OLTH**	Connection of the 6th dock of OLTH to the railroad network	22	22	N/A	N/A
14	**Ergose Neos Panteleimon**	Construction of a new station in Neos Panteleimon	1	1	2021	2025
15	**Ergose Kryoneri**	Construction of a new station in Kryoneri	7	7	N/A	N/A
16	**Western Attica suburban railway**	Upgrade of suburban railway in Western Attica	98	98	N/A	N/A
17	**Athens Suburban Railway: Extension to Laurio**	Extension of Athens Suburban Railway from Koropi to Laurio	380	380	N/A	N/A
18	**Athens Suburban Railway: Extension to Port of Rafina**	Extension of Athens Suburban Railway from Athens International Airport to Port of Rafina	300	300	N/A	N/A
	Total		**4,571**	**3,330**		

Source: Press, PwC calculations

Motorways investment pipeline is about € 6bn

No	Upcoming Projects	Details	Total Klm	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Estimated Completion Date	Average investment/ km
1	**Crete Northern Highway**	Chania - Chersonissos, Chersonissos - Neapoli & Neapoli - Agios Nikolaos	275	1,415	1,415	N/A	N/A	5.2
2	**E65 Motorway (Lamia-Egnatia)**	Lamia - Xyniada & Trikala - Egnatia	175	706	307	2008	2024	4.0
3	**Egnatia Odos**	Vertical axes*	296	1.046	1.012	2011	2021	3.5
4	**Ionia Odos**	Aktion-Amvrakia Vertical Axis	49	160	75	2010	2023	3.3
5	**Regional roads**	Ring road of Katerini, Thessaloniki-Doirani, Circumvention of Chalkida, Circumvention of Lagkadia, Kalamata-Rizomylos-Pylos-Methoni, Kalo Nero - Tsakona, Pontokomi Kozani road network, Lefkada-Aktio, Coastal road axis Larissa-Magnisia, Pythagorio-Samos circumvention, Larissa-Trikala, Thermi-Galatista, Karditsa-Delta, Southern Circumvention of Mytilene, Drama-Amfipoli, Connection of the city of Rhodes to Rhodes airport	292	1,116	1,055	2013|2011|N/A|N/A|N/A|N/A|2020|2020|2020|N/A|2020|2020|2020|N/A|N/A|N/A	2023|2023|N/A|N/A|N/A|N/A|2023|2023|2023|N/A|2023|2023|2023|N/A|N/A|N/A	3.8
6	**Underwater tunnel Salaminas**	Underwater connection of Salamina and Perama	5	450	450	N/A	N/A	91.8
7	**Underwater tunnel Lefkada**	Underwater connection of Lefkada and Etoloakarnania	3	50	50	N/A	N/A	16.7
8	**Patras-Pyrgos Motorway**	Patras-Pyrgos	75	300	300	N/A	2023	4.0
9	**Connection of OLTH**	Connection of the 6th dock of OLTH to P.A.TH.E.	2	32	32	2020	2023	15.3
10	**Thessaloniki Ring road**	Thessaloniki Internal Ring road flyover	14	300	300	2022	2026	21.4
11	**Attiki Odos extensions**	Extensions of Attiki Odos to Kymis Avenue, Ilioupoli and Rafina	N/A	1,000	1,000	N/A	N/A	N/A
	Total Budget		**1,184**	**6,575**	**5,997**			**4.7**

Source: Press, PwC calculations

For the upgrading of the tourist product around € 1.8bn have been scheduled

No	Projects	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date
1	**Kasteli Airport in Heraklion**	500	500	2020	2025
2	**Regional Aiports**	415	166	2017	2021
3	**OLTH, new dock**	170	170	2020	2023
4	**Igoumenitsa Port upgrade**	135	32	2008	2021
5	**Macedonia Airport upgrade**	180	17	2005	2020
6	**Athens International Airport expansion**	700	700	N/A	N/A
7	**Key marinas**	42	42	N/A	N/A
8	**Luxury marines (Mykonos, Argostoli)**	9	9	N/A	N/A
9	**Upgrading/ Maintenance of Regional Ports**	4	4	2020	N/A
10	**Layrio Mega Yacht**	4	4	N/A	N/A
11	**New cruiseship dock in OLP**	103	103	2020	2022
12	**Athens International Airport Small expansion**	18	5	2018	2020
13	**Construction of a new marina in Nafplio**	9	9	N/A	N/A
14	**Upgrading of Marina of Alimos**	50	50	2020	2022
15	**Port of Thessaloniki- Metropolitan Water Airport**	0.4	0.4	N/A	N/A
	Total Budget	**2,340**	**1,811**		

Source: Press, PwC calculations

Waste management projects need about € 1.6bn (1/2)

No	Projects	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date
1	**Center of Sewage Treatment (Koropi - Paiania)**	125	26	2013	2020
2	**Waste management (Aetoloakarnania)**	28	28	N/A	N/A
3	**Waste management (Ilia)**	39	16	2019	2021
4	**Waste management (Peloponissos)**	168	168	2020	2021
5	**Waste management (Alexandroupoli)**	58	14	2019	2020
6	**Water Pipeline Aegina**	22	9	2018	2021
7	**Waste management (Voiotia)**	16	4	2017	2020
8	**Connection of Pallini and Gerakas Sewage Systems to Psyttaleia**	72	72	N/A	N/A
9	**Center of Sewage Treatment (Marathonas)**	120	120	N/A	N/A
10	**Waste management (Achaia)**	35	35	N/A	N/A
11	**Waste management (Kerkyra)**	55	55	N/A	N/A
12	**Waste management (Rhodes)**	38	38	N/A	N/A
13	**Sewage system in Rafina, Pikermi, Spata, Artemida**	300	300	N/A	2023
14	**Floodplain project in Eschatia**	46	46	2020	2023
15	**Waste management project in Amari Rethymno**	32	13	2019	2021
16	**Rainwater drainage in Lachanagora of Thessaloniki**	33	33	N/A	2023

Source: Press, PwC calculations

Waste management projects need about € 1.6bn (2/2)

No	Projects	Total Budget (€ mn)	Remaining Budget (€ mn)	Start Date	Completion Date
17	**Floodplain project in Aspropyrgos**	10	10	2020	2023
18	**Floodplain project of Erasinos torrent (Markopoulo)**	19	10	2020	2023
19	**Floodplain project of Kanapitsa torrent (Menidi)**	11	15	2020	2023
20	**Rainwater drainage in Kalamaria**	12	12	N/A	N/A
21	**Floodplain project in Loutraki**	22	22	N/A	N/A
22	**Floodplain project of Rafina torrent**	105	105	N/A	N/A
23	**Floodplain project of Nea Makri torrent**	48	48	N/A	N/A
24	**Floodplain project of Agios Georgios torrent (Markopoulo)**	13	13	N/A	N/A
25	**Floodplain projects of motorway concessions**	350	350	N/A	N/A
	Total Budget	**1,776**	**1,560**		

Source: Press, PwC calculations

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