Infrastructure Research

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European Transformation: Infrastructure's Missing Capital

IN A NUTSHELL

- European Transformation is an opportunity for infrastructure investors to deploy capital to address key challenges to the region's economic security, competitiveness, and sustainability.
- Historically strong infrastructure fundraising into ever-larger Core/Core+ funds risks underfunding smaller, innovative infrastructure businesses, crucial for the energy and digital transitions, which at the same time offer access to potentially higher returns for investors.
- Europe needs EUR 6 trillion for its green and digital transformation, with EUR 3.5 trillion currently planned. This gap offers a significant opportunity for private capital to benefit from Europe's long term, well-rounded, and globally competitive infrastructure policies.

European Transformation & The Missing Middle

European governments have increasingly recognised the need for strategic efforts to address the region's economic security, competitiveness, and sustainability. The issues identified and recommendations in reports from former Italian Prime Minister Letta[1] and former European Central Bank President Draghi[2], echo the findings and efforts of DWS on its European Transformation initiative since December 2022.[3] The region has been at the forefront of policy formation in the sustainability realm for years, but the Covid-19 pandemic, Russia-Ukraine conflict and increasing geopolitical risk adds further policy impetus for European transformation.

In this report we focus on the need to provide capital to the foundational energy and digital infrastructure of the next generation, to scale solutions to tackle these fundamental challenges Europe faces. We highlight that the trends in infrastructure fundraising are increasingly directing capital towards larger funds, which poses a risk of resource misallocation. This situation potentially leaves the 'missing middle' segment under-capitalised, hindering the growth of smaller yet essential infrastructure assets and enterprises. We emphasize the substantial investment opportunity presented by the resolution of these challenges, as well as the capital required for effective transformation in Europe[4].

[1] European Commission (April 2024) Enrico Letta's Report on the Future of the Single Market
[2] European Commission (September 2024) Future of European competitiveness
[3] DWS (2022-24) European Transformation Research Hub
[4] DWS (March 2024) Europe's transformational scorecard

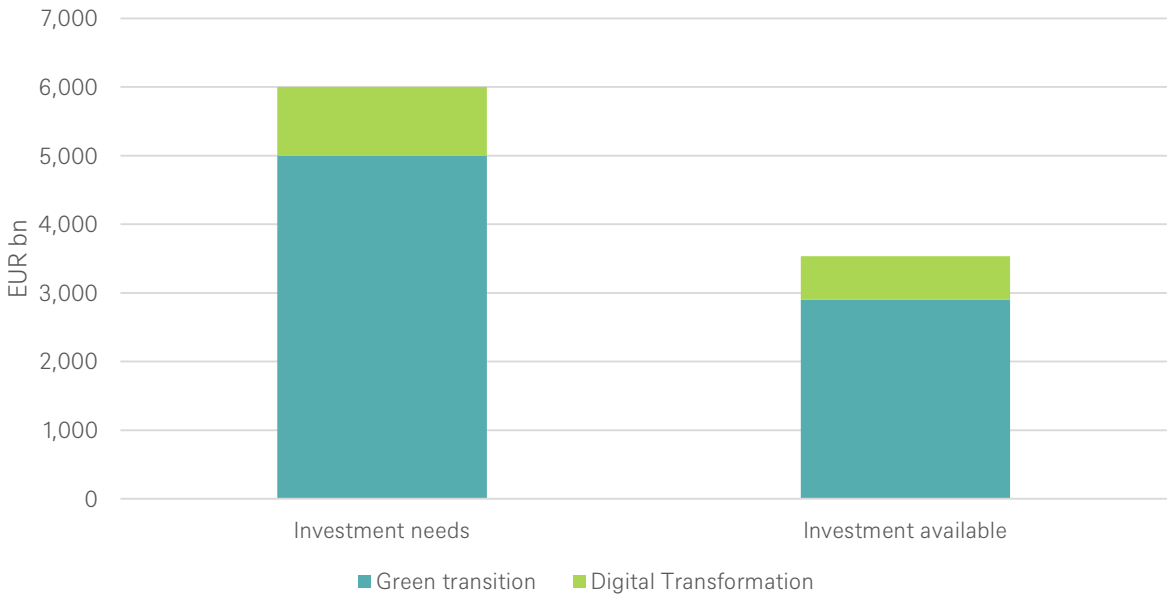
1 / Europe's Focus On The Digital Transformation and Green Transition

1.1 Significant Investment Needs

Across the European economy, we estimate that investment requirement needs for key climate and digital transformation goals stand at EUR 6 trillion across key sectors. While some of this will be funded by the public sector, in this exercise, we aim to identify where private sector capital will be required most to help support Europe's transformation.

Our analysis[5] finds that Europe has at least a EUR 2.5 trillion investment gap up to 2030 to reach climate and digital transformation goals, as outlined in Figure 1. These are typically spread across the buildings, energy, transport, digital, and green infrastructure sectors.

Figure 1: Europe's green and digital investment gap



Source: DWS analysis March 2024 based on European Commission (2021-24), NXP (2022), Morgan Stanley (July 2023) Powering Europe.

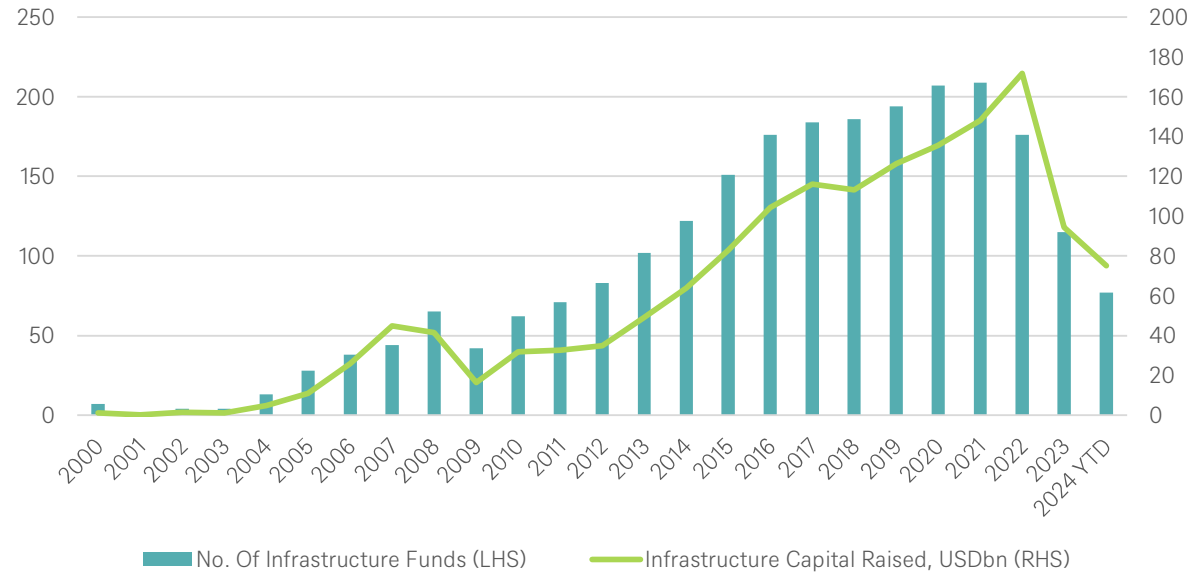
1.2 Infrastructure Investors Key To Addressing Funding Gap

For the infrastructure market to truly help to deliver a decarbonised, digitalised, and more resilient European economy, there needs to be a continued focus on scaling the infrastructure businesses capable of achieving the above investment requirements. The main challenge in achieving this is that while infrastructure fundraising has been growing significantly in recent years (Figure 2), the quantum of capital raised into funds appropriately sized to write investment tickets suitable for

[5] See also DWS Research Institute (March 2024) Europe's transformational scorecard.

the lower end of the midcap market – where many of the energy transition and digital infrastructure business enterprise values sit – has not kept pace (see Figure 5).

Figure 2: Global Infrastructure Fundraising



Source: DWS Infrastructure Research, Preqin Pro, October 2024.

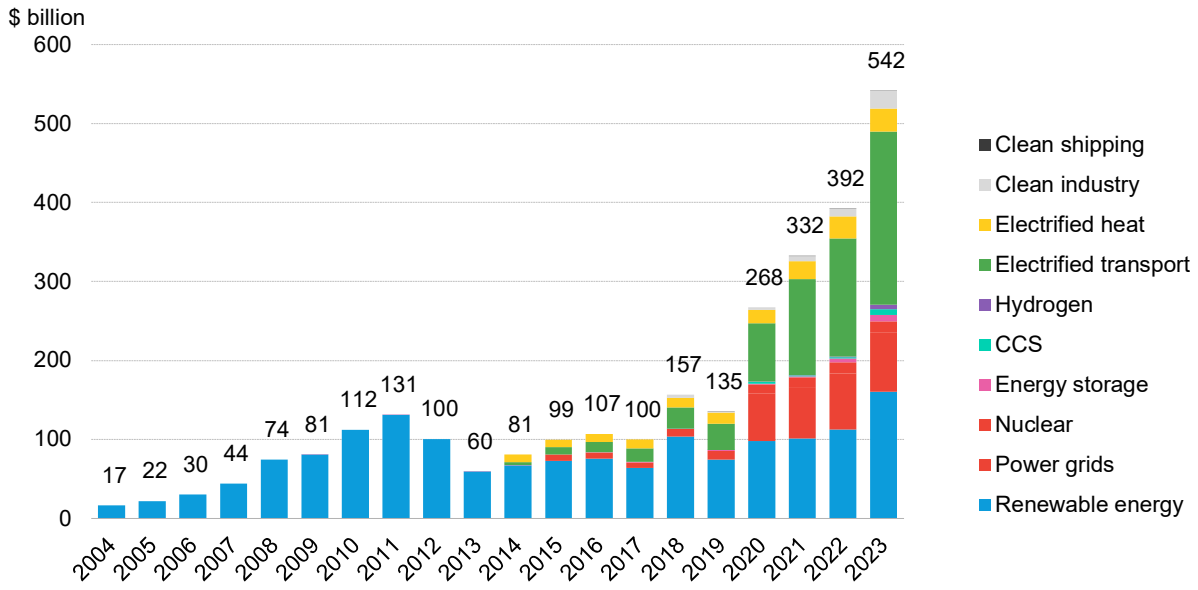
For the past two decades, infrastructure investors have been instrumental in delivering the rapid de-risking and scaling of solar and wind assets, to the extent that the combined value of transactions in those two sectors account for 15% of all infrastructure transactions completed over the last five years, and 38% of the volume[6].

As we have previously highlighted with regards to alternative fuels[7], this scaling and de-risking process needs to now be achieved across a range of other technologies to have a similarly significant impact as solar and wind but outside of the power generation sector.

The growing number of different green transition technologies and growing investment in the EMEA region is shown in Figure 3.

[6] Infralogic, October 2024.
[7] DWS Infrastructure Research (2023) Transforming European Energy: Alternative Fuels

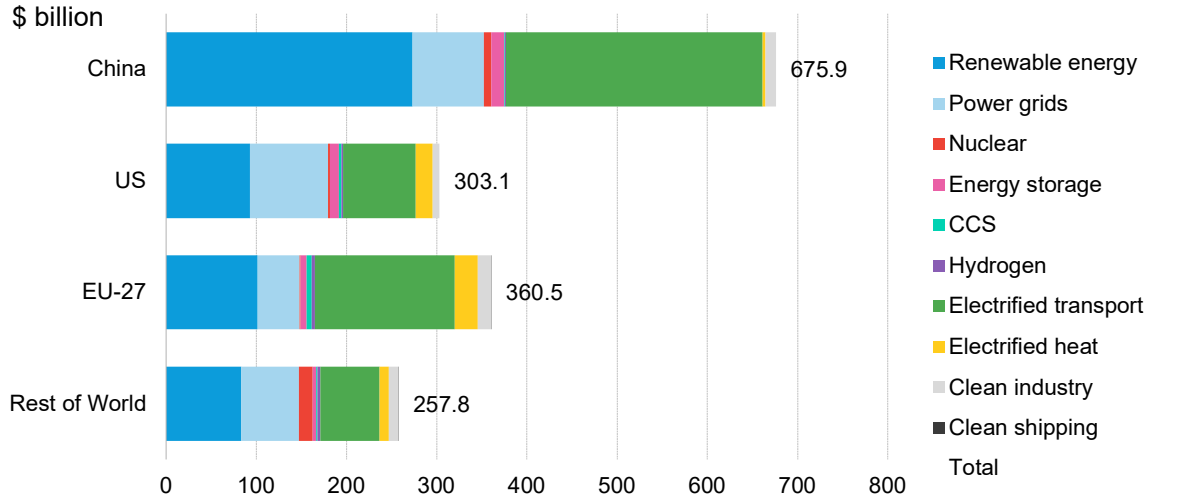
Figure 3: Growing energy transformation investments in EMEA



Source: Bloomberg NEF 2024. Note: Start years differ by sector but all sectors are present from 2020; Nuclear figures start in 2015 and power grids in 2020. CCS: carbon capture and storage.

Compared to other regions, Europe led the United States in energy transition investments as shown in Figure 4.

Figure 4: Europe was the second largest region for energy transition investment in 2023



Source: Bloomberg NEF 2024. Note: Start years differ by sector but all sectors are present from 2020; Nuclear figures start in 2015 and power grids in 2020. CCS: carbon capture and storage.

2 / Infrastructure Growth Capital Required

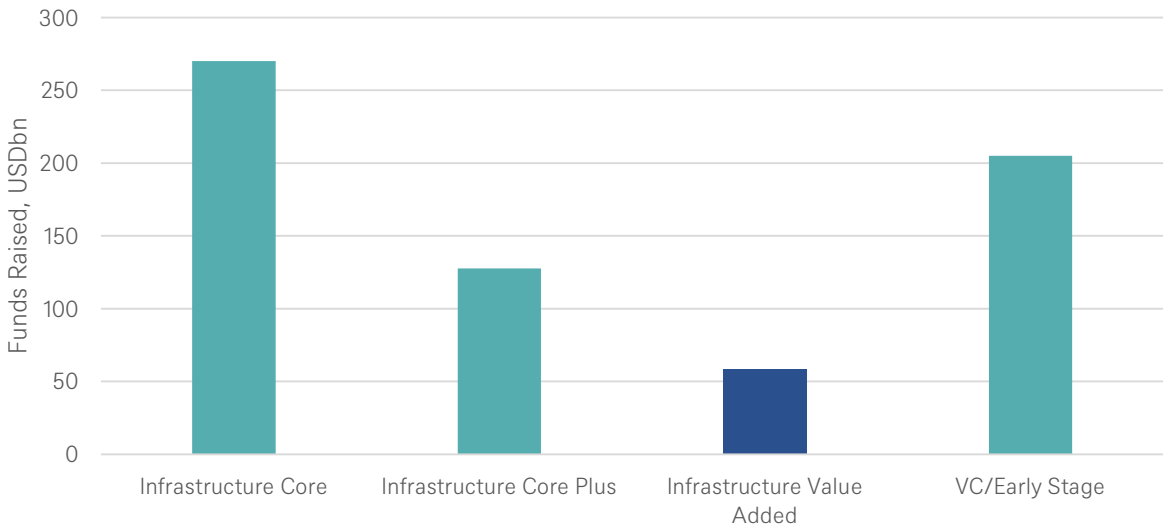
2.1 Fundraising trends pushing capital away from new assets

To achieve the successful scaling of key sectors, more capital is needed for infrastructure growth businesses. These are businesses, which exhibit the characteristics of infrastructure assets through operating in markets with regulatory support, offering essential services with strong protection from macroeconomic conditions but, as real assets delivering an infrastructure returns profile, are less appropriate to be developed by venture capital or early-stage private equity.

This requirement for capital is at odds with where infrastructure investors have historically allocated. Seeking a lower-risk entry point to the asset class many investors have looked to Core strategies, given their perceived status as lower risk, yielding investments.

As the asset class has matured and managers have proven the infrastructure characteristics of sectors away from more traditional areas such as regulated utilities, Core Plus has become the largest strategy for capital raising in infrastructure. Value Add within infrastructure, where we find most infrastructure growth businesses, has seen a comparatively small amount of capital raised in recent years, even as investors have grown in comfort with higher-risk, higher returning infrastructure strategies. Looking purely at the energy transition focused capital, this differential in fundraising is stark (Figure 5).

Figure 5: Energy Transition-focused Infrastructure Fundraising By Strategy



Source: DWS Infrastructure Research, Preqin Pro, September 2024. Note: Energy Transition includes capital allocated towards renewable energy and other clean technology sectors.

Value Add investments often involve a significant amount of active asset management to limit risk exposure, which is a key reason why some investors remain cautious towards the segment. However, as with solar and wind sectors as the beginning of that growth story, there now exists a significant number of secular and regulatory tailwinds across European infrastructure sectors that are providing similar – if not even more attractive, given lessons learned by authorities in the scaling of solar and wind – protections and incentives for investors to scale and de-risk infrastructure growth businesses.

Box 1: Insurers' role in developing and deploying climate technologies

Most of the world's largest insurance and reinsurance company CEOs are members of the Geneva Association. Over the last year, the Association has worked with senior experts from the insurance industry and scientific community, capital providers, policymakers and regulators, climate tech project developers, and engineering, procurement and construction companies. Through two major reports* and multiple events, the overall conclusion is that ***"Innovative risk management measures and insurance solutions will be key to unlocking the potential of climate technologies".***

The Geneva Association worked with the US Department of Energy to develop an 'Insurability Readiness Framework' (IRF) to allow climate technology risks to be viewed through an insurance lens. The reports provided useful recommendations for different stakeholders including for large re/insurers that are investing to expand their risk engineering services, data and analytics services and underwriting solutions for different climate technologies as expanding insurance underwriting and risk management solutions. We commend the work of the Geneva Association in this area.

While newer technologies like hydrogen and energy storage often get significant attention, there are many technologies and business models that require investment and that fall into our 'Missing Middle' report analysis. Insurance companies looking for risk management and underwriting business opportunities could benefit by partnering with investment funds deploying capital into this area.

Source: Geneva Association 2024

As an example of how critical scaling smaller infrastructure assets and businesses will be in the coming decade, businesses which enable energy efficiency in homes and industry, which develop alternatives fuels or electrification infrastructure, are central to the future European energy complex. The Russia-Ukraine crisis catalysed significant policy responses from the EU, most notably in the creation of REPowerEU, which targets significant sustainable energy production and energy efficiency targets, as well as the European Gas Demand Reduction Plan**:**

- Zero dependence on Russian natural gas imports
- 35bcm sustainable biomethane production
- 20mt of renewable hydrogen production
- 510GW of installed wind capacity
- 592GW of installed solar PV capacity
- 13% lower final energy consumption in 2030 vs. reference projection.
- 5% obligation to reduce electricity demand during peak price hours#
- 10% target to reduce overall electricity demand
- 15% gas demand reduction target

These targets, as well as various public incentives, supports the commercialisation and roll-out of a wide variety of energy transition technologies.

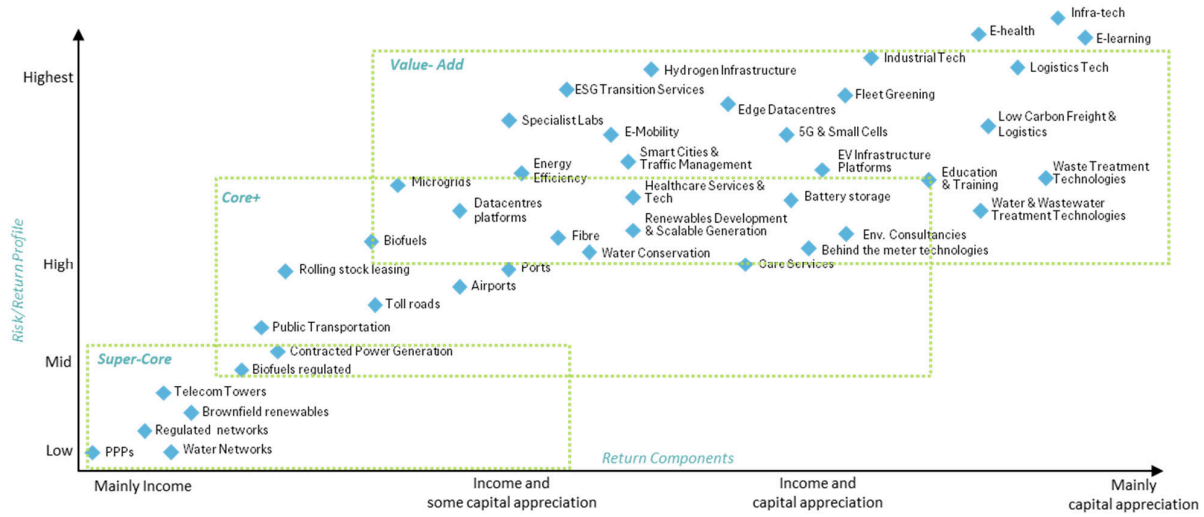
For instance, a parallel DWS report examined the infrastructure, real estate and debt investor implications and opportunities stemming from Europe's policies for energy efficiency in building renovation[8].

While utility scale wind and solar are now targets for large-cap Core infrastructure investors, renewables self-generation, biofuels production, green hydrogen production, and industrial and residential energy efficiency solutions are all often delivered by smaller-scale businesses – now crucial to Europe's energy goals but lacking in available capital to scale.

[8] DWS Research Institute (April 2024) Energy efficiency policies and investments

Figure 6 shows our estimate for the risk/return profiles of different groups of technologies or sectors. We expect that technology improvements, driven in part by different policy frameworks and public funding initiatives, will lead to technologies maturing from Value-Add towards Core+ investments. However, this evolution will not occur without greater allocation towards the Missing Middle, Value Add infrastructure strategies. With such investment, there is the potential for those crucial sectors to move down the infrastructure risk curve and undergo the same derisking and scaling that now sees operational renewables in the lower risk-return segment of the market.

Figure 6: Risk / Return profile of infrastructure relevant sectors and technologies



Source: DWS, February 2023. For illustrative purposes only. No assurance can be given that any forecast, target, or opinion will materialise. For illustrative purposes only. There can be no assurance that the important assumptions underlying target IRR ranges will prove to be accurate.

3 / Estimating the European green and digital investment gap

3.1 Estimating green investment costs

The largest area of capital required is for the ongoing energy transition and to meet European energy security goals. For instance, the European Commission estimates[9] that EUR620bn/year is needed to meet the objectives of the Green Deal and RePowerEU (which is to eliminate dependence on Russian energy sources). As well, the EU estimates that EUR92bn/year is needed for the Net Zero Industry Act which is the goal to increase European manufacturing of clean energy technologies and their supply chains, reducing dependence on other countries. Over the seven years of 2023-2030, the green transition need is thus estimated to cost just under EUR5trn total.

Europe has already made significant progress in deploying renewable energy, energy efficient and electric vehicle technologies, due to a combination of public policies, taxes, and incentives. In 2023, clean energy investment in Europe hit US$341bn compared with US$303bn in the U.S. and US$676bn in China[10]. The challenge now is to scale technologies and infrastructure assets to target hard-to-abate sectors across transportation and industry, as well as boost the uptake and impact of energy efficiency solutions[11].

Over or under-estimates?

The continuing decline in the cost of technologies like batteries and solar panels may mean that this cost is over-estimated. However, there are some reasons for believing that the green investment cost is under-estimated, including the imposition of trade tariffs affecting Chinese produced technologies like electric vehicles, the challenges encountered in European battery production (i.e. Northvolt in Sweden), and the need for more public incentives and/or energy tax changes to encourage businesses and consumers to switch to electric vehicles.

The Commission admits that this estimate does not account for the impact of extreme weather events. An EU estimate of some of the impacts of extreme weather include EUR9bn/year for droughts and EUR7.6bn/year for river flooding. The cost of making key infrastructure and economic assets more resilient to physical climate impacts is also not estimated, nor is the potential increase in insurance costs.

3.2 Availability of capital for green investments

Morgan Stanley[12] estimates that EUR1.6 trillion is already earmarked for various green investment objectives in different parts of the EU budget and programmes – a notable figure given the global attention the Inflation Reduction Act (IRA) in the US received for making a similar level of funding available, but without the long-term and well-rounded policy of the EU[13]. Morgan Stanley also estimates that the utilities sector will deploy EUR1.3-1.6 trillion in renewable technologies by 2030 (we use the lower number).

Subsidies and incentives available in Member State national budgets are not estimated here, but further compound the attractiveness of Europe's energy transition opportunities. As well, corporations in other sectors, investors, banks, and

[9] European Commission (2023) Sustainability and people's wellbeing at the heart of Europe's Open Strategic Autonomy
[10] BNEF (2024) Energy Transition Investment Trends
[11] DWS Infrastructure Research (2023) Transforming European Energy: Alternative Fuels
[12] Morgan Stanley (2023) Powering Europe's Energy, based on European Commission 2023.
[13] DWS Infrastructure Research (2024) The Case for European Infrastructure: Europe in a Competitive Global Market

individuals are committing capital to green technologies. This is why the EU should continue to improve the tracking of investment needs and deployment.

3.3 Digital Investment Needs

While the EU's climate and green goals are well known, the EU has also agreed on digital technology goals[14], declaring the 2020s to be a "Digital Decade". For instance, the EU agreed goals that by 2030 all European households should be served by a gigabit network and all populated areas covered by next generation wireless high-speed networks at least equivalent to that of 5G.

An assessment of European digital and internet technology companies[15] found that they made EUR62bn of investments in gigabit digital infrastructure and EUR59bn in 5G over 2009-2021. These investments have contributed to ~53%[16] of European households currently being reached by fibre networks and ~89%[17] of the population is covered by 5G.

The EU estimates that EUR227bn/year is needed for gigabit and 5G mobile technology roll-out. The EU states that the more intense industrial internet 4.0 scenarios and increasing security requirements will likely increase this cost. Stronger roll-out of 5G and 6G mobile technology globally could generate EUR 3trn of economic growth[18].

International comparison of digital investments found that China and the US were making greater investments in fixed broadband coverage, 5G and semiconductors, putting greater pressure on Europe to scale up capital deployment in these areas.

Semi-conductor, cloud, and industrial data investment

The EU Chips Plan set a goal to double the global proportion of European manufacturing of semi-conductor chips. An EU estimate of the cost of this goal could not be located, but the semi-conductor company NXP publicly stated[19] that EUR500bn would be needed for the EU to have 20% of the world semi-conductor chip production by 2030.

European governments and public agencies are making progress in rolling out basic digital services (online forms and appointment booking). However, in order to achieve the EU's objective to make 100% of key public services available online, all citizens will need to have access to medical records online, as well as to digital ID. The use of more advanced digital technologies like AI, big data, robotics is estimated to require an additional EUR177bn/year for public sector digital solutions.

Edge computing is when computation, data storage and data source are located closer to the user, reducing latency when compared with using a data centre. The EU's goals are for 10,000 climate-neutral highly secure edge nodes. Rolling out cutting edge digital solutions cloud infrastructure, near edge installations and far edge devices is estimated to cost EUR6.4bn/year.

[14] European Commission 2023 Europe's Digital Decade Targets
[15] EU Joint Research Centre (2023) International benchmarking of private investments in Digital Decade thematic areas
[16] FTTH Council Europe (2023)
[17] European 5G Observatory (2023)
[18] European Commission (September 2023) Report on the state of the Digital Decade; European Commission (September 2023) Implementation of the Digital Decade objectives and the Digital Rights and Principles
[19] Electronics Weekly (2022) EU chip plan would cost €500bn, says NXP CEO

3.4 Availability of capital for digital investments

Estimating and tracking digital investments in the EU was much more difficult in comparison to green investments. A variety of EU programmes and funding sources have a partial or full focus on digital technologies. For instance:

- Invest EU budget guarantees of EUR26bn are aiming to mobilise EUR372bn,
- Digital aspects of the Recovery and Resilience Facility,
- Horizon Europe research program,
- Digital aspects of the Regional Development Fund,
- Digital Europe programme,
- Connecting Europe Facility
- EU Health Digitalisation.

These programs had an estimated EUR632.5bn of public funding available[20]. Improved tracking of public and private digital investments is necessary, particularly due to the ongoing shift of corporate and personal digital activity to the cloud and the EU lacks investment need estimates.

[20] European Commission (2024) Funding for Digital in the 2021-2027 Multiannual Financial Framework

4 / Conclusion

Infrastructure investors have already played a significant role in setting Europe on a pathway to net zero, and in developing the region's digital capabilities. As noted in the first section of this report, Europe has subsequently led other regions such as North America in investing in energy transition technologies. To maintain this lead as well as address strategic goals that have come to light in the wake of the Covid-19 pandemic and 2022 energy crisis, such as economic competitiveness, energy security and sustainability, investment now needs to continue to flow into the sector. We note the need to target what is known as the 'missing middle' – the segment of the market where many of the smaller, non-core infrastructure assets that are crucial to meeting digital and green transition goals sit – through deployment into Value Add infrastructure strategies. Infrastructure capital is currently concentrated into the larger end of the market, which could starve crucial energy transition and digital businesses of the capital required to grow and have an impact. In doing so, investors have the potential to access the higher returns that are offered by scaling infrastructure businesses are markets are derisked on the back of the improving policy environment witnessed in recent years.

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