Digital Economy and Society Index (DESI) 2021

Greece

About the DESI

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas.

In 2021, the Commission adjusted DESI to reflect the two major policy initiatives that will have an impact on digital transformation in the EU over the coming years: the Recovery and Resilience Facility and the Digital Decade Compass.

To align DESI with the four cardinal points and the targets under the Digital Compass, to improve the methodology and take account of the latest technological and policy developments, the Commission made a number of changes to the 2021 edition of the DESI. The indicators are now structured around the four main areas in the Digital Compass, replacing the previous five-dimension structure. 11 of the DESI 2021 indicators measure targets set in the Digital Compass. In future, the DESI will be aligned even more closely with the Digital Compass to ensure that all targets are discussed in the reports.
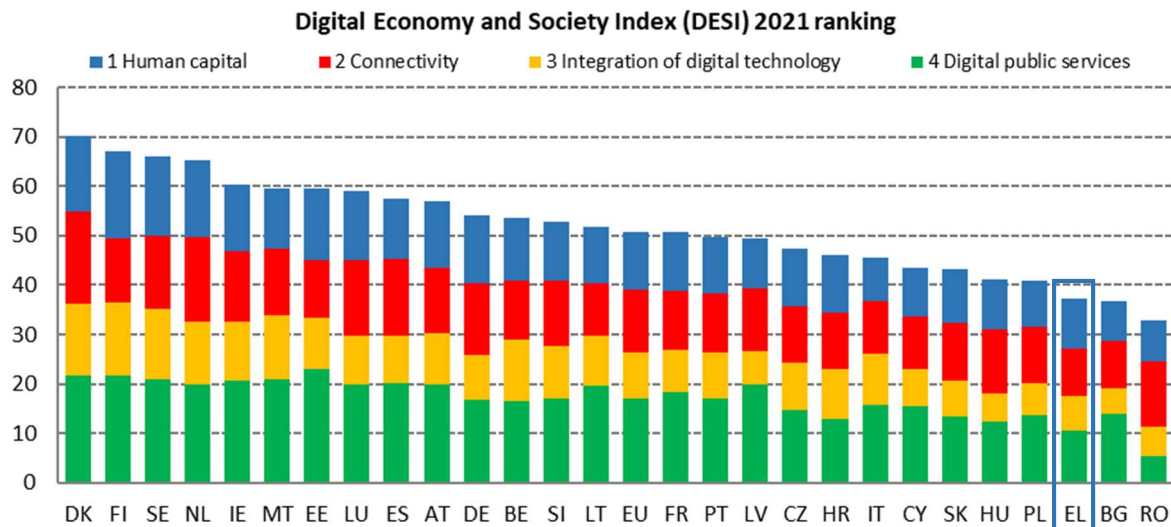
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training and using e-invoicing.

The DESI scores and rankings of previous years were re-calculated for all countries to reflect the changes in the choice of indicators and corrections made to the underlying data.

For further information, see the DESI website: https://digital-strategy.ec.europa.eu/en/policies/desi.

Overview

	Greece		EU
	rank	score	score
DESI 2021	25	37.3	50.7

Digital Economy and Society Index (DESI) 2021 ranking

Greece ranks 25th of 27 EU Member States in the 2021 edition of the Digital Economy and Society Index (DESI).

Greece continues to improve its performance in almost all DESI dimensions, although in most cases it still scores below the EU average. Overall, the country made slight progress in digital skills. The proportion of employed female ICT specialists as a share of all ICT specialists employed in Greece has been rising rapidly. Greece improved its scores on connectivity and has started to deploy very high capacity networks, though it still remains far below the EU average in very high capacity networks coverage and in fixed broadband take up of speeds of at least 100Mbps. However, the deployment of future-proof networks is likely to be accelerated with the expected investments in fibre (such as the Ultra-fast Broadband Project) and the 5G network deployment. Greece scores 99% in the 5G readiness indicator, which means that almost the total 5G pioneer spectrum harmonised at EU level has been assigned. On the integration of digital technologies into business activities, Greece is well below the EU average. On the digitalisation of public services, in 2020 Greece scores above the EU average in the number of e-government users, while it far exceeds the EU average in open data readiness, having already implemented relevant legislation and policies.

On 23 June 2021, Greece adopted the 2020-2025 'Digital Transformation Bible'[1], a new holistic digital strategy led by the Greek Ministry of Digital Governance, which describes 455 specific projects (of which 145 are ongoing) for implementing the strategy for a 'Digital Greece'. It includes the following strategic axes for the digital transformation of the Greek society and economy: (i) connectivity; (ii) digital skills; (iii) digital state; (iv) digital business; (v) digital innovation; and (vi) integration of digital technology in every sector of the economy. Greece also accelerated legislative reforms to create the right supporting framework conditions for implementing the new digital strategy. One example is the adoption of the Code of Digital Governance on 22 September 2020[2], which includes, among other provisions, the transposition of Directive (EU) 2018/1972 on the establishment of a European

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[1] https://digitalstrategy.gov.gr/
[2] Greek Law 4727/2020.

Electronic Communications Code (EECC) and which unifies the legislative framework on key elements. Greece was the first Member State to transpose the EECC in September 2020.

Furthermore, the digitalisation of public services is high on the country's political agenda. In 2020, Greece acted swiftly and decisively in the midst of the COVID-19 crisis to make public services available online in times of lockdown and quarantine so that the general public and enterprises could continue to benefit from public services remotely. The e-government portal 'Gov.gr' is now widely used by the general public. On the other hand, digitalisation of enterprises remains slow. Structural measures to create an environment conducive to digital innovation in the long-run (e.g. Digital Innovation Hubs) are needed with a focus on small and medium-sized enterprises (SME).

Generally, there is a considerable effort to accelerate the country's digital transformation, including several legislative reforms and projects.
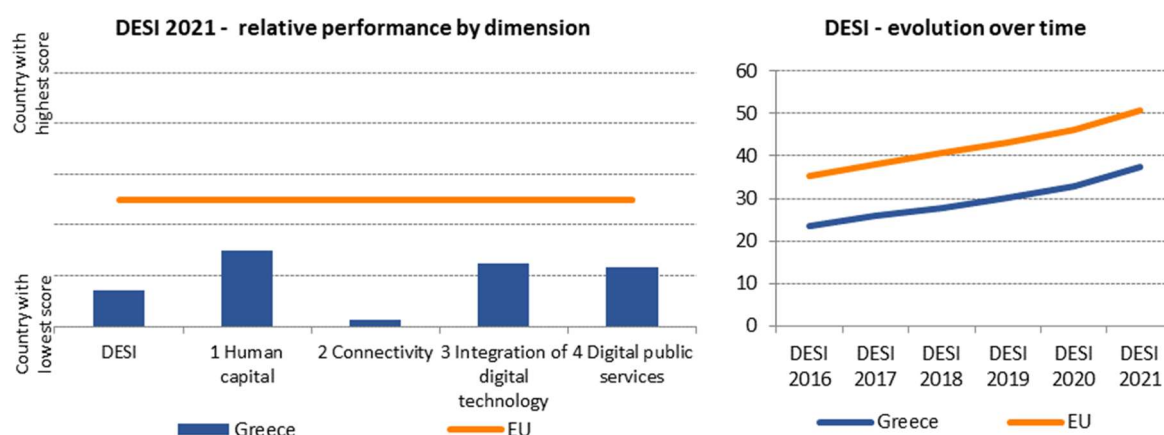

Digital in Greece's Recovery and Resilience Plan (RRP)

The total amount of the Greek plan is EUR 30.5 billion, consisting of EUR 17.8 billion in grants and EUR 12.7 billion in loans. The plan dedicates EUR 7 billion to the digital transition, which represents 23.3% of the plan's total allocation (in non-repayable support and loans). It includes a comprehensive set of reforms and investments in digital fields, addressing the country-specific recommendations and reflecting Greece's effort to support the country's digital transition.

The plan encompasses in particular measures aimed at: (i) enhancing connectivity, by accelerating and facilitating the deployment of very high capacity networks; (ii) improving the digitalisation of public administration and key sectors of the economy, notably through a wider adoption of digital capacities and advanced digital technologies; (iii) fostering the digitalisation of Greek businesses; (iv) developing the digital skills of the whole population to reduce the digital divide; and (v) implementing several multi-country projects, to achieve scale and interoperability.

1 Human capital

1 Human capital	Greece		EU
	rank	score	score
DESI 2021	21	41.0	47.1

Human capital
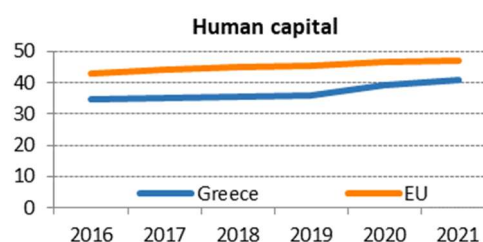
	Greece			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills % individuals	**46%** 2017	**51%** 2019	**51%** 2019	**56%** 2019
1a2 Above basic digital skills % individuals	**22%** 2017	**23%** 2019	**23%** 2019	**31%** 2019
1a3 At least basic software skills % individuals	**52%** 2017	**56%** 2019	**56%** 2019	**58%** 2019
1b1 ICT specialists % individuals in employment aged 15-74	**2.3%** 2018	**2.1%** 2019	**2.0%** 2020	**4.3%** 2020
1b2 Female ICT specialists % ICT specialists	**16%** 2018	**20%** 2019	**27%** 2020	**19%** 2020
1b3 Enterprises providing ICT training % enterprises	**14%** 2018	**15%** 2019	**12%** 2020	**20%** 2020
1b4 ICT graduates % graduates	**2.9%** 2017	**3.1%** 2018	**3.4%** 2019	**3.9%** 2019

On Human capital, Greece ranks 21st of 27 EU countries, remaining below the EU average. The percentage of people with at least basic digital skills is low (51%). The share of employed ICT specialists (2.1% in 2019) remains low in 2020 (2%) compared to the EU average (4.3%). However, among the country's ICT specialists, the proportion of female ICT specialists is growing extremely fast (from 20% in 2019 to 27% in 2020) and is well above the EU average (19%), making Greece a front-runner in this area. Only 12% of enterprises are providing ICT training to their employees in 2020, compared to the EU average of 20%.

Greece placed the development of digital skills for all at the core of its new digital transformation strategy to facilitate the use of public services and ensure the reskilling and upskilling of the workforce.

Several initiatives are in place to support the development of the population's digital skills, such as the Greek National Coalition for Digital Skills and Jobs[3], under the responsibility of the Ministry of Digital Governance. In 2020, the Coalition set up four working groups on: (i) education; (ii) training; (iii) ICT professionals; and (iv) general public. The aim is for public and private entities members of the Coalition to work together to develop initiatives for basic and advanced digital skills.

In 2020, the Ministry of Digital Governance created the Digital Skills Academy[4], a dynamic platform that assembles all available training courses of national and international educational organisations to improve the digital skills of learners of all levels. It includes around 251 courses on 33 topics given by 35 different institutions and will be regularly updated with new courses. The Ministry is also planning to create a national digital skills framework and certification system, to set up a national

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[3] https://www.nationalcoalition.gov.gr/en/national-coalition_en/
[4] https://nationaldigitalacademy.gov.gr/

register of digital skills education providers, and to develop a plan to improve the digital skills of all civil servants and local government employees.

On the education system, the COVID-19 pandemic accelerated the process of digitalisation. The Ministry of Education & Religious Affairs introduced in 2020 a remote education strategy for all education levels based on three pillars: (1) synchronous education such as live lessons on online platforms for all levels of education; (2) providing asynchronous education, such as educational material on websites and platforms for teachers and students of all educational levels; and (3) educational television programmes for elementary school pupils.

A digital education action plan was also adopted, which includes the revision of curricula, the provision of a basic certificate for IT skills for 15 year-old students and the provision of digital education resources for primary and secondary education. A major development was the use of specialised technology support for digital accessibility for children with special needs (e.g. the transcription of all the primary and secondary school textbooks into braille code). In parallel, through the 'Digital Access' (Psifiaki Merimna) programme every pupil and student whose family meets specific financial criteria is provided with a voucher of EUR 200 to purchase technological equipment (tablet, laptop, PC).

The eTwinning platform[5] is very popular in Greece. So far, 9 848 schools, 31 199 teachers and 18 512 projects have been registered and 30 educators from 24 Greek schools won the eTwinning European Prize for 2021[6].

In 2020, Greece was once again very active in EU Code Week, with 68,000 people participating in 1 179 activities - ranking Greece among the six most active countries. Furthermore, almost 6,000 students and over 1,600 school teams from all over Greece participated In the Panhellenic Robotics Training Competition.

To address the lack of digital skills in the labour force, a number of initiatives have been launched. The Central Association of the Chamber of Greece under the guidance of the Education Research Centre of Greece launched an action to upgrade the digital skills of employees in the private sector, including certification, for 15,000 beneficiaries. Other actions for training in the ICT sector were launched by the Manpower Employment Organization (OAED) under the guidance of the Ministry of Labour and Social Affairs for the unemployed graduates of universities and technical institutes.

Despite the actions already initiated to foster digital skills for all, supplementary efforts especially for advanced digital skills will be needed in light of the ambitious target set in the Digital Decade[7]. Greece needs to massively stimulate the upskilling and reskilling of the labour force and train future generations of workers. The lack of capacity in specialised education and training programmes in areas such as Artificial Intelligence (AI), quantum technologies and cybersecurity is a major challenge. Additional action, in collaboration with universities and enterprises would be welcome to provide education and training and to increase the number of digital experts needed in all sectors of the economy.

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[5] https://www.etwinning.net/el/pub/community/countries/country.cfm?c=300

[6] http://www.etwinning.gr/2016-02-29-10-54-36/2016-02-29-10-56-25/1047-etwinning-2021-4-24-30-etwprizes21

[7] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

Human capital in Greece's Recovery and Resilience Plan

Reforms and investments are planned across all education levels to digitalise processes and infrastructures and integrate digital skills into school curricula. A reform to modernise Vocational Education Training is also planned to upgrade and align the vocational education and training (VET) curricula with labour market needs, in particular digital skills for the digital and green transition (EUR 690 million), as well as a programme for digital skills upgrade for conscripts/military (EUR 32 million) and for digital skills for judges and judicial employees (EUR 32 million). Additionally, reforms and investments in upskilling and reskilling programmes for the labour force, focusing on the digital and green transition, are also envisaged to increase long-term employment and productivity.

2 Connectivity

2 Connectivity	Greece		EU
	rank	score	score
DESI 2021	27	37.7	50.2

Connectivity
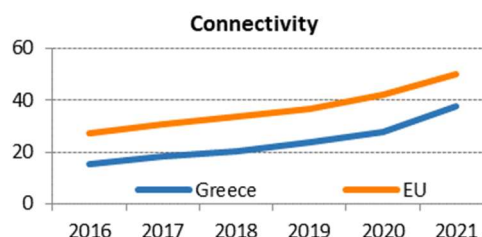
	Greece			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
2a1 Overall fixed broadband take-up % households	74% 2018	76% 2019	77% 2020	77% 2020
2a2 At least 100 Mbps fixed broadband take-up % households	0% 2018	1% 2019	3% 2020	34% 2020
2a3 At least 1 Gbps take-up % households	NA	<0.01% 2019	<0.01% 2020	1.3% 2020
2b1 Fast broadband (NGA) coverage % households	66% 2018	81% 2019	87% 2020	87% 2020
2b2 Fixed Very High Capacity Network (VHCN) coverage % households	0% 2018	7% 2019	10% 2020	59% 2020
2c1 4G coverage % populated areas	98.2% 2018	99.1% 2019	99.2% 2020	99.7% 2020
2c2 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	0% 2019	0% 2020	99% 2021	51% 2021
2c3 5G coverage % populated areas	NA	NA	0% 2020	14% 2020
2c4 Mobile broadband take-up % individuals	52% 2018	60% 2019	60% 2019	71% 2019
2d1 Broadband price index Score (0-100)	NA	49 2019	53 2020	69 2020

On Connectivity, with an overall score of 37.7 (compared to EU average of 50.2), Greece ranks 27th in EU. Greece continues to progress very quickly in fast broadband (NGA) coverage. It increased by 6 percentage points in 2020, reaching 87% which coincides with the EU average. This increase could be attributed to the progressing network deployment through the vectoring scheme. The country has also finally started to deploy very high capacity networks (VHCN). Its fixed VHCN coverage reached 10%, up from 7% one year earlier, although this is still well below the EU average of 59%. However, the take-up of at least 100 Mbps fixed broadband remains very low (reaching 3%, up from 1% in 2019) compared to the EU average (34%). Overall fixed broadband take-up is still progressing at a slow pace, reaching 77 % in 2020, up from 76% in 2019 (in line with the EU average). Greece has progressed on broadband price index with a score of 53 in 2020 compared to 49 in 2019. The mobile broadband take-up (60% in 2019) remains below the EU average (71% in 2019). Greece's 4G performance is better, with a coverage of 99.2%.

The General Secretariat of Telecommunications and Post of the Ministry of Digital Governance is updating the National Broadband Plan (expected in Q4 2021), which will include the country's roadmap for achieving its Gigabit Society targets for 2025 and will integrate the roadmap for the development of 5G networks. The updated National Broadband Plan's main objectives are to provide

by 2023 access to connections with speeds higher than 100 Mbps for more than 70% of consumers and businesses, and to upgrade the connectivity for islands. The upgrade of the existing infrastructure of electronic communications networks in Greece is planned to be addressed through providers' investment programmes, some of which are already under way, in conjunction with supplementary targeted public investments such as the Ultra-fast Broadband (UFBB)[8].

As regards EU funds (ESIF), in the current programming period (2014-2020), a total of EUR 300 million (EUR 265 million by ERDF and EUR 35 million by EAFRD) is being allocated to the major infrastructure project UFBB, for which a final call for tenders was issued on 22 June 2021 with a closing date 17 September 2021. The above-mentioned funding is available until 2023 with the possibility to extend it to the next programming period (2021-2027).

Regarding the deployment of next generation access (NGA) networks in the context of the vectoring procedure, which involves the operators OTE, WIND and Vodafone, 88.4% (19 557) of the 22 121 allocated cabinets offering FTTC/VDSL vectoring or FTTH/GPON technology had already been activated by September 2020, while the rest (2 564 cabinets) are scheduled to be activated by March 2022. Although most of the NGA deployment under the vectoring deployment plan concerns implementation of FTTC/VDSL vectoring access networks, operators also deploy FTTH networks, though to a lesser degree (1 425 FTTH allocated cabinets out of 22 121).

While Greece has recently made progress in tackling long standing obstacles to investment in networks, more efforts are needed, in particular on upgrading the infrastructure registry and creating one-stop-shop functionalities for permit granting, in order to maximise the impact of investments[9].

Greece scores 99% in the 5G readiness indicator, which means that almost the total 5G pioneer spectrum harmonised at EU level has been assigned. The country's deployment and launch of commercial 5G services commenced at the end of December 2020[10], as 5G spectrum rights of use had already been granted following the auction of 16 December 2020. The 5G auction included all the 5G pioneer bands (700 MHz, 3400-3800 MHz and 26 GHz) as well as the 2 GHz band. The Ministry of Digital Governance developed an action plan for the development of 5G networks, which introduces a clear regulatory and legislative framework and takes initiatives to ensure financial incentives and encourage the development of 5G infrastructure, such as tackling the significant delays in the process for antenna permit granting (Law 4635/2019). The establishment (with the Law 4727/2020) of an innovative national funding scheme for 5G in Greece (Phaistos Fund), is expected to play an invigorating role in the aftermath of the COVID-19 crisis. It should support SMEs active in industry 4.0 and in the creation of a market of 5G products in Greece in different sectors.

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[8] https://ec.europa.eu/regional_policy/en/projects/Greece/ultrafast-broadband-for-internet-users-throughout-greece

[9] Greece recognised these reforms as necessary based on the assessment of the best practices in the Roadmap implementing the Common Union Toolbox for Connectivity notified to the Commission on 24 June 2021 and they proposed an implementation plan (https://digital-strategy.ec.europa.eu/en/library/connectivity-toolbox-member-states-develop-and-share-roadmaps-toolbox-implementation).

[10] The 5G coverage indicator in Greece is zero, because the data are from July 2020 before the commercial launch of 5G in the country.

Main market & regulatory developments

The Hellenic Telecommunications and Post Commission (EETT) approved in November 2020 the separation of the passive infrastructure, i.e. the old 'towers' of Vodafone and Wind from the two companies and their merger into a new company, named Vantage Towers Greece. The new entity's commercial scope would be the independent lease of those passive infrastructures to the two operators (under non-discriminatory conditions) and also to third parties. The 5G Ventures S.A, an independent fund management company established by the Hellenic Corporation of Assets and Participations S.A (HCAP) and Vantage Towers Greece announced the signing of a memorandum of cooperation to support companies, which are funded by the Phaistos Fund, to develop products and services that take advantage of the capabilities of 5G networks by giving them access to the passive infrastructure owned by Vantage Towers in Greece.

In 2020, United Group, which has telecoms and TV operations in southeast Europe, completed its acquisition of the Greek telecommunications and pay-TV provider, Forthnet. There is still no mobile virtual network operator (MVNO) in the Greek telecommunications market. While Forthnet has not yet activated the June 2019 agreement with Vodafone to enter the market as MVNO, an energy company, Volton, expressed its interest to get MVNO access in the competitive telecommunications sector by submitting a formal request to EETT and the other three operators with the aim of concluding a network access agreement.

Greece was the first Member State to notify the complete transposition of the European Electronic Communications Code (EECC), Directive (EU) 2018/1972[11], before the transposition deadline (21 December 2021), which shows the country's effort to improve its connectivity ranking in preparation for the adoption of a pro-investment regulatory framework facilitating the deployment of networks and 5G.

As part of the analysis of the leased lines markets (cases EL/2019 2227, 2228, 2229) and the Commission's comments, EETT notified on 19 November 2020 its decision[12] (ref. 968/02/16.11.2020) on the final measure regarding the pricing methodology and the actual wholesale prices until the development of the bottom-up LRIC+(long-term incremental cost) model. On 18 September 2020, the Commission registered a notification from EETT concerning the fourth round review of the markets for: (i) call termination on individual public telephone networks provided at a fixed location in Greece; and (ii) call origination on individual public telephone networks provided at a fixed location in Greece[13]. Concerning market (i), EETT considered it appropriate to maintain the applicable symmetric fixed termination rate at the level of 0.0545 eurocents/minute, until the entry into force of the relevant Delegated Act. Concerning market (ii) EETT proposed a nine-month transition period before the deregulation of the market.

EETT published in May 2021 a public consultation to determine the content of the provision of broadband access based on the new Universal Service provisions introduced by the Directive (EU) 2018/1972. In addition, on 17 May 2021, EETT issued the new Regulation on General Authorisation, which sets new terms and obligations for electronic communications providers, in

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[11] The Directive (EU) 2018/1972 was transposed in the Greek legislation with the Greek Law 4727/2020).

[12] See CIRCABC : EL_2020_2290

[13] See CIRCABC: Case EL/2020/2271 and Case EL/2020/2272

line with the transposed provisions of Directive (EU) 2018/1972. On open internet access rules in Greece, a major development is the entry into force of the provisions of the EETT Decision[14] on the inclusion of information about realistic internet access speeds in consumer contracts, elaborating on the general provisions of Regulation (EU) 2015/2120. This Decision's provisions on speeds entered into force on 25 November 2020 for fixed networks and on 1 March 2021 for mobile networks.

With reforms and targeted investments, Greece needs to create the right conditions for achieving the 2025 Gigabit targets, and bridge the digital divide with investments such the cross-border 5G corridors and the interconnection of the islands with submarine fibre cables. The adoption of a pro-investment regulatory framework and the current reforms, combined with the funding from the Recovery and Resilience Facility (RRF) would help Greece to improve its connectivity, by extending coverage of fibre and 5G. This will enable people and enterprises across Greece to use next generation infrastructure and lay the ground for high-technology applications and the take-up of emerging technologies.

Connectivity in Greece's Recovery and Resilience Plan

The plan includes connectivity investments of EUR 321.6 million financed by the grant component of the RRP and additional EUR 912 million for investments in Very High Capacity Networks financed on the basis of the EUR 12.7 billion Loan Facility included in the Plan. Together, it represents a total of EUR 1.2 billion (18% of the plan's total digital budget).

Grants are foreseen to cover: (1) the installation of fibre optic infrastructure in buildings (EUR 131.3 million); (2) the development of 5G corridors covering all major Greek highways (EUR 160 million); (3) the deployment of submarine fibre cables to connect mainland with the Greek islands and Cyprus (EUR 30 million). In additon to the investments in connectivy presented above, the plan includes an investment in the utilisation of space technologies and applications by developing a constellation of small satellites (EUR 200 million). Although this is considered part of the investments in advanced technologies, this investment is also expected to highly contribute to connectivity[15].

Of those investments, three have a cross-border/multi-country (MCP) dimension: the '5G corridors' will also support the cross-border corridor Thessaloniki-Sofia-Belgrade; the 'submarine fibre cables' will allow interconnecting mainland Greece with Cyprus; and the 'small satellites' will ensure interoperability with European Quantum communication infrastructure (EuroQCI). The plan also includes reforms which will put in place a framework to facilitate the switch to fast broadband connections and the transition to 5G technology.

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[14]https://www.eett.gr/opencms/export/sites/default/admin/downloads/telec/apofaseis_eett/kanonistikes_apofaseis_eett/AP876-007B.pdf

[15] On the basis of the methodology to calculate the support to the digital objectives (Annex VII of the Regulation (EU) 2021/241), the "Small satellites" initiative is part of the intervention field "Investment in digital capacities and deployment of advanced technologies". However, for readability reasons, this initiative is mentioned together with the measures under the intervention field "Connectivity".

3 Integration of digital technology

3 Integration of digital technology	Greece		EU
	rank	score	score
DESI 2021	22	28.5	37.6

Integration of digital technology
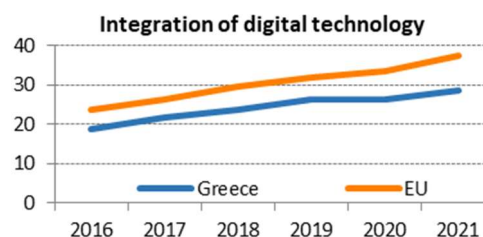
	Greece			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity % SMEs	NA	NA	NA 2020	60% 2020
3b1 Electronic information sharing % enterprises	37% 2017	38% 2019	38% 2019	36% 2019
3b2 Social media % enterprises	21% 2017	19% 2019	19% 2019	23% 2019
3b3 Big data % enterprises	13% 2018	13% 2018	13% 2020	14% 2020
3b4 Cloud % enterprises	7% 2018	7% 2018	NA 2020	26% 2020
3b5 AI % enterprises	NA	NA	34% 2020	25% 2020
3b6 ICT for environmental sustainability % enterprises having medium/high intensity of green action through ICT	NA	NA	65% 2021	66% 2021
3b7 e-Invoices % enterprises	9% 2018	9% 2018	NA 2020	32% 2020
3c1 SMEs selling online % SMEs	11% 2018	9% 2019	NA 2020	17% 2020
3c2 e-Commerce turnover % SME turnover	4% 2018	4% 2019	NA 2020	12% 2020
3c3 Selling online cross-border % SMEs	7% 2017	4% 2019	4% 2019	8% 2019

On integrating digital technology into business activities, Greece ranks 22nd in the EU. Digital technologies are slowly being adopted by Greek enterprises, with only 19% using social media compared to an EU average of 23%. 38% of enterprises use electronic information sharing (above the EU average of 36%). On the adoption of advanced digital technologies, Greece's enterprises are among the frontrunners for the use of AI (34%), well above the EU average (25%). On ICT for environmental sustainability, at 65%, Greece is close to the EU average of 66%. The same applies to big data analytics, where at 13% Greece is close to the EU average of 14%.

The Digital Transformation Bible includes strategic measures to make enterprises in Greece more digital. Having identified the obstacles to the digitalisation of enterprises, the strategy focuses on: (i) adapting information systems and digital services for the export orientation of enterprises; (ii) disseminating best practices for strengthening the digital presence of Greek enterprises; (iii) creating new ecosystems; (iv) making better use of data for developing new products, business models and markets; and (v) training employees and entrepreneurs in digital skills. To give an example, an action named e-retail (e-lianiko), launched by EPAnEK, will provide grants to SMEs in the retail sector for the development/upgrade and management of an e-shop.

AI is one of the main strategic action areas of the Digital Transformation Bible. The Ministry of Digital Governance is preparing a Greek national AI strategy with the involvement of major stakeholders and experts in Greece, as well as EU experts. Its main objective will be to determine the conditions for the development of AI, including skills, a trust framework, data policy, and ethical principles for its safe development and use. It will also define national priorities and areas for maximising the benefits of AI to meet societal challenges and foster economic growth. Greece has also begun to set up an Artificial Intelligence Centre of Excellence in Athens. The Centre is intended to become a global point of reference for document intelligence, connecting researchers, scientists and AI specialists with business experts from a wide range of industrial sectors, and using emerging technologies to accelerate innovation. This private-public initiative aims to help turn the country's 'brain drain' into a 'brain gain'.

Greece is committed to making progress on new digital technologies and investing in them through EU-coordinated programmes and plans. The country signed the European declaration on high-performance computing (HPC), joining the European effort to build the next generation of computing and data infrastructures. The National Infrastructures for Research and Technology (GRNET) coordinates a consortium of partners to create an HPC Competence Centre in Greece. It will enable the uptake of HPC technologies to advance competitiveness in research, improve effectiveness of government services and promote innovation in the industry. In 2021, the country announced plans to expand its hyper-computing system, ARIS (Advanced Research Information System).

In 2019, Greece signed the Quantum Declaration[16] of cooperation to develop and deploy a European Quantum communication infrastructure (EuroQCI). The country intends to develop its national and cross-border EuroQCI network both on the ground and in space. An important development in 2020 was the selection of the Helmos observatory[17] by the European Space Agency (ESA) as the first Optical Ground Station (OGS) for the 'Fibre in the Sky' project that will be part of the EuroQCI Greek national programme.

In December 2020, the Ministry of Digital Governance issued the 2020-2025 Cybersecurity Strategy[18], which sets out strategic objectives, priorities, and policy and regulatory measures to ensure a high level of security for national telecommunications and IT systems, and formed the National Cybersecurity Authority (NCSS). The NCSS fosters R&D investment and promotes local/regional start-up ecosystems and networking channels to support the implementation of the legal framework. The NCSS is actively pursuing collaborations with academic institutions and is already implementing framework agreements with academic departments of major Greek universities.

In Greece, nine Digital Innovation Hubs (DIHs) have been set up and are in operation, focusing mainly on research institutes. In September 2020, an open call for expression of interest for European Digital Innovation Hubs (EDIHs) was issued. To address the lack of an overarching framework for organising, systematically monitoring, supporting and coordinating these hubs, concrete steps to develop a strong

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[16] https://digital-strategy.ec.europa.eu/en/news/nine-more-countries-join-initiative-explore-quantum-communication-europe

[17] http://helmos.astro.noa.gr/index.html

[18] https://mindigital.gr/wp-content/uploads/2020/12/%CE%95%CE%98%CE%9D%CE%99%CE%9A%CE%97-%CE%A3%CE%A4%CE%A1%CE%91%CE%A4%CE%97%CE%93%CE%99%CE%9A%CE%97-%CE%9A%CE%A5%CE%92%CE%95%CE%A1%CE%9D%CE%9F%CE%91%CE%A3%CE%A6%CE%91%CE%9B%CE%95%CE%99%CE%91%CE%A3-2020-2025.pdf

ecosystem in the country are being planned from Q2 2021. This includes setting up a network of Centres of Excellence (CoE) and EDIHs.

Creating a reliable, sustainable and coordinated network of DIHs to support the digital transformation of Greek enterprises by strengthening and utilising poles of digital innovation at national level would boost the digital transformation of the economy, covering a significant part of enterprises' digitalisation needs. Structural measures to create an environment conducive to digital innovation in the long-run (e.g. business R&D and public-private collaboration in research, networking, clusters and support for activities that allow innovations to reach the market) are needed, with a focus on SMEs.

Greece has also recognised the need for a national digital industrial strategy and for additional measures to create a favourable regulatory and investment framework to speed up the digitalisation of larger and smaller enterprises.

Integration of digital technology in Greece's Recovery and Resilience Plan

The plan includes significant measures to increase the digitalisation of Greek's enterprises, notably investments in the form of grants for the digital transformation of SMEs (budget EUR 375 million). The reforms and investments included in the plan are expected to help SMEs: take up digital technologies; adopt and develop innovative digital solutions tailored to the specific needs of their industries; expand their digital presence, for instance through participation in e-commerce platforms; and reduce their operating costs, through more efficient data processing. The plan also envisages a budget of EUR 330 million in Loan Facility funding for the digitalisation of SMEs and a budget of €770 million for the digitalisation of large enterprises. Finally, the plan also includes a measure called 'Accelerating Smart Manufacturing', which aims to provide financial support for small and medium manufacturing enterprises to enhance their technological infrastructure, upgrade their manufacturing equipment using state-of-the-art smart technologies with low environmental impact and ultimately accelerate the industry's transition to Industry 4.0.

4 Digital public services

4 Digital public services	Greece		EU
	rank	score	score
DESI 2021	26	41.9	68.1

Digital public services
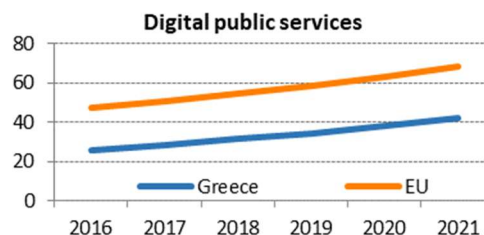
		Greece		EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	**68%** 2018	**68%** 2019	**67%** 2020	**64%** 2020
4a2 Pre-filled forms Score (0 to 100)	**NA**	**NA**	**36** 2020	**63** 2020
4a3 Digital public services for citizens Score (0 to 100)	**NA**	**NA**	**54** 2020	**75** 2020
4a4 Digital public services for businesses Score (0 to 100)	**NA**	**NA**	**54** 2020	**84** 2020
4a5 Open data % maximum score	**NA**	**NA**	**85%** 2020	**78%** 2020

Greece ranks 26th in the EU on Digital public services. The open data maturity indicator shows that Greece, with 85% in 2020, performs well, exceeding the EU average of 78%. On active users of e-government services, at 67% Greece is above the EU average of 64%. However, with 36/100 pre-filled forms, Greece is well below the EU average (63/100). The availability of digital public services for both citizens and businesses remains low (54) compared to the EU average of 75 for citizens and 84 for businesses in 2020.

The modernisation of the public administration and the access to e-government services for all is high on the government's agenda. The focus is on increasing the interoperability and robustness of public IT systems, and on e-governance. The main goal is to make digital public services more accessible and usable for citizens and businesses, and to simplify and digitalise State governance and public services, to ensure that Greece is 'digital by default' by 2023.

In March 2020, the e-government portal 'Gov.gr' was launched as a central platform for government information and services with the aim of unifying all governmental services online. Since the beginning of 2020, a large number of procedures related to key life events, such as birth certificates, were simplified and digitalised. During the pandemic, Greece introduced an SMS lockdown permit service, recognised as OECD best practice. It also made registries interoperable in order to: create a unified social security fund (e-EFKA); digitise tax clearance for public procurement; and introduce a unified national e-pass for tolls on highways. It also managed to digitalise other key government certificates and services, making more digital public services available to citizens. There are currently more than 1 119 end-to-end digital government services hosted in gov.gr (starting from 501 services in March 2020). These and other public administration digitalisation measures have resulted in a significant uptake by users. Notably, in 2018 all digital transactions (logins and interactions) with the Greek government stood at 8.8 million, whereas in 2020 this increased 11-fold to 94 million.

In addition, to reduce physical presence in public centres and agencies because of the COVID-19 pandemic, the Ministry launched video call services to enable citizens and businesses to meet and

interact with civil service officials, such as the tax authority, 'KEP' (the Citizen Service Kiosk), consular offices around the world, and the national unemployment agency.

The 'Digital Cabinet' service has allowed the government to share various laws, bills, decrees, and other official documents digitally between Ministries and Parliament, and enabled Ministers to sign them even from their mobile phones.

Greece has yet to notify an electronic identification (eID) scheme under the eIDAS Regulation to the Commission, which is a pre-condition for the cross-border recognition of national eIDs. The procurement process for the Greek national eIDs is still ongoing. The expected actions on eID and trust services (such as electronic signature) are key steps for creating a trusted online environment for the public sector.

Greece shows a strong commitment to digitalising public services as well as State governance. Simplifying processes and reducing the administrative burden on people, enterprises and the public administration remains the biggest challenge. However, the swift implementation of digital services is expected to help increase competitiveness, productivity, investment as well as citizen engagement.

Highlight 2020-2021: The Greek digital vaccination platform

In 2021, Greece developed a digital-first vaccination platform which underpins its overall vaccination strategy. The architecture of this multi-channel platform comprises a central data warehouse that stores all data on vaccination shipments, the supply chain, appointments, and vaccination centres. It also features a public-facing vaccination website, including an open data section with information on the number of total jabs, daily jabs, and first and second doses, both at national and regional level. It also includes an online booking platform where people can book, amend, or cancel their appointments, an SMS notification service, and a booking platform for pharmacists. The vaccination platform accelerated the vaccination process, ensured accuracy, saved time and demonstrated how digitalisation can improve people's quality of life.

Digital public services in Greece's Recovery and Resilience Plan

E-government and the digitalisation of public services account for a large share of the digital budget, worth in total more than € 2.7 billion. Key investments and reforms include among others:

- The digitisation of archives in key services (justice, urban planning agencies, cadastre, immigration & asylum) and their integration in the relevant IT systems, coupled with system interoperability initiatives that allow the application of the 'once only' principle. This is the foundation for the digital transformation of public sector bodies and will help reduce the administrative burden on people and enterprises.
- Reforms and investments related to digital capacities and advanced technologies, such as measures on cloud infrastructures and cybersecurity.
- Investments in cloud computing and big data, in particular to link back-office and front-office processes and ensure the interoperability of systems, processes, applications and services.
- The development and implementation of a cybersecurity strategy to increase the reliability and security of public sector systems and data and improve the public's trust in interactions with the public sector. The strategy will include the creation of a National Cybersecurity Operations Centre (SOC), and advanced security services in G-Cloud critical infrastructure to improve the security of the public sector's central infrastructures and information systems.