

Investment in infrastructure in the EU

Gaps, challenges, and opportunities

SUMMARY

Public infrastructure consists of the basic physical assets and structures that support economic activity. Investment in such assets is markedly different from other types of capital expenditure, due to the heavy involvement of the public sector and the significant positive spill-over that it generates throughout the economy. Yet the same characteristics that underlie infrastructure investment can also result in its under-provision over time, due to factors such as fiscal constraints.

In the European Union (EU), following a period of sustained growth, investment in infrastructure has been declining since 2009. Despite the gradual easing of this negative trend from 2015, investment rates remain below pre-crisis levels. This has given rise to a lively debate over the emergence of an investment gap and its implications for the EU's economic recovery and competitiveness. This is because investment in infrastructure has the potential not only to boost aggregate demand in the short term, but also to bring important benefits over the longer term by broadening the productive capacity of the economy as a whole.

Estimates for the EU indicate that plummeting investment is below the levels needed. European Investment Bank (EIB) estimates suggest that economic infrastructure investment needs for energy, transport, water and sanitation, and telecoms are as much as €688 billion per year. Additional estimates for social infrastructure suggest that the investment gap for health, education and social housing is at €142 billion per year. The mobilisation of resources required is therefore significant. In due recognition of the emerging needs, the current and previous multiannual financial frameworks put emphasis on the expansion of programmes and initiatives where infrastructure plays a prominent role, both directly, as the primary targeted sector, and indirectly through broader interventions covering a range of sectors.



In this Briefing

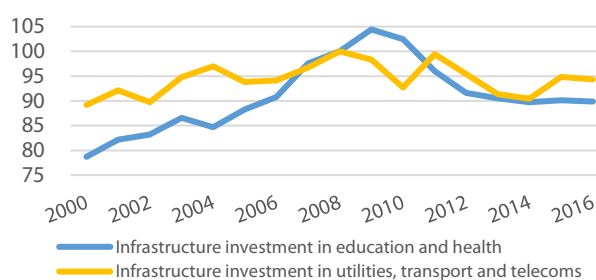
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The issue

Investment in economic and social infrastructure in the European Union (EU) has been in steady decline since the outbreak of the economic and financial crisis. Although the negative trend appears to gradually level off from 2015 onwards, overall investment remains far below pre-crisis levels (see Figure 1). The extent to which the substantial decline in investment also reflects the emergence of an alarming gap relative to projected infrastructure needs has been the subject of debate over the past decade.

On one strand of the discussion lies the premise that the observed drop may reflect the fact that infrastructure has reached saturation point considering that key assets regarding transport, energy and communication are in place in the EU countries. Technological change may also be shifting investment from infrastructure to other growth-enhancing spending.

Figure 1– Infrastructure investment, real terms (2008=100)



Data source: Eurostat, Author's own calculations.

However, as stressed by the European Investment Bank (EIB), this view fails to explain the [significant fall](#) in government investment in most EU countries. Crucially, it overlooks the fact that public capital stock depreciates and may indeed depreciate even faster if not properly sustained. Hence there is a need to spend on maintenance, replace old assets, and complete long overdue connections.

Most importantly, there is need for new and modern infrastructure to keep up with rapid changes on the technological and [demographic](#) fronts. According to the European Commission, the number of European citizens aged over 65 will rise by more than half by 2030 relative to 2005 levels. This implies that the pressure on healthcare infrastructure will grow substantially over the next decade. Equally, the changes brought about by the ongoing new industrial revolution ([Industry 4.0](#)) and digitalisation will both transform and escalate demand for new infrastructure investments. For example, supply chains and channels for the delivery of products and services to consumers could evolve considerably through these transformations, and require new infrastructure in the years to come. In this context, EIB estimates indicate that achieving the targets of the EU digital agenda – which includes expanding data centre capacity to reach international benchmarks – would demand additional investment of approximately [€55 billion](#) per annum.

In view of the above, research by the [European Commission](#) and the EIB suggests that the availability of adequate and modern infrastructure able to support the rapidly evolving economic landscape lies at the centre of a robust economic recovery for the EU, as it would promote growth and competitiveness, link people and businesses and provide sustainable access to resources and energy, while upholding inclusiveness and equal opportunities for all.

Context and key notions

Public infrastructure denotes the basic physical assets and structures that facilitate economic activity, through the provision of services to households and enterprises. In economics literature, there is no strict definition of the term, whilst its scope has expanded considerably over time. Over two decades ago, the notion used to refer primarily to [capital-intensive sectors](#), such as telecommunications, transport and power generation. Since then, in the [literature](#), the term has extended to other less-tangible assets relating to the protection and development of human and social capital across the economy.

In this context, public infrastructure falls into two main classes: economic and social infrastructure. Economic infrastructure refers primarily to the [fixed physical assets](#) that directly support the

production process. This includes public utilities, such as electricity and water, transport networks and communication systems. The assets themselves – and the services supported by them – provide essential inputs to the production of other goods and services. They therefore play a critical role in respective supply chains, as well as a wider role connecting producers and consumers and enabling information and knowledge exchange.

Social infrastructure refers to what may be considered as public necessities such as education, health and community services. Although not contributing directly to the production process, they do play a critical role in protecting and developing the health and skills of the workforce. They therefore improve the human capital endowment of the nation, which in turn, results indirectly in efficiency and productivity improvements over the longer term. By providing equal access to public health and education services, social infrastructure contributes to the improvement of social cohesion and the alleviation of inequalities.

How infrastructure differs from other capital expenditure

Investment in infrastructure is markedly different from other types of capital expenditure. As emphasised by the International Monetary Fund (IMF), a number of distinct features render such investments subject to market failures, which can result in their under-provision over time. For example, infrastructure projects are often characterised by large physical size and increased [capital intensity](#). This makes their provision by many entities problematic. Additionally, while their costs are significant and front-loaded, the benefits are not felt until much later in time. This makes private-sector provision difficult due to both financing and operational issues. Finally, infrastructure investments can generate wider positive spill-over effects. The existence of such externalities may imply that private returns on an investment project are lower than the social returns, thus making its provision by a public entity more likely relative to private investors. It is largely due to these considerations that infrastructure investment is traditionally led by the public sector, with the private sector entering infrastructure projects primarily through special contractual arrangements, such as public-private partnerships.

Infrastructure investment is usually thought of in terms of new projects. However, this is to overlook equally essential capital expenditure relating to maintenance and operations. These are critical, particularly in the context of aging infrastructure, as they help prolong operational use and slow down capital depreciation, thereby also reducing risks to human health. Research by the IMF argues that, despite its critical role, maintenance capital expenditure is usually not given top priority relative to new infrastructure. It is often one of the [first budget items](#) to be cut in periods of fiscal pressure even though in reality the expenses are simply postponed to a later period.

Economic rationale for investment in infrastructure

Infrastructure investment impacts upon the economy through a range of different channels. Economic literature differentiates between economic and broader social benefits, as well as between shorter and longer-term horizons.

Short-term economic impacts relate to the boost that infrastructure investment brings to aggregate demand. Like other types of government spending, infrastructure expenditure permeates the economy, triggering demand in a variety of sectors (such as construction material or engineering services) via the short-term fiscal multiplier.¹ Its overall impact depends on the [state of the economy](#) at the time of the investment. Beyond the structural changes of an economy that affect the size of fiscal multipliers over time, the type of public financing employed to support the investment can also be critical in determining its impact. For example, should the investment be financed through additional debt, then the effect on debt as a share of gross domestic product (GDP) will depend on the [size of the multiplier](#) and elasticity of tax revenues to output. If these are large enough, then GDP may grow much faster than debt and bring higher tax revenues, thus resulting in a lower net effect on public finances.

Economic studies emphasise that, over the longer term, investment in infrastructure can also bring important supply side benefits to the economy. As the capital stock of infrastructure expands, it can

raise the [productivity](#) of all factors of production, thereby broadening the productive capacity of the economy as a whole. For example, larger and better public transport networks reduce transportation costs for business and cut-down on commuting times for the general public. This not only results in improved labour productivity, but can also generate benefits resulting from [economies of scale](#). Similarly, investments in telecommunications infrastructure can improve access to information and technology, for both citizens and business, which, in turn, broadens markets, promotes competition and enables technological innovation to flourish.

World Bank research has stressed that such longer-term benefits can increase significantly when there is [strong complementarity](#) with other factors of production. For example, investments in network infrastructure, such as electricity or telecommunications, improve access to corresponding services and lower costs for entrepreneurs, which is conducive to the growth of private investment. Public infrastructure investments may therefore enhance the productivity of private investment, thus having a [crowding-in effect](#). In a recent study, the Commission also emphasises other wider benefits, namely that infrastructure has the potential to induce other investments by sending [signals to key sectors](#) in the economy. Importantly, the efficiency of the investment is central in the realisation of the aforementioned benefits. If there are inefficiencies in the investment process, such as poor selection of projects with a low benefit-to-cost ratio, then the long-term gains for the economy can be limited. Clearly identified infrastructure needs and efficient public investment procedures have been identified by the IMF as critical in improving the [efficiency](#) of infrastructure investment.

On the social benefits front, the economics literature emphasises the central role of public infrastructure in generating broad welfare gains. This is achieved by improving access to [markets and critical social services](#) and lowering regional and income disparities, thereby supporting economically disadvantaged groups. According to a recent Council of Europe Development Bank (CEB) report, infrastructure services generally account for about a third to a half of households' final consumption. This suggests that more and better infrastructure that lowers pressure on household budgets can result in notable monetary benefits for citizens, especially those with lower incomes.

Beyond the direct monetary benefits of economic infrastructure, social public infrastructure can serve to enhance human capital development. A recent [joint report](#) by the EIB and the World Economic Forum (WEF) argues that infrastructure has the potential to address both competitiveness and inclusiveness issues at the same time. For example, health-related public infrastructure simultaneously improves personal well-being and labour productivity by helping to maintain the health of the population. The non-exclusive nature of the services provided by new hospitals or water sanitation facilities helps to alleviate socioeconomic disparities. Equally, education-related infrastructure allows for the growth of human capital across society, which again results in improved productivity of labour and is linked to the reduction of socioeconomic inequalities.

Investment in infrastructure in the EU

Recent trends

Over the past decade, investment in infrastructure in the EU has been broadly pro-cyclical, following the course of overall economic activity. EIB estimates indicate that, after a period of sustained growth, investment in infrastructure started to decline sharply from 2009 onwards. The contraction was driven mostly by the deep drop in public infrastructure expenditure. The chief underlying reason behind this drop was the general [shift in public spending](#) from gross fixed capital formation towards current expenditure throughout the crisis, but especially so after outbreak of the sovereign debt crisis of 2011-2012 and the cyclical fiscal consolidation adopted in many countries. Private infrastructure investment also dropped, but at a more stable rate, [recovering in recent years](#).

According to the EIB, this declining trend appears to have levelled off in 2015 and most probably also in 2016, based on provisional data (see Figure 2).² This has been driven largely by an

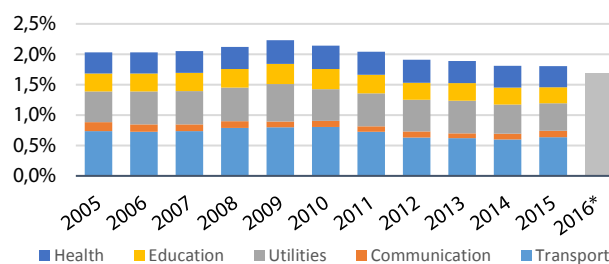
improvement in private investment with public investments following at a [slower pace](#). Despite the return to stability, investment rates remain well below pre-crisis levels. These are estimated as the percentage of infrastructure investment – i.e. gross fixed capital formation (GFCF)³ – in GDP. In 2015, investment rates were about 20 % below pre-financial crisis rates, dropping from a peak of 2.2 % in 2009 to 1.8 % in 2015.

On the sectoral front, data for the EU suggest that the largest decline in infrastructure investment between 2009

and 2015 was experienced in the transport sector at approximately 0.2 % of GDP. To put this figure in context, in 2015 transport accounted for 26 % of total investment in infrastructure down from 31 % in 2007.⁴ Utilities and education also experienced considerable contraction in investment at 0.18 % and 1.15 % of GDP respectively, while other sectors exhibited greater stability.

The general decline in infrastructure investment has not been uniform across Europe. Owing to divergent initial conditions in the stock and quality of infrastructure, as well as the fundamentally different macroeconomic factors at play, the experience between European states has been [heterogeneous](#). For example, research indicates that the reduction in infrastructure investment has generally been more marked in countries that began with low infrastructure quality. This has further exacerbated difficulties in promoting the convergence of infrastructure quality. CEB analysis further highlights how macroeconomic conditions underlie countries' divergent experience in infrastructure investment in recent years. Their analysis clusters this experience into five main groups over the period between 2009 and 2015 (see Figure 3). The first group consists of countries severely hit by the economic downturn, such as Greece, Spain, Italy and Portugal, with GDP growth averaging only 0.44 % between 2009 and 2015 and GFCF declining by an average of -8.35 % per annum. Fiscal consolidation had a negative impact on public investment spending, while weak economic recovery further slowed down infrastructure investment. Countries in the second and largest group, which includes the Czech Republic, Germany, France, and the Netherlands, experienced better economic recovery. Yet, they have still collectively exhibited declining public GFCF growth rates since 2009. The third and fourth groups share the characteristic of weak GDP recovery between 1.06 % and 1.91 % per annum, with positive growth in GFCF – the latter to varying degrees. For example, Belgium, Bulgaria, Latvia, Norway and Finland experienced weaker GFCF rates at 2.13 %, whereas Denmark, Hungary and Slovakia exhibited much stronger investment growth at 8.82 % on average. The final group includes countries with sound GDP recoveries at 5.29 % per annum, with positive albeit weaker GDFC growth at round 2.83 %. EU Member States in this group are Sweden and the United Kingdom.

Figure 2 – Infrastructure investment by sector (% of GDP)



* provisional data

Source: [EIB, Investment Report 2017/2018: From Recovery to Sustainable Growth, November 2017](#).

Figure 3 – Clustering of European states by GDP and infrastructure investment growth rates (average 2009-2015)



Source: Council of Europe Development Bank, *Investing in Public Infrastructure in Europe*, February, 2017.

Investment needs versus actual spending

Investment in infrastructure today stands at its [lowest level](#) in a decade. Research suggests that this drop is evident not only in the EU, but also [globally](#), which in turn has given rise to a lively debate over the potential gap that has been generated between actual infrastructure expenditure and potential infrastructure investment needs.⁵ Data constraints make any attempt to identify what and how much investment is missing very complicated. This is especially because estimates of potential needs are highly sensitive to the methodological approaches adopted. For example, studies tend to make different assumptions regarding location and time and, more importantly, future trends including demographic, technological and climate changes.

Research estimates global infrastructure investment needs at around [3.9 % to 9.7 % of world GDP](#). This figure is driven mainly by the very high needs for new capital investments still present in developing countries. In Organisation for Economic Co-operation and Development (OECD) countries, according to a 2006 estimate, total cumulative infrastructure requirements in road, telecoms, electricity and water will reach about [US\\$53 trillion](#) by 2030.⁶ In the EU, according to estimates drawn up by the Commission in 2011, the completion of the TEN-T network in transport alone would require about [€550 billion](#) by 2020. Additional Commission estimates indicate that in the field of energy alone about [€200 billion](#) will be required up to 2020 to develop cross border interconnections between Member States.

A more recent attempt by the EIB in 2016 estimated the EU's total investment needs in economic infrastructure at [€688 billion](#) per year until 2020. Energy, at €230 billion, accounts for the bulk of this. With current annual expenditures in energy infrastructure estimated at €130 billion, this implies a gap of €100 billion. For transport and logistics, investment needs are estimated by the same study at €160 billion per annum. Furthermore, current annual expenditure in transport and logistics stands at €80 billion, while another €80 billion is needed to close the investment gap. For water and sanitation, and telecoms, needs reach €160 billion and €138 billion respectively. On the social front, a recent report by the [High-Level Task Force](#) on Investing in Social Infrastructure in Europe indicates that the investment gap for education and lifelong learning, health and long-term care, and affordable housing in the EU amounts to €142 billion per annum.

These estimates indicate that bridging the gap between actual spending and estimated needs will be costly. Dealing with the backlog to boost competitiveness through the improvement of infrastructure stock in the long term will require significant mobilisation of resources.

A sub-national view: the role of local and regional authorities

Traditionally, the provision of public infrastructure has tended to be centralised. However, one of the key characteristics of many public services that are supported by public infrastructure is that their delivery and consumption takes place at [local level](#). Various tiers of government (central, state and local) can be involved. This observation is all the more significant considering the importance of infrastructure in promoting regional development. According to the OECD, it contributes to the growth of cities and is fundamental to the development of [economic and regional clusters](#). EIB research also underlines that infrastructure investment, even when localised, tends to [generate externalities](#), whose reach goes beyond the local economy, while also affecting the geographical distribution of economic activities.

Many EU countries are increasingly recognising that the decentralisation of public infrastructure investment decisions can be critical in improving viability and effectiveness in the provision of key services related to public infrastructure. Developments on this front have been mixed across EU, largely reflecting differences in public governance systems, as well as alternative views between countries on the scope of the competences that should be rendered to local authorities.

A 2017 [EIB survey](#) indicates that municipalities across the EU fared slightly better in infrastructure investment during the crisis than the aggregate EU declining trend. This does not mean that they

were unaffected, however, as one in three municipalities indicated that investment activities since 2012 had been consistently below actual needs. Of those that reported infrastructure gaps, around 75 % indicated that a major obstacle in addressing these were fiscal constraints (budget and/or debt ceilings). Beyond this, regulatory and political instability were also identified as major obstacles, with the first mentioned by close to [50 % of the municipalities surveyed](#). While the loosening of national fiscal constraints is perceived by the municipalities surveyed to be important, effective planning, prioritisation based on cost and benefit, and execution will play a central role in reviving infrastructure investment. The EIB survey revealed that while 80 % of municipalities have an urban development strategy, roughly one in four do not consult their strategy when [planning for new projects](#), while less than half assess quality prior to implementation.

EU programmes and initiatives

In recognition of the growing investment gap in the EU, the current and previous multiannual financial frameworks provided for the [expansion of programmes and initiatives](#), and the development of new financial instruments for their implementation. Infrastructure investment is addressed directly or indirectly by the majority of these funding and support initiatives.

The five European structural and investment funds – jointly managed by the Commission and the EU countries – address infrastructure through a range of channels. Under the European Regional Development Fund ([ERDF](#)), infrastructure investment has a more horizontal character, broadly entering the various fund's thematic areas including the digital agenda, innovation and research and the low-carbon economy. The Cohesion Fund ([CF](#)) has more direct relevance as it funds transport and environment projects – under its €63.4 billion envelope – in specific countries,⁷ focusing on trans-European transport networks, rail and public transport and projects supporting energy efficiency and use of renewable energy. Other funds, such as the European Agricultural Fund for Rural Development ([EAFRD](#)) and the European Maritime and Fisheries Fund ([EMFF](#)) are still relevant, albeit more specific in character given their sectoral concentration. Finally, the European Social Fund ([ESF](#)) could be argued to hold a more indirect role in relation to infrastructure as it complements social infrastructure by investing in Europe's human capital.

Complementary to the above are grant financing and other actions under specific policy areas. The most crucial of these in relation to infrastructure investment are the Connecting Europe Facility (CEF) and the Digital Europe Programme. The CEF is designed to promote and part-finance the construction of pivotal cross-border transport, energy and telecommunications infrastructure links between EU Member States. The Commission has proposed the extension of the CEF as part of the 2021 to 2027 EU budget, with a total of [€42.3 billion](#), in current prices, of which 72 % would be allocated to transport, 21 % to energy and 7 % to digital (high-capacity broadband networks).

Infrastructure investment has also benefited significantly from the European Fund for Strategic Investments (EFSI) 1.0 and 2.0, which has been providing EU investment guarantees in cooperation with the EIB. Around [48 %](#) of the total €335 billion of investments mobilised under EFSI relate to economic and social infrastructure. This substantial support will continue under the InvestEU Programme proposed by the Commission for 2021 to 2027. InvestEU will build on the success of EFSI and bring together under one roof various EU financial instruments, including the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) programme, as well as specific guarantees and facilities under the Employment and Social Innovation (EaSI) programme and InnovFin. The [aim](#) is to capitalise on economies of scale and mobilise public and private investment through an EU budget guarantee of €38 billion to back the investment projects of financial partners such as the EIB and others, thereby extending their risk-bearing capacity.

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ENDNOTES

¹ Fiscal multipliers measure how much additional income is generated from government spending. Studies that have measured the impact of public investment argue that it has a rather high fiscal multiplier, ranging between 1.3 and 1.8. This means that €1 of general government expenditure in public investment increases gross domestic product (GDP) by an average of 30 to 80 cents –see also M. Szczepański, [Public investment to support long-term economic growth in the EU](#), EPRS, European Parliament, July 2016.

² EIB preliminary estimates for 2016 based on information only for Bulgaria, Germany, Estonia, Ireland, France, Austria, Slovakia, Slovenia, Finland, suggest negative growth rates become stabilised.

³ Infrastructure is not a single economic activity and, as such, is not classified separately in national accounts. Data on infrastructure investment are commonly examined separately by different studies. The most common approach is to employ gross fixed capital formation (GFCF, i.e. investment) in the activity sectors that reflect economic and social infrastructure, namely transport, energy and water supply, communications, education and health. Recent Eurostat offerings provide a detailed breakdown of fixed capital by type, which has allowed studies to focus on strict infrastructure elements alone, namely buildings and other structures. These refinements have helped generate more realistic estimates in recent years, which in turn can feed better into ongoing policy discussions – see [Wagenvoort et al.](#) (2010) and [Revoltella et al.](#) (2016).

⁴ This estimate is drawn from [Revoltella et al.](#) (op. cit.), who base their calculations on total fixed GFCF. Estimates may differ in later studies, which focus on buildings and other structures.

⁵ See e.g. Bhattacharya A. et al. (2016), [Delivering on sustainable infrastructure for better development and better climate](#), Brookings Institution, December 2016.

⁶ For electricity this estimate includes transmission and distribution only. If electricity generation is included the figure rises to US\$71 trillion.

⁷ For the 2014-2020 period, the Cohesion Fund concerns Bulgaria, the Czech Republic, Estonia, Greece, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Portugal, Romania, Slovenia, and Slovakia.

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eprs@ep.europa.eu (contact)

www.eprs.ep.parl.union.eu (intranet)

www.europarl.europa.eu/thinktank (internet)

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