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Ireland's infrastructure demands

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Niall Conroy and Kevin Timoney¹

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Abstract

This paper identifies infrastructure deficits in Ireland relative to other countries. We find significant deficits in housing, health, transport, and electricity. More investment will also be required to help transition to a greener society. The planning and objection system has made it harder to deliver infrastructure projects and has increased their costs. Reforming this system would not cost a significant amount of money, relative to overall government spending. While some additional government investment may be required, the amounts needed are modest relative to overall government spending. We suggest how infrastructure deficits could be addressed in a phased way. However, this will be challenging. Many of the projects rely on construction workers, who are already scarce in Ireland. We estimate that employment in construction would have to increase by almost 80,000 to address these infrastructure challenges. Increasing productivity in the construction sector would mean less than 20,000 extra workers would be required.

Keywords: Infrastructure, public investment and capital stock, fiscal policy, capacity.

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Summary

Where does Ireland's infrastructure stand? Are there clear deficits and, if so, where? How can they be addressed? This paper attempts to address these questions.

We compare Ireland's infrastructure to other high-income European countries. We find that, looking at economy-wide measures, a common story emerges. Ireland's capital stock — a measure of its overall infrastructure — was well below average in the mid-1990s. While some progress has been made since then, Ireland's infrastructure is now 25% lower than average for a high-income European country.

There are obvious areas where Ireland's infrastructure is underdeveloped. We identify four key areas: housing, health, transport, and electricity. While these areas are well known to have infrastructure deficits, we quantify how far below high-income European averages each area is. We also highlight how more investment will be needed to transition to a greener society. Doing so will reduce pollution, improve health outcomes, and help Ireland avoid costs of missing its legal targets.

Given the scale of these deficits and challenges, they cannot be addressed in a single year. Long-term multi-year planning is needed to address these issues. If the Irish economy and population continue to grow, demand for infrastructure will continue to increase.

The planning and regulatory environment is a barrier to investment. At present, it means it takes longer and is more expensive to deliver housing and other major projects. Reforming the planning and objection system could aid the delivery of housing and other infrastructure. This would not cost a significant amount of money, relative to overall government spending. Time will tell if the new Planning and Development Act will bear fruit.

Capacity constraints will make it difficult to address these deficits quickly. Many of these projects will require additional construction workers. Overall, we estimate that almost 80,000 additional construction workers would be required to address Ireland's infrastructure deficits (this equates to a 47% increase from current levels). Given construction workers are already scarce in Ireland, this is a significant barrier to resolving infrastructure shortfalls. If productivity

improved in the construction sector, less than 20,000 extra workers would be required.

Some additional public investment may be required to address these infrastructure deficits. We find that the additional public investment required is modest relative to present levels of spending. However, before increasing spending, reallocating some existing spending could improve outcomes. The efficiency of investment could also be improved.

Given the economy is already performing close to capacity, it does not require additional money being pushed into it. As a result, any additional investment should be offset by increasing taxes or reallocating existing spending. Using offsetting measures like this would mean extra investment could take place without adding to inflation. This would keep the cost of living down and help maintain Ireland's competitiveness.

1. Introduction

The Irish economy has performed extremely well in recent years. This is despite the Covid-19 pandemic and the wars in Ukraine and the Middle East. Employment is at record highs and unemployment is at record lows. The economy is running into capacity constraints, and inflation for domestic services remains high.

Ireland's capital stock — a measure of its overall infrastructure — was well below average in the mid-1990s. While some progress has been made since then, Ireland's infrastructure is about 25% lower than average for a high-income European country.

We quantify how large some of the infrastructure deficits are. We find that there are large shortfalls in some areas compared to other high-income European countries. These are housing, health, transport and electricity. In addition to addressing these shortfalls, there are large investment requirements for Ireland to transition to a greener society. We then explore how these deficits may be best addressed. Given how large some of these infrastructure deficits are, it will take many years of high investment to address these deficits.

The planning and regulatory environment is a barrier to investment. At present, it means it takes longer and is more expensive to deliver major projects. Reforming the planning and objection system could aid the delivery of housing and other infrastructure. This would not cost a significant amount of money, relative to overall government spending. Time will tell if the new Planning and Development Act will make a big difference.

Capacity constraints will make it difficult to address these deficits quickly. Addressing these infrastructure deficits would require almost 80,000 extra workers in the construction sector. Alternatively, it would require Ireland's construction sector to become much more productive. In this case, less than 20,000 extra workers would be needed.

These solutions are not without challenges. Productivity has long been stagnant in Ireland's construction sector. This is partially due to a boom-to-bust history — one not helped by procyclical fiscal policy. And there are very few unemployed construction workers. This means new construction workers from Ireland or abroad would be required. This could come about from reallocation from other sectors, training and apprenticeships or inward migration.

Some of the infrastructure deficits are in areas which rely on either direct government funding or support. As a result, we examine how much extra government capital spending may be required to address these deficits. Overall, we find that the extra government investment required would be modest relative to present levels of spending. Given the economy is already performing close to capacity, it does not require extra money pushed into it by the government. As a result, reallocating existing spending or increasing taxes could help offset any increase in government investment.

1.1. Why does infrastructure matter?

Infrastructure is key for the economy and society at large. Infrastructure is needed to ensure the delivery of essential services to all of society, like water, electricity, education, health and housing.

For an open economy, infrastructure is a key factor in competitiveness.² Having sufficient infrastructure is key to attracting Foreign Direct Investment, which has been an important part of Ireland's economic success.³ This is one of several factors' multinationals consider when making investment decisions.

Having strong infrastructure also facilitates international trade.⁴ This allows firms operating in Ireland to access larger markets abroad. This brings opportunities to take advantage of economies of scale.

Upgrading Ireland's infrastructure will be required for the transition to a greener society. This includes renewable energy generation, electrifying transport and retrofitting homes. Moving to a greener society would reduce pollution, improve health outcomes, and help Ireland avoid costs of missing its legal targets.

High quality infrastructure is also important for the standard of living for citizens. Having sufficient housing and a stable water and electricity supply are obviously beneficial for living standards. Having sufficient infrastructure in health, transport and education means citizens are more likely to be able to access high quality public services.

Regarding the direct impact of public investment on economic activity, Ivory, Casey, and Conroy (2019) investigated the case in Ireland. They found that public investment in Ireland had significant positive impacts on economic activity in the short run. However, there was no significant long-run effect. This is likely due to the open nature of the Irish economy. By contrast, recent work by Suresh *et al.* (2024) suggests that public investment in the UK can support higher long-run potential output.

² See Revoltella *et al.* (2016)

³ See Bellak, Leibrecht and Damijan (2009)

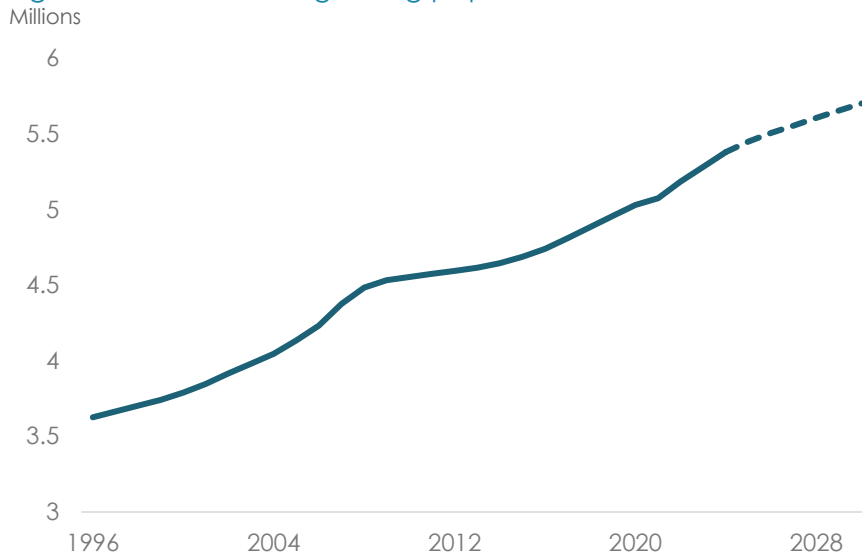
⁴ See Nordås and Piermartini (2004)

2. Demand for infrastructure

There are several methods for estimating the demand for infrastructure and capital goods. Three main aspects are covered below. These relate to Ireland's population, economic activity and employment. Under all three headings, demand for infrastructure in Ireland has increased in recent years.

The population has increased substantially in Ireland in recent years. Over the last decade, the population has increased by almost 14%.⁵ Some of this growth has been due to the following exceptional factors. The economy has recovered strongly over the last decade, with the unemployment rate falling by 8 percentage points. A strongly performing economy has led to significant net inward migration. In addition, the war in Ukraine has also led to further migration to Ireland. While neither of these factors are likely to be repeated in the coming years, the population is still expected to grow. Central Statistics Office projections (CSO, 2024a) suggest the population will grow by almost 10% in the coming decade.⁶

Figure 1: Ireland has a growing population



Source: CSO. The latest outturns for 2024 are used. Thereafter growth rates of CSO population projections are used (2025 -2030, M2 scenario is used)

An increased population leads to a higher demand for capital assets and public services, regardless of the level of economic activity.

⁵ This population increase is roughly equally split between net inward migration (53%) and the natural increase (47%), given by births minus deaths.

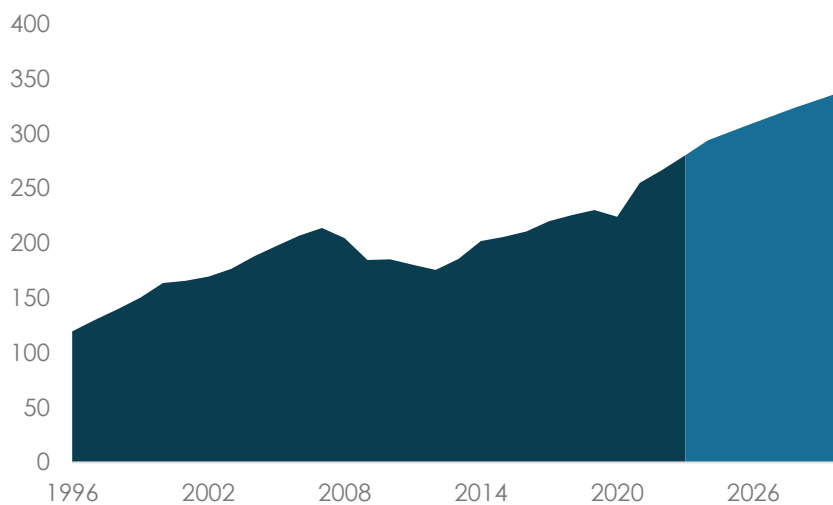
⁶ We use the M2 scenario from the CSO population projections.

These include healthcare, transport, housing and electricity. Another way to explore the demand for the capital stock is economic activity.

The main metric used to assess economic activity is modified Gross National Income (GNI*).⁷ Using this metric, there has been strong growth in recent years. This comes despite negative shocks such as the Covid-19 pandemic and the ongoing war in Ukraine. The volume of economic activity in 2023 was 21% higher than pre-pandemic levels (2019). While growth may have been expected to transition to more moderate rates, 2023 saw growth of 5% in real terms.

Figure 2: Economic activity has expanded

€ billion, real GNI*



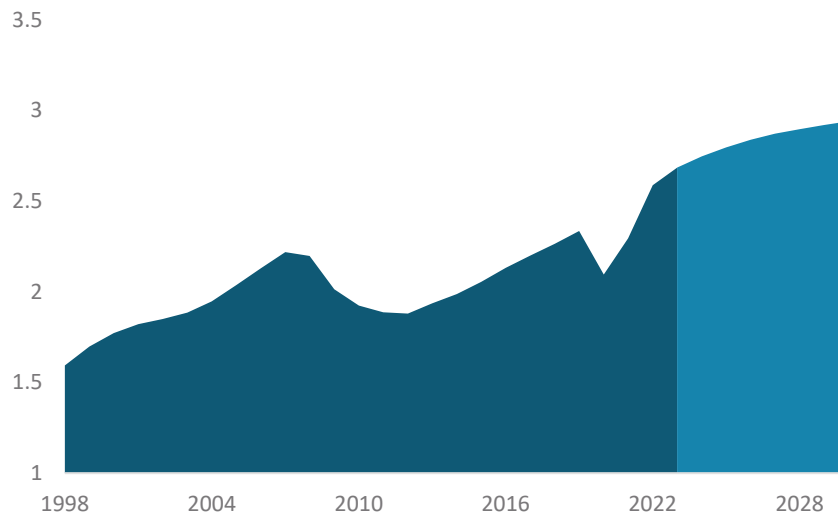
Source: CSO and Budget 2025 forecasts. Budget 2025 forecasts of real GNI* growth are used from 2024 – 2030.

The increase in activity can also be seen in the number of people at work. Employment in 2023 was 15% higher than before the Covid-19 pandemic (2019). This is despite the fact that unemployment was quite low in 2019 (5%). There has been a large increase in demand for labour since 2019. That increased demand has been matched by a big increase in the labour force. This labour force growth has been driven by two factors.

⁷ More standard metrics such as GDP are distorted by the activities of foreign multinationals in Ireland.

Figure 3: Employment has increased to record highs

Employment, thousands



Source: CSO, Budget 2025 forecasts and authors' calculations. Employment levels in 2020-2022 are adjusted to take account of recipients of the pandemic unemployment payment. Budget 2025 forecasts are shown from 2024 to 2030.

First, the participation rate has increased substantially (3.3 pp). The increase has been most pronounced for women (4.4 pp). Remote working has become more commonplace in many sectors since the pandemic.⁸ This increased flexibility may explain part of this increase in the participation rate as well as the fall in unemployment.

The second channel which has increased labour supply to facilitate this increase in employment is migration. From April 2019 to April 2024, there was net inward migration of around 275,000. Less than half of this inward migration is accounted for by refugees from Ukraine or those seeking international protection.⁹ Inward migration has substantially increased labour supply in Ireland.

All these metrics suggest that the requirements for infrastructure in Ireland have increased substantially over the last 5 to 10 years. In addition, the population, employment and economic activity are all forecast to continue growing. As a result, the level of required infrastructure is likely to grow over the coming years.

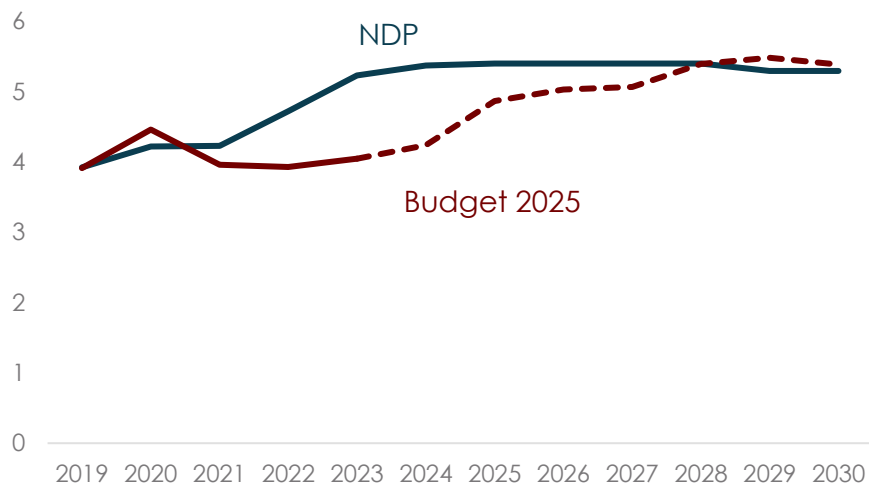
⁸Those who "usually work from home" has increased from 7.5% of employment in 2019 to 20.6% in 2023. Interestingly, those who "sometimes work from home" has barely increased (12.8% in 2019 to 13.5% in 2023).

⁹ Data based on PPS numbers suggests there have been around 109,000 arrivals from Ukraine to date, with 76% of these PPS numbers still active (CSO, 2024b). This suggests that around 82,000 remain. Of these, 63% are of working age. A total of 41,645 have applied for international protection during this period. While estimates of positive decisions vary, we assume here that between 80% and 90% of applicants are successful either initially or via subsequent appeal.

2.1 Public Sector investment plans

In 2021, the National Development Plan (NDP) was published. This set out the government's objectives for capital spending out to 2030. Conroy, Casey and Jordan-Doak (2021) showed that these plans were ambitious. Government capital spending was planned to reach record highs as a share of national income, over 5% of national income by 2023.

Figure 4: Public investment has fallen short of government plans
% GNI*



Source: CSO and Budget 2025 forecasts. Dashed line indicates Budget 2025 forecasts. Solid red line indicates outturns.

Actual government capital spending in 2023 was a much smaller share of national income (1.2pp lower). This is due to two factors. First, national income is higher than was anticipated when the NDP was drafted. Second, government capital spending was lower in 2023 than was planned in the NDP. In 2023, the 'national income' effect accounts for 0.7pp, while lower capital spending accounts for 0.5pp.

Lower-than-planned capital spending may be due to a number of factors. The Covid pandemic delayed some projects for a period. Capacity constraints in the construction sector have often been cited. These include a shortage of available construction workers, difficulties in the planning system and supply chain issues. Recent high inflation may also have played a role. Approval for some projects was delayed because cost estimates and tender prices were higher than expected.

3. How does Ireland's infrastructure compare to other high-income European countries?

We can assess how Ireland's infrastructure compares with other high-income European countries. We use two approaches to do this. First, we examine the net capital stock (in real terms; that is, adjusting for price inflation) relative to the population. Alternatively, we benchmark the capital stock to the size of the economy. This can also serve as a proxy of overall demand for infrastructure.

As is often the case for Ireland, some adjustments need to be made to remove distortions to the data. These arise due to the activity of some foreign-owned multinationals. The approach taken mirrors that of Timoney (2023). This yields a capital stock for the economy which is broadly consistent with modified GNI*. In short, this approach involves excluding two types of assets in three different sectors.¹⁰ To provide a consistent comparison, we make these adjustments for Ireland and for all other countries where data are available.

First, we assess infrastructure by comparing the capital stock to the population. In 1995, Ireland had a low capital stock per capita. This is to be expected, as Ireland was just transitioning into the high-income category and had not yet developed a large capital stock

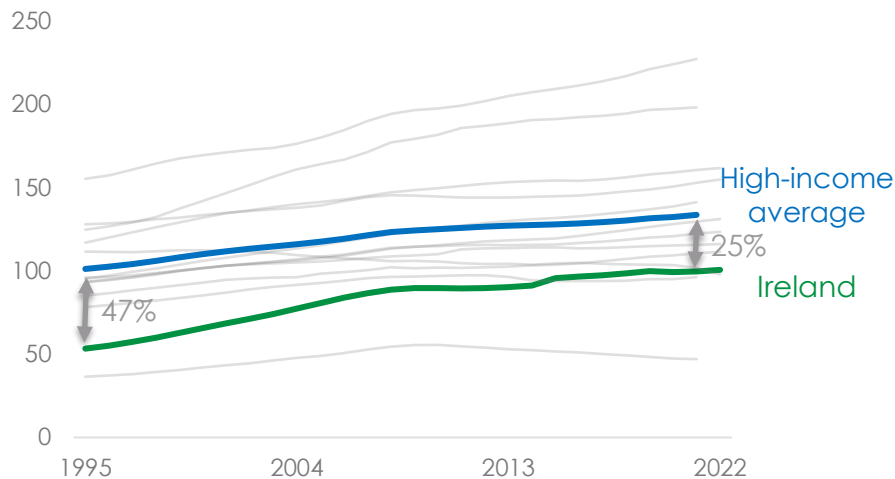
Infrastructure per capita in Ireland has improved since the mid-1990s. However, it remains below the average of high-income European countries.¹¹ Since 2015, the gap between Ireland and these countries has been around 25%.

¹⁰ These assets are transport equipment and intangible assets. The economic sectors are Manufacturing (NACE code C), information/ communication (J), and administration/support (N).

¹¹ The only other high-income country (with comparable availability of disaggregated capital stock data) that has a lower level of infrastructure is Greece.

Figure 5: Ireland's infrastructure per person has grown

Real net capital stock (2015 prices, € thousands) divided by total population



Sources: Eurostat, CSO, and Authors' workings

Notes: Some assets in the manufacturing, Information and Communication Technology (ICT) and admin and support services sectors are excluded for all countries due to distortions in the Irish data. The assets which are excluded for these sectors are other transport equipment (mostly aircraft for leasing) and intangible assets. The countries shown are Belgium, Denmark, Germany, Ireland, Greece, France, Italy, Luxembourg, Netherlands, Austria, Finland, Sweden and Norway.

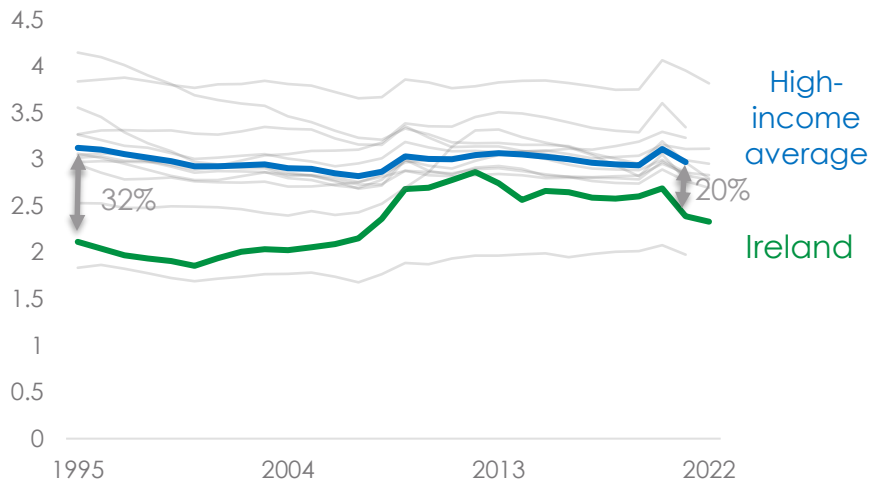
Another way to assess infrastructure provision is to compare the capital stock to national income. Infrastructure has increased broadly in line with national income since the mid-1990s. However, this still leaves Ireland below other high-income European countries.¹² By this metric, Ireland was about 20% below the average for a high-income European country.¹³

¹²Ireland's position appears to improve around the great financial crisis. However, that likely reflects that Ireland had a more severe economic downturn than most high-income European countries. A reduction in national income makes the infrastructure to national income ratio look stronger. By contrast, the recent strong growth in the Irish economy makes the ratio lower in recent years.

¹³This is based on 2021, which is the last year comparable data is available for all high-income European countries (with comparable availability of disaggregated capital stock data).

Figure 6: Ireland's infrastructure has increased relative to national income

Real net capital stock relative to GDP (GNI* for Ireland)



Sources: Eurostat, CSO, and Authors' workings

Notes: GDP is used for national income for all countries apart from Ireland, where GNI* is used. Capital in the manufacturing and ICT sectors is excluded for all countries due to distortions in the Irish data. The countries used are Belgium, Denmark, Germany, Ireland, Greece, France, Italy, Luxembourg, Netherlands, Austria, Finland, Sweden and Norway.

Given these shortfalls in infrastructure, the recent performance of the Irish economy appears all the more extraordinary. Addressing infrastructure shortfalls has the potential to increase the capacity of the Irish economy even further and improve citizens' daily lives. The National Productivity and Competitiveness Council (2024) has recently outlined how continuing infrastructural deficits in Ireland threaten the attractiveness of Ireland for Foreign Direct Investment (FDI).

It is worth keeping in mind that even to maintain the existing stock of infrastructure per person requires ongoing investment. A growing population and economy mean there are more demands for infrastructure. In addition, some fraction of the capital stock becomes obsolete or decreases in usefulness due to wear and tear every year. In order to increase infrastructure relative to demand for it, investment needs to exceed the impact of increased demand and depreciation of the existing capital stock.

External rankings support this overall view

An alternative way to benchmark Ireland's current infrastructure provision is to use the Institute for Management Development (IMD) World Competitiveness Rankings.¹⁴ This ranking assesses competitiveness via four different aspects. These are economic performance, business efficiency, government efficiency and infrastructure. 256 indicators are used to assess competitiveness across 67 economies.^{15,16}

Ireland is ranked 4th out of 67 economies for overall competitiveness in the 2024 IMD World Competitiveness Rankings. Of the four aspects of the ranking, infrastructure is easily the worst aspect of Ireland's ranking. Ireland ranks 17th out of 67 economies for infrastructure provision. Within infrastructure, Ireland performs particularly poorly on basic infrastructure (38th of 67 in 2024). This covers the water infrastructure, the density of road and rail networks, and energy infrastructure. Other areas such as education and technological infrastructure are better performing areas.

Overall, this ranking seems to chime with the results shown above. As infrastructure in Ireland looks to be below average for a high-income European country, we next explore the specific areas where shortfalls appear to be most apparent.

¹⁴ The full rankings can be seen here: <https://worldcompetitiveness.imd.org/>

¹⁵ 164 of these indicators use quantitative data, while a further 92 are based on qualitative data from surveys.

¹⁶ The 67 countries are a mixture of developed and developing economies. Developed economies perform best in this ranking. So being a mid-rank out of all 67 countries would mean you are well below average for developed economies.

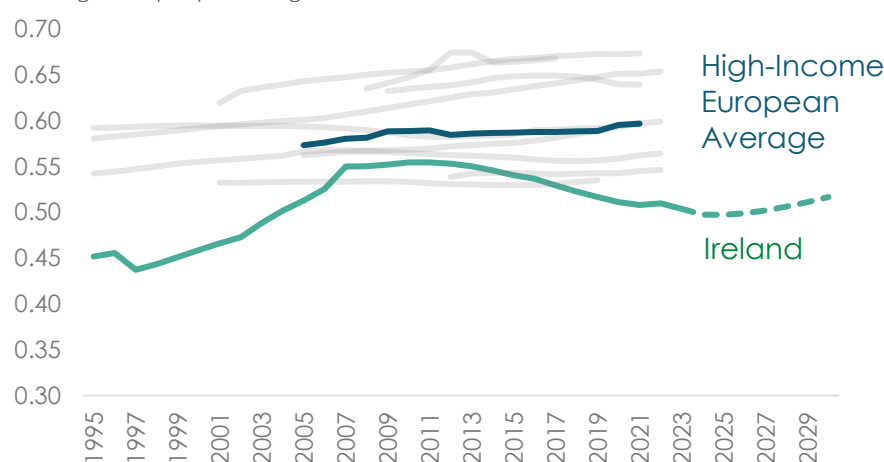
3.1 Housing

It is well understood that there is a shortfall in housing in Ireland. Figure 7 shows Ireland's housing stock relative to other high-income European countries. When measured against the population aged 15 and over, Ireland looks to have a low housing stock.

However, Ireland has often appeared to have a relatively low housing stock. This reflects Ireland having an above-average household size and a relatively young population. In addition, emigration reduced demand for housing up until the 1990's meaning a lower stock of housing was built up to that period.¹⁷ We can see that Ireland's housing stock per person was converging towards other high-income European countries until the great financial crisis (Figure 7).

Figure 7: Ireland's stock of housing is low but inching up

Housing stock per person aged 15 and over



Sources: Eurostat, Statistik Austria, StatBel, Danmarks Statistik, Tilastokeskus Suomi, INSEE, DeStatis, European Central Bank, Centraal Bureau voor de Statistiek, Instituto Nacional de Estadística, Moody's, Statistikmyndigheten, Office for National Statistics, CSO and Authors' workings.

Notes: The countries shown are Ireland, Austria, Belgium, Denmark, Finland, France, Germany, Italy, Portugal, Netherlands, Spain, Sweden and the UK. For Ireland, Census data for 1991, 1996, 2002, 2006, 2011, 2016, and 2022 are used for the dwellings stock. The interim years are approximated using a capital accumulation equation based on ESB connections (1992–2010) and new dwelling completions (2011–2024) data, and an average annual implied depreciation rate of 0.31% for 1992–2022. A dashed line shows a forecast for Ireland. This is based on Fiscal Council projections of housing completions, population growth, and an assumed annual depreciation rate of 0.31%.

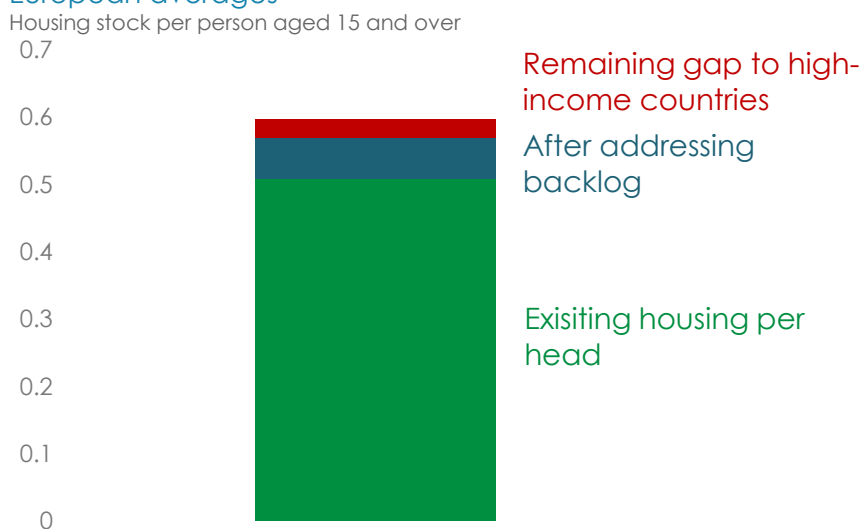
Since 2010, the average household size has been increasing. The trend to that point had been a falling average household size. The Housing Commission (2024) estimate that the average household size

¹⁷ Emigration exceeded immigration by 680,000 over 1951–1990 in Ireland.

would have fallen since 2010 if adequate housing had been available.¹⁸

Using this gap between actual household size and what would have occurred had sufficient housing been available, The Housing Commission (2024) estimated the shortfall in housing. They estimated that in 2022 there was a deficit of between 212,500 and 256,000 homes in Ireland. Figure 8 shows that if 250,000 homes were added to the Irish housing stock, that would bring Ireland close to the high-income European average.

Figure 8: Addressing the backlog in housing would bring Ireland close to European averages



Notes: Existing housing per head shows the current housing stock per adult in Ireland. The “after addressing backlog” bar shows how this would increase if another 250,000 houses were added to the stock in Ireland. The final bar shows the small gap that would remain to the high-income European average if that happened.

Recent work completed by Bergin and Egan (2024) estimates how much additional housing will be required for a growing population.¹⁹ These estimates do not incorporate any catch up for pent-up demand. So, they are best thought of as the rate of home building required to keep availability constant. If new house completions are in line with increased demand, that simply keeps the current shortage of housing constant. Bergin and Egan (2024) estimate that about 44

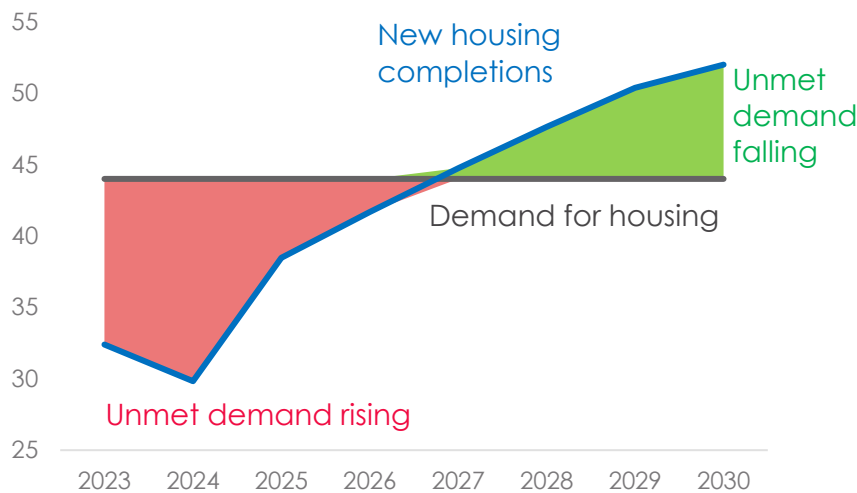
¹⁸ The underlying household size is the household size that would be seen if there was no shortfall of housing. Due to a shortage of housing, the average household size is larger than the underlying household size.

¹⁹ These estimates also incorporate an assumed rate of obsolescence. Obsolescence rates of 0.25% and 0.5% are used for their scenarios.

thousand homes would need to be built per year to accommodate increased demand.²⁰

To address pent-up demand or undersupply of housing, completions will need to be higher than 44 thousand. While Fiscal Council projections suggest there will be an increase in new housing completions, this is below the level required to facilitate an increasing population out to 2026. This level of completions would not address the pent-up demand or under supply of housing in Ireland (Figure 9).

Figure 9: Increased completions would only cover new demand by 2027
Thousands of houses



Note: Additional demand for new housing is given by Bergin and Egan (2024) projections. These estimates that between 2023-2030, 44,000 new homes per year would be required on average. This is just to satisfy new demand due to an increasing population and obsolescence. In years where new housing completions are lower than this, unmet demand would increase (2023-2028). New housing completions are given by Fiscal Council projections as part of the broader macroeconomic benchmark projections, completed in September 2024.

Housing completions are going to have to remain elevated for some time to alleviate current housing shortages. Even the significant increase in housing completions shown above would not be sufficient to significantly increase the housing stock relative to population. This is a long-term problem that will only be addressed over many years of strong housing completions.

As an illustrative exercise, we show how many completions would be required to address this pent-up demand for housing. First, we take the midpoint of the Housing Commission estimates of pent-up demand.²¹ We then assume that it is to be addressed over 10 years.

²⁰ This takes the average of 12 scenarios presented in the paper.

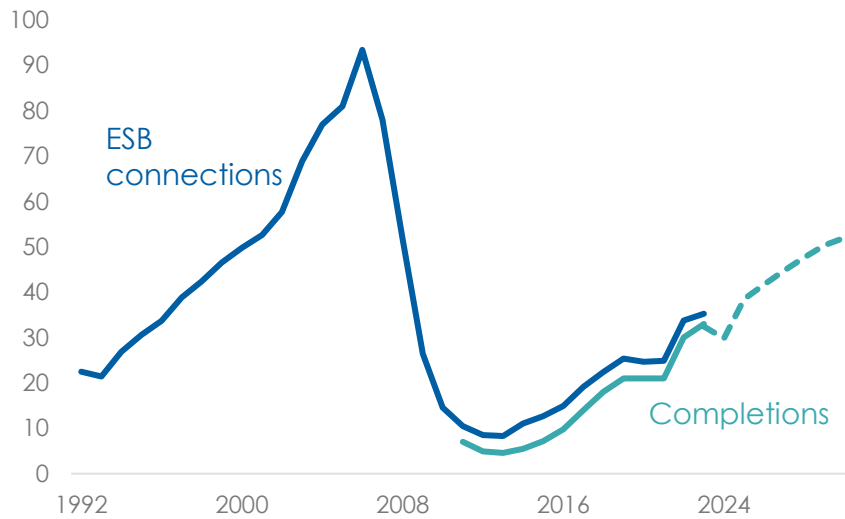
²¹ As completions in 2023 (33k) were lower than estimated requirement for an increasing population (44k), we add 11k to the estimates of pent-up demand from the Housing Commission. This gives estimates of 223,500 and 267,000, with an average of 245,250.

That would mean that housing completions would need to be around 68,500 a year — 24,500 higher than the 44,000 required to simply satisfy a growing population.²² This is more than double the number of housing completions in 2023 (32,600). If this pent-up demand was satisfied, Ireland's housing stock per head would be close to the average for high-income European countries (Figure 8).

While a huge scaling up of housing completions would be required to satisfy pent-up demand, we have seen rapid increases in home building before (Figure 10). Scaling up home building without another credit-fuelled boom-bust cycle in the construction sector is the key challenge.

Figure 10: Housing completions have seen large swings

Thousands of completions



Sources: CSO and Fiscal Council benchmark projections of housing completions. Prior to 2011, the most reliable source of data for housing completions was new connections to the ESB network. This would slightly overestimate housing completions, as houses which were disconnected for more than two years, or houses which were previously unfinished would be counted when (re)connected to the ESB network.

²² This estimate is in line with recent estimates from the Central Bank (2024) of required housing output to address shortfalls over 10 years.

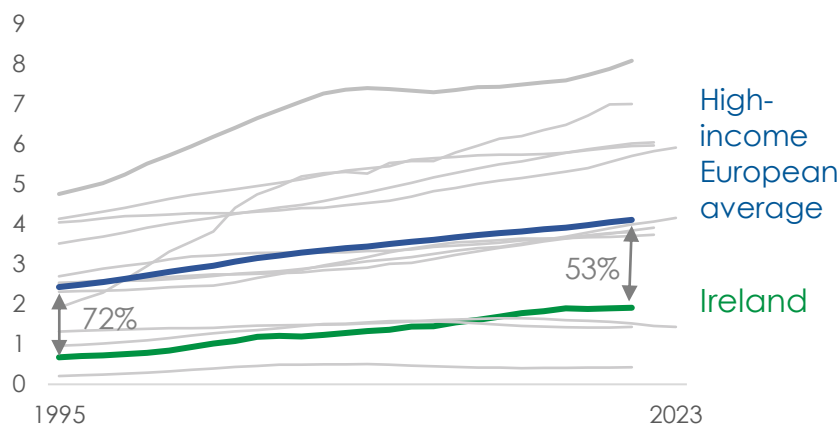
3.2 Health

Another area where Ireland's infrastructure looks low relative to other high-income European countries is in healthcare. Ireland's stock of health infrastructure per person is only higher than that of three other high-income European countries for which data are available. It is only at around half the level of other high-income European countries. This considers the entire health capital stock, both the public and private systems.

Ireland's position would look slightly more favourable if the old-age population was used. This is because Ireland's population is younger than most other European countries. But the population in Ireland is now ageing rapidly, with significant increases in demand for services likely over the coming years. Recent population projections from the CSO (2024a) suggest that the number of people aged 65 or more will more than double in the next 30 years. This will also mean the dependency ratio converges towards other European countries.

Figure 11: Health infrastructure is low compared to high-income European countries

Health net capital stock (€ million, 2015 constant prices) per person



Sources: Eurostat, CSO and Authors' workings.

Notes: The total, economy-wide health capital stock is shown here. This includes both public and private providers of healthcare.

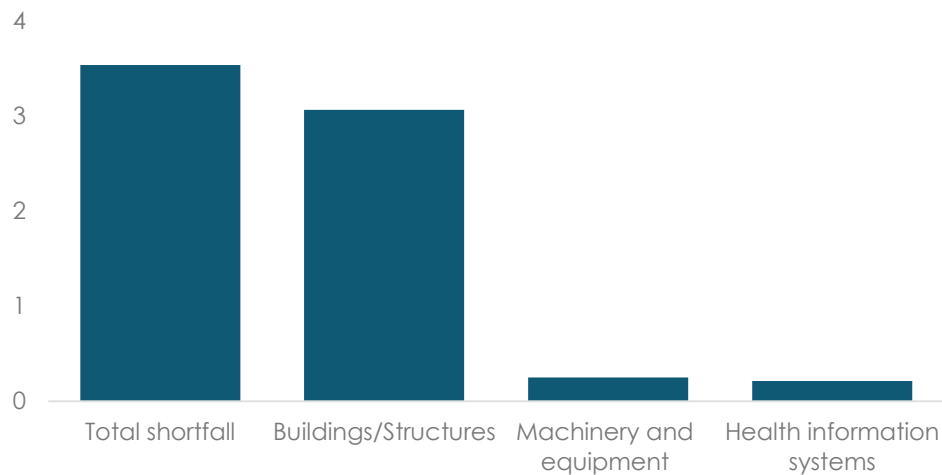
There is a broad breakdown of the types of health infrastructure provided by Eurostat. This can help to identify where Ireland's shortfalls are relative to other high-income European countries. The majority of the shortfalls in Ireland's health infrastructure is in buildings and structures. This refers to the physical buildings/structures of healthcare facilities in Ireland. This could suggest that older healthcare buildings are in use in Ireland, or that building maintenance has been relatively low in Ireland, compared to other high-income countries in Figure 11.

Machinery and equipment is another area where Ireland's infrastructure is below other European countries (Figure 12). Examples of equipment used in medical settings would be beds and diagnostic equipment.

Walsh and Brick (2023) have estimated that there is already a significant shortfall in inpatient beds in Ireland. They also find that while inpatient beds per capita in Ireland have increased, they remain amongst the lowest in the OECD.²³ To accommodate an increasing and ageing population, over 300 additional beds would be required each year. Walsh *et al.* (2021) details the increase in demand for various healthcare services in Ireland due to a growing and ageing population.

A final area where Ireland has below-average health infrastructure is in health information systems. Data management and compatibility between different hospitals has often been listed as a shortcoming in the Irish health system.²⁴ Earlier this year, a framework was announced which aims to upgrade digital services in the health service.²⁵

Figure 12: Shortfall in health infrastructure is focused on buildings
Shortfall in the health capital stock (as a share of national income) relative to high-income European country averages



Notes: The difference between the health capital stock (as a share of national income) in high-income European countries and Ireland is shown. Positive values indicate that Ireland's capital stock is lower than the average of other high-income European countries. GNI* is used for national income in Ireland, GDP is used for other countries. Sources: Eurostat, CSO and Authors' workings.

²³ Of the 34 countries measured by the OECD in 2021, Ireland ranks 25th for hospital beds per head.

²⁴ See Walsh *et al.* (2021) for an exploration of how the Irish health information systems compare to other countries.

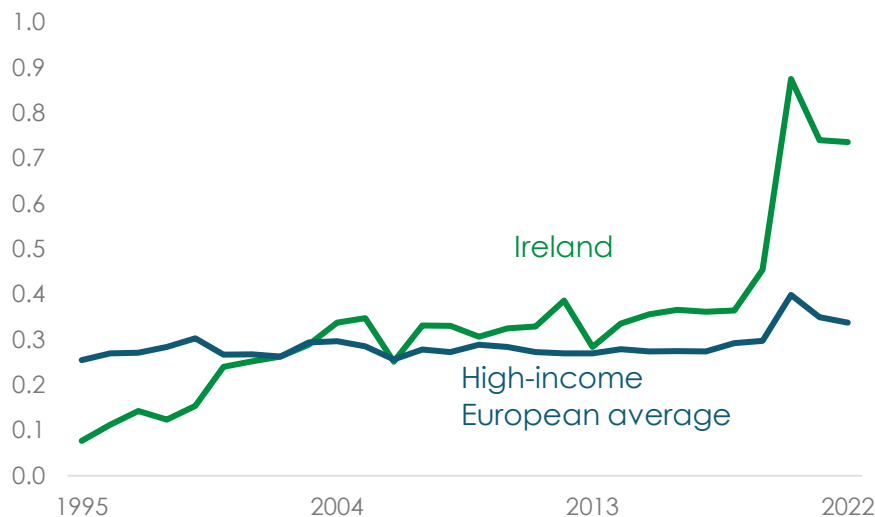
²⁵ See <https://www.gov.ie/en/press-release/3ad02-minister-for-health-publishes-digital-for-care-a-digital-health-framework-for-ireland-2024-2030/>.

Previous research (Casey and Carroll, 2021) showed that Ireland is a high spender on health relative to other countries. They showed that this was mainly visible in hospital care. By contrast, they showed that Ireland is around the median when it comes to some key infrastructure items, such as mammography machines, MRI units and CT scanners.²⁶

That Ireland is a high spender on health overall compared to other countries is striking. This is especially so, given that Ireland's population is relatively young. One potential explanation for high spending in the health sector is that a lack of infrastructure reduces the efficiency of the provision of health services. Another explanation could relate to how health services are managed or where they are located.²⁷ Wren and Fitzpatrick (2020) suggest that general wage levels being high explains the high cost of healthcare in Ireland.

Figure 13: Health investment has increased dramatically

General government health investment as a share of national income



Sources: Eurostat and Authors' workings.

Notes: Eurostat COFOG (Classification of the functions of government) data is used. This gives detailed information on government spending by area. General government investment in health is shown. This gives the broadest picture of government investment. GNI* is used for national income in Ireland. GDP is used for all other countries.

Given that healthcare is mainly provided by the State, increasing the capital stock in this area would likely require a high level of investment over many years. This process appears to have already begun.

Looking at general government investment in health, there was a

²⁶ This refers to the total system (public and private), so there could be shortfalls in the public system.

²⁷ Sicari and Sutherland (2022) point to the health system being strongly based on hospitals as a key factor in elevated levels of health spending in Ireland.

large increase in Ireland in 2020. This increase seems to have been sustained thereafter (Figure 13).

Some of this increase in investment is believed to be related to the construction of the National Children's Hospital. This project has been subject to multiple delays and is now expected to be completed in 2025 or 2026. Approximately half of this project has been added to the capital stock by 2022.^{28,29}

We consider what level of investment may be required to bring health infrastructure to high-income European average levels. We take the real net capital stock per head of population as the measure to be targeted. We assume population growth in Ireland as forecast in the CSO (2024a) population projections. We also assume a depreciation rate of 7.8%, which is the average for the health sector in Ireland over 1985-2022.

If health capital investment grew by 5% every year from its current high level, Ireland would reach average European infrastructure levels by about 2033.³⁰

Keeping investment in health at high levels would require more large projects. However, there are more large projects planned in the coming years. These include the new National Maternity Hospital, as well as new elective hospitals in Cork and Galway.^{31,32} More generally, the HSE (2024) has outlined plans for increasing acute bed capacity. Over 2024-2031, almost 3,500 additional inpatient beds are planned to be added.

These estimates assume that capital spending is efficient, i.e. that €1 of government spending leads to a €1 increase in the capital stock. Previous experience with megaprojects suggests that getting good

²⁸ Typically, new additions to the capital stock are only included when the project has been completed. However, due to the length of the construction projection and given the certainty of the purchase, the National Children's Hospital has been gradually included in Ireland's capital stock.

²⁹ Typically, investment projects such as this are valued at the cost which they were built. As a result, the National Children's Hospital should add around €2.2 billion to the estimated health capital stock in Ireland.

³⁰ For simplicity, we do not assume any increase in infrastructure from the private healthcare sector. There are some additional private facilities planned, such as Bon Secours in Limerick and an expansion in the Blackrock Health Group.

³¹ Enabling work has begun on the National Maternity Hospital, and the tendering process is scheduled to finish in the middle of next year. See Department of Health (2024) for more.

³² See Department of Health (2023) for more on St Stephen's Hospital (Cork) and Merlin Park University Hospital (Galway)

value for money can be challenging.³³ This is the case internationally and is not unique to Ireland. If poor value for money was achieved, then it would cost even more than what is outlined above to increase health infrastructure (or take even longer for a given level of spending).

While high capital spending may be required to address infrastructure deficits in health, this is not the full picture of health spending in Ireland. Given Ireland is already a high spender on health, there may be potential for reallocating some existing current health spending towards these investments. A comprehensive review of spending on healthcare could find resources that could be reallocated towards additional capital spending.

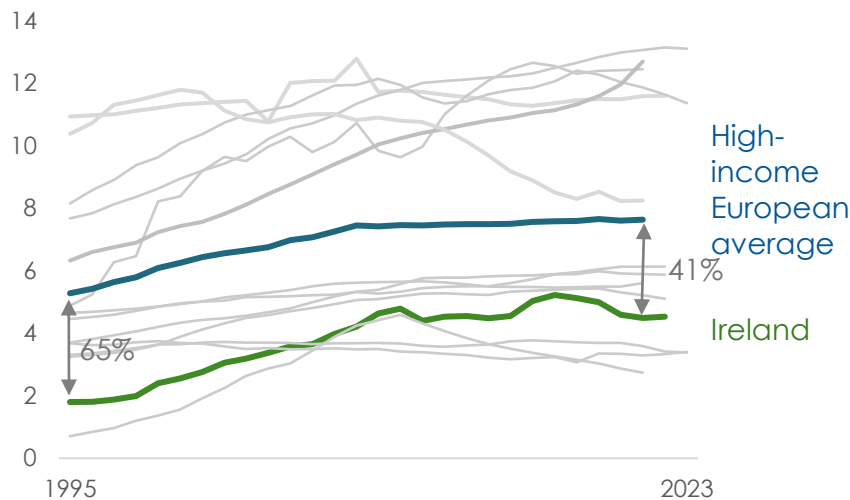
³³ For example, see Palcic and Reeves (2022) and Healy *et al.* (2022) for an exploration of the cost overruns with the National Broadband Plan.

3.3 Transport

Another area where Ireland's infrastructure looks low relative to other high-income European countries is transport. Figure 14 below shows that the real net capital stock of transport per person in Ireland has grown but remains below other high-income European countries.

Figure 14: Transport infrastructure is low compared to other high-income countries

Transport net capital stock (€ million, 2020 constant prices) per person



Sources: Eurostat, CSO and Authors' workings.

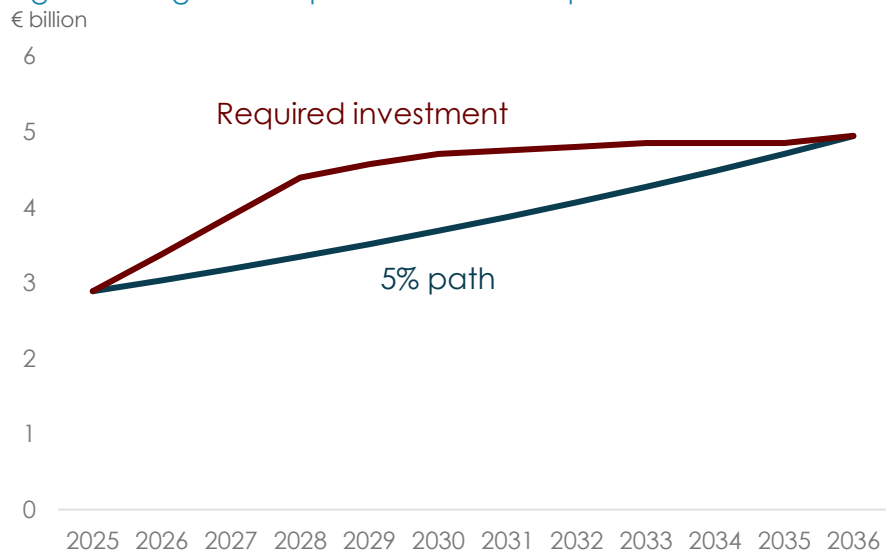
As with health, Ireland's transport sector mainly relies on State provision. With this in mind, public investment seems the most likely avenue to address shortfalls in transport infrastructure. As another illustrative exercise, we quantify what public investment in transport would be required over 10 years to get the capital stock per person to the average level of high-income European countries today.

We find that investment would need to increase temporarily by more than 5% per year over the next 10 years, but could then return to more normal levels. Again, this assumes that value for money is achieved with this spending.

Figure 15 gives an illustrative example of how this could be done. Investment in transport would increase substantially over the first five years, growing by about 10% per year. Little to no growth in the level of investment would be needed over the next five years. Overall, this

would leave investment at the level that would have resulted had it grown by 5% in each year.³⁴

Figure 15: Higher Transport investment required to address shortfalls



Source: Authors' workings.

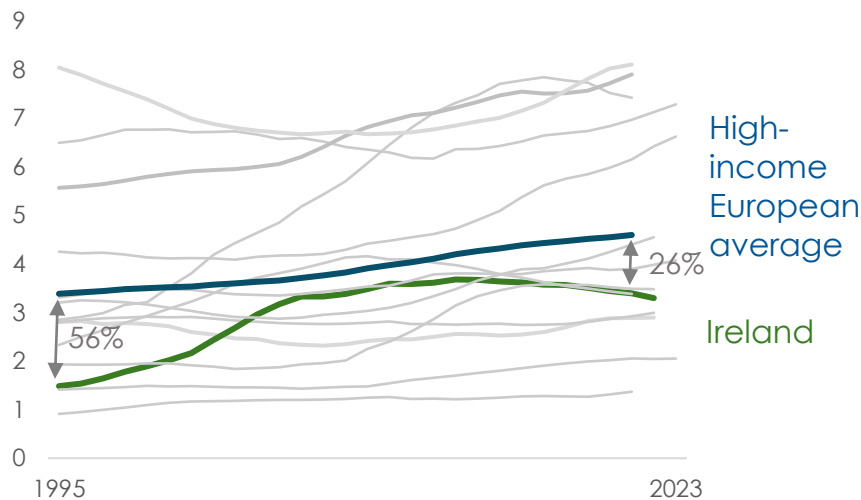
³⁴ Because the investment has been frontloaded, the required investment line results in €6.9 billion more total investment over the 10-year period. This is relative to the 5% growth scenario.

3.4 Electricity and the green transition

The electricity sector is another area where Ireland appears to have an infrastructure shortfall. While infrastructure in this area has increased since the mid-1990s, it remains 26% below the average of high-income European countries (Figure 16).

Figure 16: Electricity infrastructure has grown, but remains below other high-income countries

Electricity net capital stock (€ million, 2020 constant prices) per person



Sources: Eurostat, CSO and Authors' workings.

Notes: What is shown here is the capital stock of the Electricity, Gas, Steam and air conditioning sector.

The National Competitiveness and Productivity Council (2024) have previously outlined the implications of a lack of infrastructure in the electricity sector. Households and businesses are facing higher costs of electricity, much of which is due to shortfalls in infrastructure. Electricity is also a key piece of supporting infrastructure when building housing.

In recent years, there has been a shortage of generation capacity in the Irish system. As a result, the Commission for Regulation of Utilities has invested in emergency generation to fill this gap in the short term (CRU, 2024).³⁵ The EirGrid and SoNI (2024) generation capacity statement outlines the deficits that are apparent in electricity generation. The most significant deficits are projected for 2025, but deficits persist out to 2032. Significant investment will be required to address these deficits.

³⁵ This consists of two gas fired plants and two distillate (a form of diesel) plants.

In addition to investment in generation capacity, ESB Networks are currently planning investments in the distribution network (ESB Networks, 2024). This is required as the electric grid was not originally built for the pattern of generation and consumption that is likely to occur in the future.

It is also worth keeping in mind whether the high-income European average level of electricity infrastructure is sufficient in Ireland. Given the large number of technology firms and other heavy users of electricity based here, Ireland may have higher requirements for electricity infrastructure relative to other countries (see Section 3.5 for a similar discussion regarding water infrastructure).³⁶

The existing infrastructure shortfalls in the electricity sector are just one consideration. There are significant investment requirements in the coming years, as the country seeks to reduce its greenhouse gas emissions. Moving to a greener society would reduce pollution, improve health outcomes, and help Ireland avoid costs of missing its legal targets.

Casey and Carroll (2023) outline the fiscal implications of climate change in Ireland. They estimate the levels of government investment which would be required. The main area which would require direct government investment is in retrofitting homes. As the State owns about 10% of the housing stock, the cost of retrofitting these homes would be solely borne by the State.

Current plans suggest that major investments in the electric grid (for the island of Ireland) will be made by the network operators (EirGrid and ESB Networks). As a result, the money required for these investments is likely to come from customer charges, EU grants and borrowings by EirGrid. Because of this, there would not be direct government spending on upgrading the electric grid. However, if these funding sources prove to be insufficient, there may need to be capital grants from government to fund this work.

If Ireland does not meet its targets to reduce emissions, there will be significant financial implications. The government would have to purchase statistical transfers or credits. A recent report by T&E (2024) suggests that Ireland's costs for not reaching its climate goals could be between €1.7 and €9.6 billion by 2030. These costs could be even

³⁶ However, EirGrid estimates of electricity requirements do consider the structure of the economy.

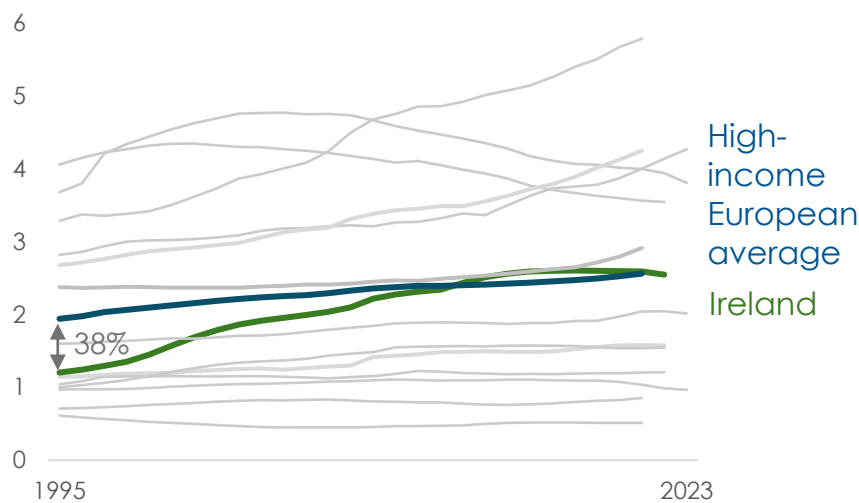
higher. Those estimates are based on Ireland implementing additional measures to reduce emissions. If these measures were not implemented, then the State would be further from its climate objectives and would face much higher compliance costs. In this case, compliance costs could be as high as €20 billion.

3.5 Water

Another area often where Ireland is often cited as having shortfalls in infrastructure is water and wastewater treatment. This was certainly the case in the mid-1990's. However, Ireland appears to have largely caught up to other high-income European countries over the last 25 years. Ireland now appears to be almost at average levels for high-income European countries.

Figure 17: Water infrastructure has increased and is now at average high-income European levels

Net capital stock in the water sector (€ million, 2020 constant prices) per person



Sources: Eurostat, CSO and Authors' workings.

Being at average levels of high-income countries is clearly a marked improvement. However, due to the structure of the Irish economy, Ireland may require above-average water infrastructure.³⁷ Three obvious examples come to mind.

Data centres are extremely heavy users of water for cooling purposes (See Mytton, 2021 and ING, 2023). There are around 70 data centres in Ireland, 65 of which are in the Dublin area (Ryan-Christensen, 2022).

Producing semiconductors also requires substantial water (World Economic Forum, 2024). This is another sector that Ireland has a large presence in. Intel recently invested €17 billion in Ireland with its most advanced semiconductor fabrication plant in Europe located in Ireland.

³⁷ According to Uisce Éireann, about 37% of treated water is lost due to leaks.

Ireland also has an outsized presence in the pharmaceutical sector. Ireland is the third largest exporter of pharmaceuticals in the world.³⁸ The pharmaceutical sector is also a very heavy user of water (see Cervest, 2022).

Having a heavy presence in these sectors brings many positives, especially high-paying jobs. In addition, the largest payers of corporation tax in Ireland come from pharmaceutical and information and communication sectors (Cronin, 2023). But having a strong presence in these sectors means strong demands on water supply and treatment. This places increased demands on water infrastructure. As a result, Ireland may need to aspire to have higher than average water infrastructure.

Uisce Éireann is nearing the completion of its current five-year capital investment plan (2020-2024). A new five-year plan will soon be submitted to the Commission for Regulation of Utilities. Recent reports indicate that Uisce Éireann aims to invest €10-11 billion over the next five years, which is roughly double the investment made in the previous five years.³⁹ As part of Budget 2025, the Minister for Finance suggested that Uisce Éireann may receive extra funding of €1 billion (see Section 5).

Water is also one of many supporting pieces of infrastructure needed when increasing housing supply. The Society of Chartered Surveyors Ireland (SCSI, 2023) has pointed to delays in connecting new homes to water and wastewater infrastructure. This, as well as delays in connecting to the electric grid, may be delaying housing completions and pushing up costs.

³⁸ According to the UN International Trade Statistics database.

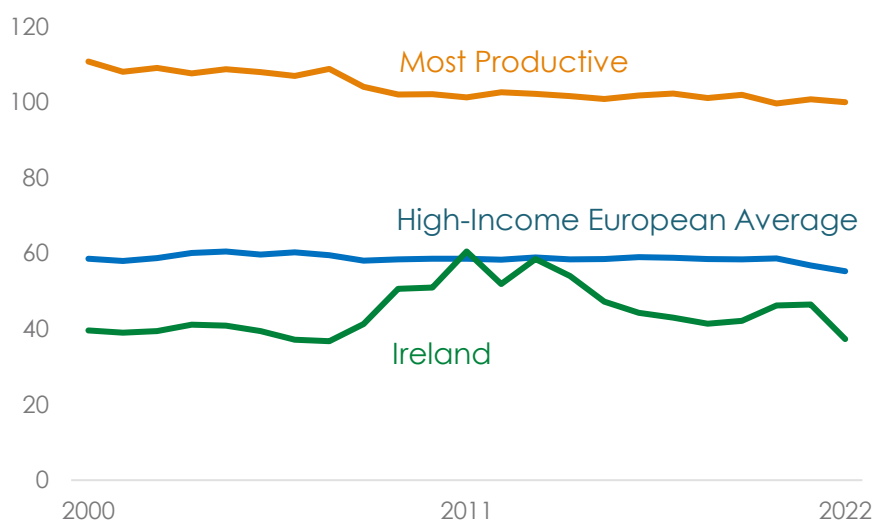
³⁹ See <https://www.businesspost.ie/news/uisce-eireann-we-need-e120-billion-to-fix-irelands-creaking-water-network/>

4. Productivity in the construction sector

A key issue for addressing infrastructure deficits is the productivity of the construction sector. Conroy, Casey, and Jordan-Doak (2021) show that productivity in the construction sector in Ireland is low. Looking at the most recent data, construction productivity in Ireland still looks well below average (32% lower). Compared to the country at the frontier (Norway), productivity in Ireland is less than half of that level. If productivity improved greatly, then house building (and other infrastructure projects) could increase substantially without additional workers. This could help address a key issue for the Irish economy and society.

Figure 18: Productivity in the Irish construction sector is low

Index: Construction output per hour worked



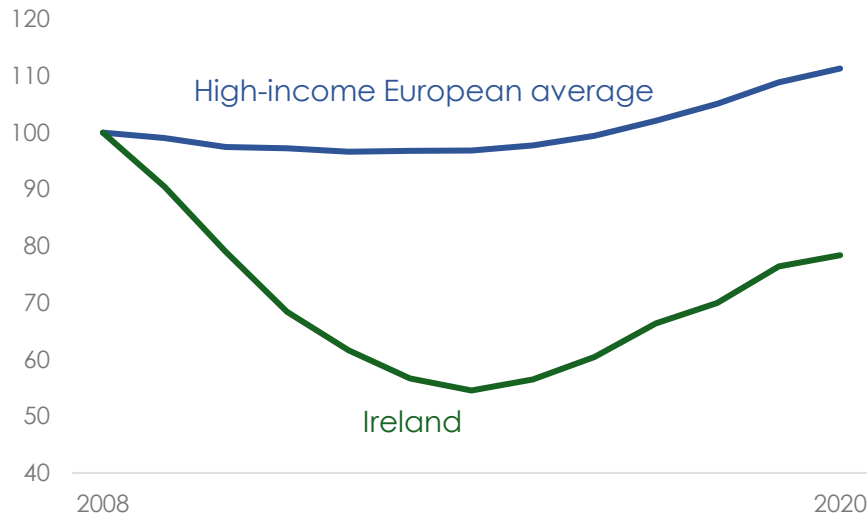
Source: Eurostat

Notes: Real construction output (Gross Value Added) in the construction sector is used. This is then divided by hours worked in the construction sector. The countries used are Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, Norway and Switzerland. Norway is the country with the highest productivity in every year examined.

There are a number of issues that could be inhibiting productivity growth in the construction sector. Low investment by construction firms may be one explanation. This is partially due to the boom-bust nature of the housing market in Ireland. Investment in the construction sector has remained low since the financial crisis. As a result, the productive capacity of the construction sector is lower. The productive capital stock of the construction sector is 20% below 2008 levels (Figure 19).

Figure 19: Capital in the Irish construction sector has yet to recover from the financial crisis

Productive capital stock, index 2008 = 100



Sources: Eurostat and Central Bank of Ireland (2024).

Notes: High-income European countries consist of Austria, Belgium, Germany, Greece, Spain, Finland, France, Ireland, Italy, Luxembourg and the Netherlands

One example of modern construction methods which have not yet been widely adopted in Ireland is modular construction methods. Recent estimates suggest that at least 70% less labour is required compared to traditional methods (DoHLGH, 2023). Building costs are estimated to be 20% to 40% lower also. A significant increase in the adoption of these methods could make it possible to produce much higher levels of housing with the same numbers of workers, and at a lower cost.

Finally, most construction firms in Ireland are quite small. There are only two large, listed firms building housing at present. Typically, larger firms are more productive in construction, as they are better able to invest in the latest technology (see Central Bank of Ireland, 2024).

If productivity is not improved, increasing housing completions will require additional construction workers. For example, to bring housing completions from 32,600 in 2023 up to 68,500 would require approximately 50,000 extra construction workers.⁴⁰ If productivity in the construction sector was improved, the required increase in workers would be much smaller.

⁴⁰ This assumes the historical relationship between employment and housing completions is maintained. If there were improvements in productivity in the construction sector, then there would be lower requirements for workers.

4.1 The Planning and objection system

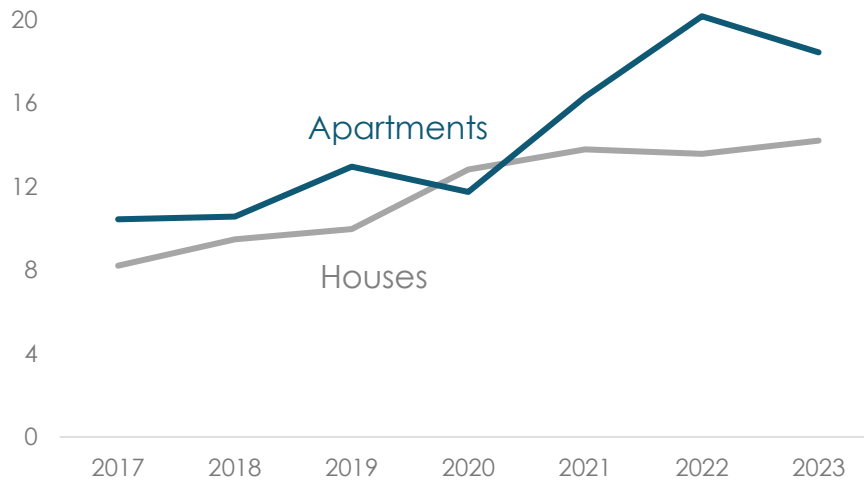
An unpredictable and slow planning and objection system is another factor that reduces productivity in the construction sector. This adds uncertainty to projects, pushing up costs. The National Competitiveness and Productivity Council (2024b) have repeatedly pointed to the planning system as a barrier to addressing infrastructure deficits in Ireland. Most large infrastructure projects enter the planning process as a Strategic Infrastructure Development (SID). The most recent estimates suggest approval takes an average of nine months, with the possibility of judicial review thereafter (An Bord Pleanála, 2023).

Uncertainty regarding planning decisions and delays increases project risk. Increased project risk typically leads to a higher cost of capital. As a result, a slow and unpredictable planning system can increase the cost of infrastructure projects. This increase in costs can make some projects unviable. Reforming the planning system is an example of an action that can be taken by government to facilitate higher investment with limited financial cost.

Analysis by Joyce (2024) reveals the growing time lag between planning permission being issued and work beginning on site for housing (Figure 20). There are many potential causes of delays. These include planning appeals, judicial reviews and securing funding for development. Some reforms are ongoing that could help. The Planning and Development Act (2024) is a significant piece of legislation which has just been enacted. This aims to address some of the shortfalls in the planning system. In addition, it is hoped to reduce the likelihood of judicial reviews of proposed projects. If a new planning and regulatory environment can deliver faster decisions, and higher thresholds for rejection of plans, that could help deliver housing and other infrastructure projects. The extent of the impact of these reforms remains to be seen.

Figure 20: Long delays from planning to commencement

Average time between planning to work commencing, Months



Source: Joyce (2024).

The average amount of time between planning permissions and commencements has increased over recent years. For apartments, the average delay is around 18 months. Long delays such as these increase costs of building housing.

Mitchell-McDermott (2024) provide estimates of the number of housing units which are delayed by planning decisions or objections. As of early 2024, more than 20,000 housing units in Strategic Housing Developments were awaiting a decision at An Bord Pleanála. A further 8,000 units were subject to delay due to judicial reviews.

Challenges in the planning and regulatory environment can also affect other types of infrastructure projects. Longoria *et al.* (2024) study how organising the regulatory process in a linear sequence impacts the delivery of renewable energy. They suggest that running some regulatory processes in parallel could speed up the delivery of renewable power. According to their estimates, this approach could reduce wholesale electricity prices by 10% and lower carbon emissions by 4%.

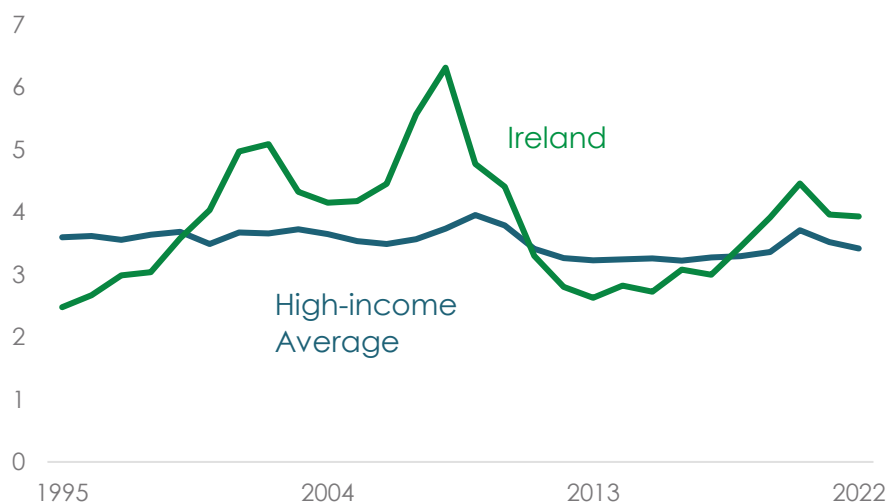
5. The budgetary implications

Several areas with infrastructure deficits have been identified. Some of these would require additional public investment (transport and housing). In addition, public investments will be required to facilitate the transition to a net-zero carbon society. This section attempts to quantify the budgetary implications of carrying out these investments.⁴¹

Public investment in Ireland is already at elevated levels. As a share of national income, government investment is above the average of other high-income countries (Figure 21).

Figure 21: Government investment in Ireland is high

General government investment as a share of national income (GNI* for Ireland)



Sources: Eurostat and CSO.

Notes: GDP is used for national income of all countries apart from Ireland, where GNI* is used.

In Budget 2025, the Minister for Finance indicated that an additional €3 billion would be made available for infrastructure spending. This included €1.25 billion for the Land Development Agency, €1 billion for Uisce Éireann and €0.75 billion for the electricity grid infrastructure. The timescale for these investments is unclear, and the figures were not included in the fiscal projections for Budget 2025.

For transport, 2025 investment figures are taken from the Expenditure report in Budget 2025. For 2026, updated NDP investment figures are used.⁴² Thereafter, investment grows in line with the requirements

⁴¹ The National Competitiveness and Productivity Council (2024b) have advocated for capital investment being prioritised over current spending increases.

⁴² See <https://www.gov.ie/pdf/289023/?page=null>

outlined above. This would bring transport infrastructure up to the average of other high-income European countries.

This is then compared with a baseline, whereby transport investment grows by 5% per year after 2025. A growth rate of 5% is chosen as it is in line with the assumed long-run growth rate of the economy. This is also the growth rate used for the National Spending Rule. Transport investment would temporarily be above what is implied by simply growing by 5% per annum, before returning to more normal levels (Figure 15).

For the green transition, Casey and Carroll (2023) provide estimates of the additional government spending that may be required. In some areas, this would not show as public investment. For example, upgrading the electric grid is going to be carried out by EirGrid and ESB Networks. This is to be funded by EU grants and customer charges, so it would not require additional government spending.

One area the government will have a direct investment role is in retrofitting homes. As the State owns approximately 10% of the housing stock, the costs of retrofitting these homes would fall directly on the State. This would amount to investment of around €187 million per year (less than 0.1% of GNI*) out to 2035.

The rest of government costs are likely not to come in the form of government investment, but in the form of subsidies and incentives for households and businesses.⁴³ For example, subsidising households to retrofit their homes or to purchase electric vehicles.⁴⁴ The cement industry may receive grants or assistance from government to decarbonise its plants.⁴⁵ Finally, income supports may be provided to the agriculture sector as farmers reduce livestock numbers. As these subsidies and supports are not direct investment by the government, they are not included in the estimates below.⁴⁶

Regarding housing, the Central Bank of Ireland (2024) found that government spending on housing has increased substantially since

⁴³ €3.15 billion is planned to be used from the Infrastructure, Climate and Nature Fund over 2026-2030 in order to meet climate goals.

⁴⁴ Casey and Carroll (2023) assumed that the costs of electrifying State vehicles (Garda cars, ambulances etc) and upgrading some rail services was already incorporated into the National Development Plan (NDP). The NDP allocated €5 billion to energy efficiency measures such as retrofits over the period 2021-2030.

⁴⁵ Measures such as these are likely to be classified as investment grants (ESA code D92).

⁴⁶ In total, Casey and Carroll (2023) estimate that government spending of between 0.5% and 0.8% of GNI* would be required over 2026-2035.

2015. As a share of national income, government spending on housing in Ireland is the second highest in the Eurozone.

There may be a case for further increasing spending in this area. However, before doing so, reallocating some existing spending could improve outcomes. The efficiency of investment could also be improved.

At present, about 25% of the financing for housing comes from State sources (Central Bank of Ireland, 2024). Bringing housing completions from 32,600 to 68,500 would require an additional €12 billion of financing per year. If one assumes that the State maintains a 25% share of financing, this implies an additional €3 billion from the State annually.

However, as government spending on housing is already amongst the highest in the Eurozone, one might expect much of the additional financing to come from the private sector.

In Table 1 below, we provide two scenarios. In the low-cost scenario, the private sector provides all the additional financing to increase housing completions. This means there would be no additional government spending required. In the high-cost scenario, we assume that the State continues to provide 25% of the financing for housing projects. This means that government spending would have to increase by €3 billion and remain at that higher level for a prolonged period.

The final sector where infrastructure deficits have been identified is in health. However, capital spending in health is already at elevated levels. If this high level of investment is sustained over the next 8-10 years, Ireland would reach high-income European average levels of infrastructure.

Table 1: Some additional government investment will be required
 Average additional government investment over 2026-2035, € millions unless otherwise stated

	Low-cost scenario	High-cost scenario
Retrofitting Housing	187	187
Transport	689	689
Housing	0	3,000
Total	876	3,876
Total (% GNI*)	0.3	1.2

Source: Casey and Carroll (2023) and Authors' calculations.

Notes: Figures for retrofitting the housing stock assume that the State directly invests to retrofit housing which is publicly owned. Transport figures give the average of how much higher transport investment would need to be relative to simply growing investment by 5%. The high-cost scenario for housing assumes that the State continues to provide an average of 25% of the financing for housing. The low-cost scenario assumes that all additional funding comes from the private sector.

Overall, we find that the costs to government of resolving these infrastructure deficits are modest relative to overall spending. By addressing the infrastructure deficits in a phased way, these costs are spread over many years. Even in the high-cost scenario, the additional government spending required is just over 1% of national income.

There are obvious risks to the costs of addressing these infrastructure deficits. The estimates are produced on the basis that public investment is efficient and gets good value for money. That has not always been the case historically, both in Ireland and internationally (see Flyberg *et al.*, 2003).

We have assumed that upgrading the electricity infrastructure does not require additional direct government investment. If EU grants, customer charges and borrowings by EirGrid or ESB Networks are insufficient to cover these costs, additional government spending or capital transfers may be required.

In addition, there may be areas where Ireland may seek to get to above-average levels of infrastructure. Water and electricity are obvious examples, given the large number of technology and pharmaceutical companies based here.

Many of the main obstacles to addressing Ireland's shortfalls in infrastructure are not a lack of government funding. Difficulties in the planning and objection system delay projects and make them more expensive and difficult to deliver. Reforming the planning system and objection system would cost a relatively small amount of government money, relative to total government spending (see Section 4.1).

Addressing infrastructure deficits is just one of many competing demands on the public finances over the coming years. The budgetary costs of an ageing population are set to ramp up in the coming years. Higher spending on pensions and health care are inevitable with an ageing population. In addition, transitioning to a zero-carbon society will incur budgetary costs, although the transition is also likely to improve efficiency and reduce exposure to expensive energy imports. Nonetheless, some government revenue based on fossil fuels will need to be replaced as explained by Casey and Carroll (2023). Extra spending will also be required to incentivise households and businesses to play their part.

While there are obvious demands for investment, the economy currently does not need an extra stimulus from government spending. Extra investment should be offset by either reallocating spending or increasing taxes. Limiting overall increases in spending net of tax measures to 5% would reduce the risk of adding to the cost of living and eroding Ireland's competitiveness.

6. How to address infrastructure deficits and the workers required

A number of areas have been identified where there are shortfalls in Ireland's infrastructure. Such shortfalls cannot be addressed in a single year. These challenges require a sustained high level of investment over several years.

A key consideration is addressing these infrastructure deficits while the economy is at full employment. In some areas, upgrading the infrastructure would require limited domestic labour. For example, transitioning from petrol and diesel vehicles to electric vehicles would require almost no domestic labour, as these vehicles are produced abroad and imported.

Many other areas are much more labour intensive, however. Increasing the number of new homes built would require substantially more workers in the construction sector. If productivity increased in the construction sector, then the required amount of labour would be lower. However, if construction productivity remains at current levels, bringing housing completions up to 68,500 per year would require approximately 50,000 additional construction workers.⁴⁷

Kakkar, Farrell and Lynch (2024) produced estimates for the labour required for investing to meet our renewable energy targets. Over 2023-2030 they estimate that roughly 24,000 workers would be required to work on these projects.⁴⁸ The majority of this is for retrofitting homes.

The authors' note that these estimates may be considered as a lower bound for two reasons. First, these estimates do not include upgrading the electricity grid. Second, these estimates were based on a constant rate of activity over 2021-2030. Given retrofits fell behind these targets in 2021 and 2022, higher activity would be required in later years to meet targets. As a result, there would be more demand for labour.

In the healthcare setting, the main shortfall in infrastructure identified is in buildings/structures. As a result, building, expanding or renovating

⁴⁷ The ESRI (2023) estimated that 26,000 additional construction workers would be required to meet the housing targets outlined in the current National Development Plan. However, the housing completions those estimates were based on are much lower than those outlined here.

⁴⁸ These estimates are very similar to those produced by the Department of Further and Higher Education, Research, Innovation and Science (2022).

hospitals or other healthcare settings would require construction workers. However, investment in this area is already high, so additional construction workers are unlikely to be needed for this area.

We can see that there are various areas which will require significant investment over the coming years. If productivity in the construction sector remains low, these projects will require significant amounts of labour to address them. These demands are all likely to occur simultaneously. Without increases in productivity, we estimate that around 78,500 additional construction workers may be required to address these key infrastructure challenges over the coming years. This corresponds to a 47% increase in employment in the construction sector.

Table 2: Labour requirements for capital projects

Additional construction workers required, thousands

Area	Quantity
Housing	50
Green transition	25
Transport investments	3.5
Total	78.5
Total (percentage of construction employment)	47.4%

Sources: Authors' calculations, CSO and Kakkar, Farrell and Lynch (2024).

Notes: Estimates assume no improvements in construction sector productivity. Kakkar, Farrell and Lynch (2024) had suggested 24,000 additional workers would be required for investments to meet renewable energy targets. However, as delivery has been somewhat delayed in the initial years of the projects, accelerated delivery may be required out to 2030. As result, we increase the required number of workers to 25,000.

Given the scarcity of labour, one strategy could be to prioritise projects which do not require significant domestic labour in the short term. For example, transitioning to electric vehicles would not require significant domestic labour. This is because these vehicles are produced abroad and would be imported.

However, the capacity constraints the economy faces need to be alleviated at some stage. Budgetary policy could play a role. Raising taxes or cutting spending elsewhere would reduce demand in the economy. This could free up some resources in the economy.

As mentioned in Section 4, raising productivity in the construction sector could be key to improving Ireland’s infrastructure provision. This would mean fewer workers would be required to carry out these infrastructure projects. Applying modern methods of construction could help raise productivity in the construction sector.⁴⁹

Table 3: Higher productivity would reduce the labour required

Additional construction workers required to address infrastructure deficits

	Current productivity	Higher productivity
Thousands of workers	78.5	19.3
Percentage of construction employment	47.4%	11.6%

Sources: Authors' calculations, CSO and Kakkar, Farrell and Lynch (2024).

Notes: The higher productivity scenario is based on Irish construction productivity increasing by 32% so it reaches the high-income European average (see Figure 18). The current productivity scenario assumes no increase in construction productivity in Ireland. These figures replicate Table 2.

If construction productivity in Ireland improved to the average of high-income European countries, this would mean a 32% improvement in productivity (Figure 18). Were this to happen, then the 47% increase in labour shown in Table 2 would shrink to 12%. In terms of people, instead of needing 78,500 extra workers, you would need 19,300 extra workers.

Another way to source workers for these projects would be to see reallocation of construction workers from other types of projects. First, we need to estimate how many workers are being used for different types of investment projects.

The Labour Force Survey provides estimates of how many people are employed in the construction sector.⁵⁰ There is no breakdown of what type of projects these workers are working on. We attempt to break down how employment might be allocated across different projects. We do this using investment data from the national accounts.⁵¹ These

⁴⁹ This includes off-site manufacturing.

⁵⁰ In addition, [a breakdown of employment by occupation](#) is also provided.

⁵¹ We assume that the share of construction employment in these three sectors moves with investment in each of these sectors, given in the national accounts.

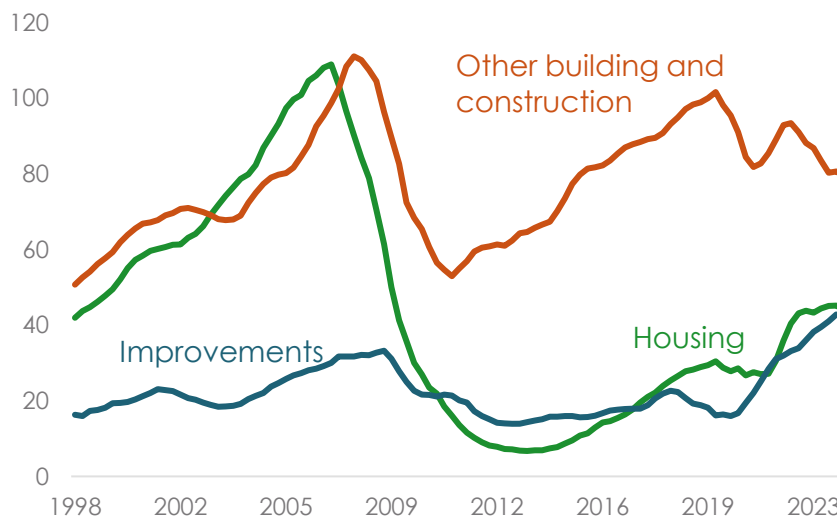
estimates are subject to large uncertainty but give a sense of how many workers are currently allocated to each area.

Three main types of investment are shown. Dwellings refers to the construction of new homes. Improvements refers to maintenance and upgrading of existing buildings. The final category is other building and construction. This encompasses all other construction. One of the main elements is commercial real estate.

There is already some evidence of workers moving from commercial real estate projects to housing projects (Figure 22). However, there is still a large stock of workers in the other building and construction sector. As investment in commercial real estate continues to decline, there could be scope for further reallocation of workers to housing, retrofits and renewable energy.

Figure 22: Employment for housing is recovering

Estimated employment in main investment areas, thousands, four quarter moving average



Sources: CSO and Authors' workings.

Notes: Total employment in the construction sector is taken from the Labour Force Survey. This is then allocated to the three sectors shown using investment data from the national accounts. These estimates are purely illustrative and are subject to very large uncertainty.

As has been previously pointed out (Fiscal Council 2024), attracting construction workers from other EU countries may be more challenging than was the case in the 2000s.⁵² Increased apprenticeships and training in the construction sector can help. However, these measures take time to produce a large increase in workers. Substituting workers from light manufacturing sectors into construction could help source additional labour. If the increase in

⁵² The difference between wages in the construction sector in Ireland and the rest of the EU are not as large as was the case in the mid-2000's.

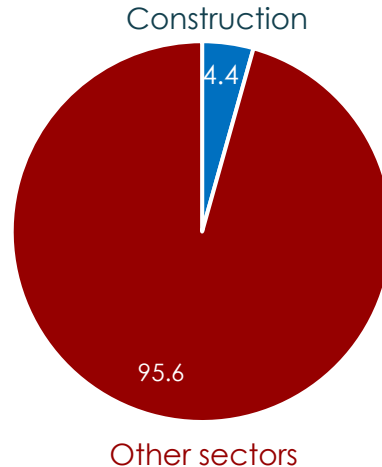
construction workers comes from additional inward migration, this itself could increase the required housing and other infrastructure, although this may prove somewhat temporary.⁵³

Attracting construction workers from outside the EU is a potential source of additional workers. Workers from outside the European Economic Area require work permits.⁵⁴ In 2023, almost 31,000 work permits were issued, with less than 1,400 related to the construction sector. This represents less than 5% for all work permits issued.⁵⁵

The issuance of work permits is based on prioritising different occupations. The critical skills occupation list gives advantages to applicants from certain occupations when applying for a work permit. At present, the only occupation on this listing which is construction related is site managers.⁵⁶ If a significantly higher percentage of work permits were for workers in the construction sector, that could help to address the shortfall in construction workers. This could be done by adding more construction occupations to the critical skills occupation list.

Figure 23: Work permits focused on non-construction sectors

Percentage of work permits allocated in 2023



Sources: Department of Enterprise, Trade and Employment and Authors' calculations.

⁵³ If some of these migrants only move temporarily to Ireland, then this effect would be short lived. In addition, some of this migration is already built into population projections by the CSO (2024a) and estimates of demand for housing from Bergin and Egan (2024).

⁵⁴ The European Economic Area consists of EU countries, plus Norway, Iceland and Lichtenstein. In addition, those from the UK or Switzerland do not require a work permit.

⁵⁵ Construction accounts for around 6% of total employment at present.

⁵⁶ The current listing can be found here: <https://enterprise.gov.ie/en/what-we-do/workplace-and-skills/employment-permits/employment-permit-eligibility/highly-skilled-eligible-occupations-list/>

7. How should public investment work?

A well-thought-out public investment plan could help resolve these issues. Such a plan would have a series of projects planned and waiting to be implemented. In the event of an economic downturn, particularly in the construction sector, these projects could be put into action (see Haughwout, 2019). This approach offers two benefits. Firstly, it would achieve better value for money by investing when the construction sector is in a downturn. Secondly, investing during downturns would help sustain the construction sector and ensure the sector still has capacity when the economy recovers.

Another key factor is how efficient public investment is. A previous IMF (2017) study found that public investment was significantly less efficient in Ireland than other advanced economies. Some of the recommendations from the IMF have since been implemented. However, Conroy, Casey and Jordan-Doak (2021) found scope for the Department of Public Expenditure, NDP Delivery and Reform to improve its analytical techniques, its analysis of existing assets, and its reviews of past investment projects.⁵⁷

⁵⁷ Last year, the Project Ireland 2040 Delivery Board was reconstituted. The Delivery Board is said to focus on major project (€200+ million) delivery.

8. Conclusions

We find that, overall, Ireland's infrastructure provision has improved since the mid-1990s. However, Ireland's infrastructure remains around 25% below the average of high-income European countries.

We identify health, housing, transport and electricity as areas where Ireland has below-average infrastructure. Given the scale of these deficits, they will require investment plans over ten years to address these. In addition to these areas where Ireland's capital stock looks low, there are also investment requirements for the transition to a greener society. We quantify how these deficits could be addressed in a planned, phased way.

The planning and objection system has been a barrier to investment. At present, it means it takes longer and is more expensive to deliver major projects. Reforming the planning and objection system could aid the delivery of infrastructure. This would not cost a significant amount of money, relative to overall government spending. It remains to be seen how much of an impact the new Planning and Development Act (2024) has.

One of the key challenges in addressing these shortfalls in infrastructure is sourcing the workers. Many of these projects demand significant amounts of the same type of workers (construction). If productivity in the construction sector is not improved, we estimate that almost 80,000 additional construction workers would be needed to address infrastructure shortfalls. If productivity improved to average high-income European levels, less than 20,000 extra workers would be needed.

Some of the infrastructure deficits are in areas which rely on either direct government funding or support. As a result, some additional public investment may be required. Overall, we find that the extra government investment required would be modest relative to present levels of spending. Given the economy is already performing close to capacity, it does not require extra money pushed into it by the government. As a result, reallocating existing spending or increasing taxes could help offset any increase in government investment.

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