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THE NATIONAL DEVELOPMENT PLAN IN 2023: PRIORITIES AND CAPACITY

EDITED BY ALAN BARRETT AND JOHN CURTIS

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THE NATIONAL DEVELOPMENT PLAN IN 2023: PRIORITIES AND CAPACITY

A report submitted to the Department of Public Expenditure, National Development Plan Delivery and Reform

Edited by Alan Barrett and John Curtis

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Corrigendum: Minor correction made to section 8.1.4, the first paragraph on page 81, following initial publication.

Text now reads 'estimate an ETS price of €410 per tonne of CO2 in 2050, which will have large impacts on the economy'.

A previous version had read '….estimate an ETS price of €435 per tonne of CO2 in 2030, which will have large impacts on the economy'.

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THE AUTHORS

All authors are at the ESRI. Alan Barrett is the Director; John Curtis is a Research Professor; Sheelah Connolly is a Senior Research Officer; Kelly de Bruin is a Senior Research Officer; Niall Farrell is a Senior Research Officer; Eoin Kenny is a Research Assistant; Muireann Lynch is a Senior Research Officer; Kieran McQuinn is a Research Professor; Conor O'Toole is an Associate Research Professor and Emer Smyth is a Research Professor.

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ABBREVIATIONS

CAO	Central Application Office
CAP	Climate Action Plan
CBA	Cost-Benefit Analyses
CCGT	Combined Cycle Gas Turbines
CNAG	Comptroller and Auditor General
COP	Conference of Parties
COSMO	COre Structural MOdel for Ireland
CPI	Consumer Price Index
DFHERIS	Department of Further and Higher Education, Research, Innovation and Science
ETS	EU Emissions Trading System
FE	Further Education
FTE	Full-Time Education
GDFCF	Gross Domestic Fixed Capital Formation
GFC	Great Financial Crisis
GGB	General Government Balance
GHG	Greenhouse Gases
GUI	*Growing Up in Ireland*
HE	Higher Education
LTRC	Long-term residential care
MCE	Multi-Criteria Analyses
MDD	Modified domestic demand
MMC	Modern methods of construction
NAIRU	Non-accelerating inflation rate of unemployment
NDC	Nationally Determined Contributions
NPF	National Planning Framework
OCGT	Open Cycle Gas Turbines
OECD	Organisation for Economic Co-operation and Development
O-RESS	Offshore Renewable Energy Support Scheme
PLC	Post-Leaving Certificate
RES-E	Renewable share in electricity generation

RESS	Renewable Energy Support Scheme
RHA	Regional health authorities
SEN	Special Educational Needs
SOLAS	The Irish Further Education and Skills Service An tSeirbhís Oideachais Leanúnaigh agus Scileanna
TII	Transport Infrastructure Ireland
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Introduction

When the current National Development Plan (NDP) was launched in 2018, it identified a clear need for substantial public investment in Ireland and set out an ambitious programme for this investment. The needs were set out again with the launch of the renewed NDP in 2021, along with an updated set of projects. In spite of the ambition which underpinned the NDP, the latest information which informs the scale of investment needed suggests that the earlier level of ambition may have underestimated what is needed. Population growth is exceeding expectations, partly as a result of the inflow of Ukrainian refugees, and targets on greenhouse gas emissions look increasingly challenging.

In the absence of any constraints, the obvious response at this point would be to increase the near-term ambition of the NDP through higher spending allocations and the acceleration of projects which are at various stages of readiness. However, the existence of capacity constraints largely in the form of labour shortages implies that the policy options which would apply in an unconstrained setting may not be optimal in the immediate future. In essence, an accelerated NDP risks generating increased inflation in the construction sector whereby the costs of delivery increase.

This conflict between the need for public investment and the constraints on investment provides the context for this report, and the challenge is to provide high-level guidelines on how the conflict can be managed.

REPORT STRUCTURE

The report is structured in the following way. We begin by looking at the capacity constraints, in particular with regard to the labour market. We then go on to look at specific areas – housing, energy, transport, health and education – in Chapters 3 to 7, and reflect with varying degrees of emphasis on the needs and constraints within these areas. In Chapter 8 we look at a set of cross-cutting issues – balanced regional development, climate and planning – in order to provide a broader context. In the final element of our analysis, in Chapter 9, we make suggestions on how the timing and sequencing of NDP projects might be designed so that maximum benefits are derived while minimising possible negative inflationary consequences.

CAPACITY CONSTRAINTS

The economy is performing exceptionally strongly at the moment, and this is reflected in the current rate of unemployment – 3.8 per cent – which is historically low in modern times. Noting limits to increased labour supply from sources such as increased participation and increased immigration, it is clear that the economy – and hence the NDP – faces severe capacity constraints.

Studies are reviewed which sought to quantify the amount of labour needed to deliver on some of Ireland's investment needs. For example, the Expert Group on Future Skills Needs (2021) asked how many additional construction workers would be needed to raise housing output from a level of 20,000 units in 2020 to 33,000 in 2025. Looking at 'direct' employees and 'indirect' (which is supply-chain related), they estimate that approximately 40,000 full-time equivalent employees were required to build 20,000 housing units and so an extra 26,000 would be needed to reach an output of 33,000 units. Based on this and other studies, including the analysis in the Energy chapter of this report, it is clear that an accelerated NDP will create levels of labour demand in the construction sector where supply is simply unavailable.

We go on to ask what the effect might be of injecting additional demand into such a constrained setting. Referring back to earlier ESRI work from 2006 and from more recent simulations using macroeconomic models, it seems likely that such additional demand would lead to construction wage inflation. However, the models could well be underestimating the inflationary impact. With the unemployment rate at a historically low level, previous trends suggest that the relationship between the unemployment rate and the inflation rate might not be linear. Instead, inflation might accelerate as unemployment is lowered. The effect of this would be to raise the cost of delivering capital expenditure and spillover inflationary effects are also possible. However, we should also note that in the medium term the successful delivery of NDP projects including housing should lead to a reduction in inflationary pressures.

SECTORAL ANALYSIS

A key point to emerge in the chapter on **housing** is the likelihood that existing targets for housing supply might understate need, given the stronger than expected increase in the population seen in the recent release of results from Census 2022. This chapter also recognises the capacity constraints which confront efforts to increase output. However, it is noted that increased housing output should dampen the price of existing houses and rents. Hence any increase in the costs of new building arising from increased investment could be offset by an easing in housing costs.

Ireland has well-established targets with respect to **energy** infrastructure and these are set out in the corresponding chapter. The focus on the chapter is on translating these targets into levels of investment in terms of euros but also in terms of labour inputs. Combining likely labour needs for onshore wind, offshore wind, solar PV, conventional generation and energy efficiency, it is estimated that the annual additional employment requirement would be approximately 24,000.

The benefits of investment in **transport** infrastructure are well-known and well-understood and range from economic considerations such as improved labour mobility (and hence improved productivity) to broader social, cultural and recreational opportunities. However, Ireland's transport system – being heavily reliant on roads and motor vehicles – is a significant contributor to greenhouse gas emissions. Echoing advice from the OECD, this chapter discusses the need for truly transformational policy with a focus on sustainable mobility at a system level. In that context, even if the 2:1 expenditure ratio favouring public transport over new roads is maintained, the roads element of expenditure should be based on design which includes active travel modes.

Healthcare policy has an over-arching framework – namely Sláintecare – and the discussion of investment needs in the Health chapter is grounded in Sláintecare. However, as with other chapters, the faster pace of population growth has implications for capital needs in healthcare. In addition, the pace of population ageing presents particular issues for healthcare, especially with regard to long-term care. So while the basic policy framework is in place and identifies the needs for investment in acute, primary and community care, the required scale and geographic distribution of the investment is likely to be evolving.

Population growth and increasing participation will lead to an increased need for **education** facilities from early childhood through to higher education. This is well understood but an additional issue in education is the standard of facilities and the need for upgrades. Although more systematic information is needed, we know through the *Growing Up in Ireland* survey that many school principals rate school facilities poorly. We also know from previous ESRI research that facilities in many further education colleges are viewed as being poor by FE providers. Investment in digital infrastructure is also needed in education if stated policy ambitions are to be realised.

CROSS-CUTTING THEMES

On **climate**, Ireland has committed to an ambitious GHG emission reduction target of 51 per cent by 2030. This target was made legally binding by the *Climate Action and Low Carbon Development (Amendment) Act of 2021* and further commits to

net-zero emissions by 2050. The Climate Action Plan (CAP23) outlines a roadmap with specific targets, policies, and measures across various sectors in order to achieve these targets. However, based on achieved emission reductions to date and planned actions under the CAP23, success in meeting targets is far from guaranteed. Hence, our climate policy efforts need to increase rapidly to ensure our targets are met.

The section on **planning** reflects on a number of issues including the delays that seem to arise in a system which is under-resourced. Another point which is addressed is the situation where nationally important projects that are designed to facilitate decarbonisation and to address the potential impacts of climate change are substantially delayed, reduced in scale or abandoned. Examples arise in the cases of energy networks and sustainable mobility. Sustainable development requires striking a balance between the absolutes of local projects and their wider national contribution in the context of national housing, environmental and climate targets.

The achievement of **balanced regional development** is a key component of Project Ireland 2024. In support of that goal, investment under the NDP should ideally be spread in an integrated and systematic manner across the country. While the spread of projects appears to reflect a reasonable degree of alignment between investment and population targets, the data available are too limited to assist in any level of rigorous assessment. CSO data on population growth across counties and regions are more useful and allow for the following observations. The fact that all counties experienced population growth between 2016 and 2022 is to be welcomed. However, the fact that the Eastern and Midland region is experiencing a share of population growth beyond that envisaged in the 2040 target is a concern. This is not to suggest that the NDP is failing with regard to balanced regional development, but merely to note that continued effort and assessment are required.

PRIORITISATION GUIDELINES

There is a clearly a need to improve Ireland's public infrastructure. However, there is also a capacity constraint particularly in the construction sector. It is not possible for the ESRI to say if one policy goal (such as housing) should be prioritised over another (such as climate), and we do not attempt to do so. But we do provide some broad principles which might be applied in deciding how projects might be prioritised.

An acceleration of the NDP could avoid an inflationary impulse if it was combined with an overall budgetary package where other measures such as taxation and current expenditure balanced any NDP-related stimulus. Another option would be

to direct construction activity towards, for example, housing and away from other activities such as office space, hotels and carparks. A tax could be used, not for the purpose of aggregate demand management but for the more microeconomic purpose of re-directing activity. Yet another approach would be to delay any acceleration until labour market conditions had changed.

Clearly, approaches based on tax increases, spending reductions and deliberate delays are likely to present political challenges so we need to think creatively about the speed and sequencing of NDP delivery.

Decisions on public spending will almost always have a judgment component and such judgement is particularly important in giving weight, for example, to socially valuable outcomes in health and education. However, it is important that some form of metrics inform decisions too. It is suggested that Cost-Benefit Analyses and Multi-Criteria Analyses which were undertaken – or are planned – for projects be re-assessed with altered parameters used which capture the more severe capacity constraints and the more demanding climate targets which have arisen since the original NDP was drafted. For capacity constraints, the labour intensity of projects should be considered, with the climate impacts of projects (whether positive or negative) also featuring more prominently in the CBAs.

A further factor which could be incorporated into revised CBA metrics is the impact of projects on easing inflationary pressures through supply-side impacts even if the demand-side impact in the short-run is inflationary. As discussed above, increased building of housing units will lower the price of the existing stock, all else being equal. With regard to energy, a faster transition to renewable sources could reduce energy costs.

A similar consideration arises in terms of whether the demands created by investments are largely met from domestic resources or through imports. An increased demand for imports will have no impact on inflation given that Ireland is a price-taker in the relevant markets. It would also be desirable to favour projects which use innovative methods and materials that economise on labour and other inputs.

Regardless of the degree to which projects can be rationally re-ordered in terms of the sequence of delivery, a challenge will remain around the scale of investment at any point in time. Just as decisions on priority should be informed by metrics, it would be important to base any acceleration of the NDP on evidence of a loosening of capacity constraints.

CHAPTER 1 INTRODUCTION

Alan Barrett

When the current National Development Plan (NDP) was launched in 2018, it identified a clear need for substantial public investment in Ireland and set out an ambitious programme for this investment. The needs were set out again with the launch of the renewed NDP in 2021, along with an updated set of projects.

In spite of the ambition which underpinned the NDP, the latest information which informs the scale of needed investment suggests that the earlier level of ambition may have underestimated what is needed. The figures on population growth from Census 2022, released in May 2023, show a rate of increase which exceeded expectations. In 2022, the population stood at 5.149 million and this was an increase of 8 per cent on the 2016 figure. With population growing more rapidly, the need for extra housing and associated infrastructure is clear.

The recent release by the Environmental Protection Agency (EPA) of greenhouse gas emission projections highlights another challenge. A legally binding commitment to reduce emissions by 51 per cent out to 2030 is in place but EPA projections suggest that a reduction of just 29 per cent will be achieved.[1] While there is some discussion about whether further measures between now and 2030 will allow for more progress towards the 51 per cent target, the scale of the challenge is clear to all.

In the absence of any constraints, the obvious response at this point would be to increase the near-term ambition of the NDP through higher spending allocations and the acceleration of projects that are at various stages of readiness. The remarkable health of the public finances at the time of writing – albeit with awareness of the risks surrounding the sustainability of corporate tax receipts – would normally add to the impetus for acceleration. However, the economy is performing exceptionally strongly at the moment and this is best illustrated through the rate of unemployment. At 3.8 per cent, the rate is at a historic low and full employment appears to have been achieved.

The existence of capacity constraints implies that the policy options which would apply in an unconstrained setting may not be optimal in the immediate future.

[1] The 29 per cent estimate includes the effect of new policy measures where the EPA were able to model those effects. Other policy measures have also been proposed but their potential effects were not included in the projections where the EPA thought there was insufficient detail for modelling purposes.

Specifically, the injection of additional demand into an economy which is operating at full capacity is likely to lead to inflation. Consumer price inflation, while decelerating, remains well above recent rates and above target rates. Attention is shifting from externally generated inflation in the form of higher energy and food prices to internally generated inflation based in part on wage inflation.

It was against this background that the ESRI was asked by the Department of Public Expenditure, NDP Delivery and Reform to provide input into the Department's decision-making process with regard to allocations under the National Development Plan. Changing circumstances suggest a need to re-assess issues such as priorities, resources and capacity in order to ensure optimal delivery relative to national policy priorities.

Given the tight timeline that was available, the ESRI contribution is both focussed and limited in scope. In the first stage of our analysis, we look at capacity constraints, mainly with regard to labour availability, and assess what difficulties might arise from any acceleration in NDP delivery. We then move on to look at a number of areas – housing, energy, transport, education and health – and assess the issues and challenges which arise within each which are relevant to the NDP. We then go on to take a more cross-cutting perspective and consider a number of issues. Clearly, climate is an enormously important consideration, so we provide an overview of the relevant issues. Balanced regional development is a key consideration in the broader Project Ireland 2040 programme, so we also provide some observations and discussion. We consider the planning system and how it might act as a constraint. All combined, the report covers most of the major areas and major issues of the NDP.

Having reflected on the capacity constraints and the infrastructural requirements across the various areas, in the final section we consider how to balance the conflict between capacity constraints on the one hand and clear investment needs on the other. Standard economic analysis would suggest that an accelerated NDP at this time will lead to construction price inflation and hence a reduced volume of infrastructure delivered for the same expenditure in euro terms. One option would be to delay the NDP and to increase the pace of delivery as the economy slows. However, such an approach means foregoing projects in the short term which themselves could ease inflationary pressures, with an example being increased housing supply lowering the prices of existing houses and hence rents.

Even if the current pace of NDP expenditure and delivery is to be maintained, we seek to provide guidance on how projects might be re-assessed so that the sequencing under the NDP takes fuller account of the current conditions. We focus on how the metrics employed in assessing projects – Cost Benefit Analyses and

Multi-Criteria Analyses – might be supplemented to take a fuller account of issues such as capacity constraints and more challenging climate targets.

It is one of the roles of government to set policy priorities and it is not possible for analysts to rank objectives such as housing, climate and healthcare. However, analysts can provide frameworks and approaches which aid the task of prioritisation, especially across competing projects. It is in that spirit that our recommendations are presented.

CHAPTER 2 CAPACITY CONSTRAINTS

Alan Barrett

Reference has been made in the Introduction to the capacity constraints which face the delivery of projects under the NDP. In this section, we look at this issue and consider how any acceleration of the NDP might have impacts in the economy, notably on inflation.[2]

2.1 EMPLOYEES NEEDED AND EMPLOYEES AVAILABLE

Any acceleration of the NDP will require increased numbers to be employed in delivery. At times of labour market slack – due to low participation rates or high unemployment rates – the source of the extra labour is readily identifiable. However, Ireland is currently experiencing remarkably tight labour market conditions. Before looking more closely at the current labour market, it is useful to reflect on the quantum of labour that might be needed in order to boost NDP delivery. A comprehensive exercise has not been possible under this study, but three recent studies provide helpful insights.

DPER (2021) estimates the number of construction jobs that are supported by the NDP capital programme and conclude that '80,742 construction jobs will be sustained per year as a result of public investment over the period of 2021 and 2030'. They also estimate that 'if a construction project (under the NDP) worth €10 million lasts for one year then it supports around 80 construction jobs for a one-year period'. Scaling this figure up implies an estimate of 8,000 extra construction jobs for an extra €1 billion of capital spending under the NDP, assuming the same capital-labour ratio.

The Expert Group on Future Skills Needs (2021) conducted a more focused exercise and asked how many additional construction workers would be needed to raise housing output from a level of 20,000 units in 2020 to 33,000 in 2025 and up to 40,000 in 2030. Looking at 'direct' employees and 'indirect' (which is supply-chain related), they estimate that approximately 40,000 full-time equivalent employees were required to build the 20,000 housing units and so an extra 26,000 would be needed to reach an output of 33,000 units. In order to reach 40,000 units, 80,000 employees would be needed, representing an extra 40,000 over the 2020 level. With completions having reached almost 30,000 in 2022, the extra employees now needed to reach existing targets will be lower. However, it is useful to think in terms of 20,000 employees being needed to deliver 10,000 extra housing units if

[2] We should note that while it is sometimes asserted that there is limited capacity with regard to the project management elements of infrastructural development, this is not something we address in this study.

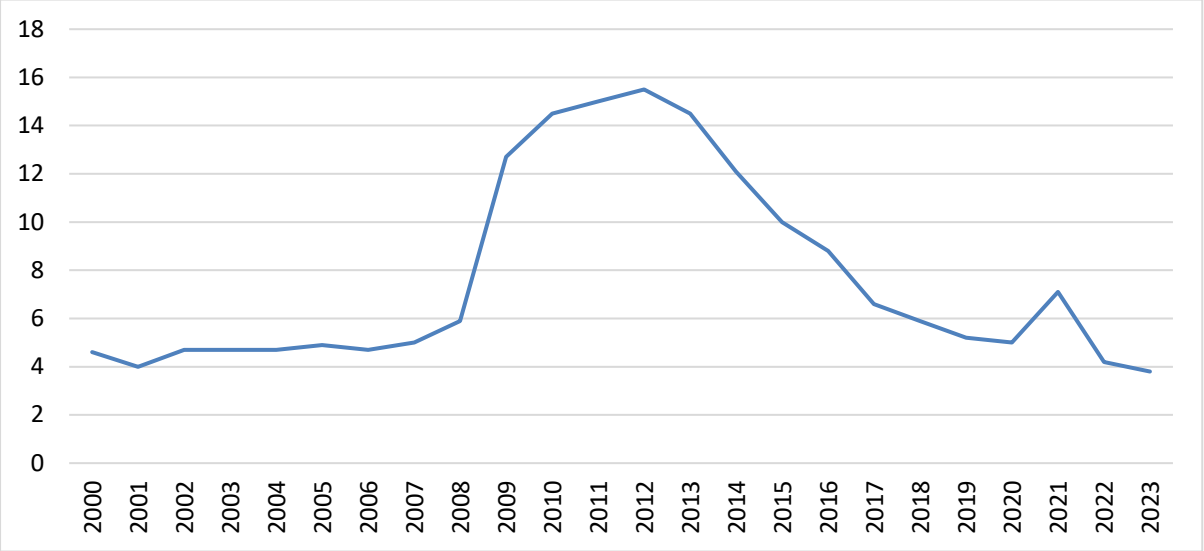
we are to move from 30,000 to 40,000 units, which may be required given the latest Census figures.

IFAC (2021) also reflect on labour constraints in construction. They estimate that an employment level of 180,000 in construction would need to be in place if the government's planned increases in capital spending were to be accommodated. They compared this to an employment level of 148,000 just prior to the onset of COVID. They also point to the low numbers of unemployed people whose last job was in construction (5,000 in 2019).

In comparing the results of the three studies, it is likely that the lower employment figures in the DPER study reflect a large mix of construction projects where many would have much higher capital-labour ratios than housing projects. Also, it is expected that a proportion of the targets on increasing housing output will be achieved outside of the NDP so the figures in the Expert Group on Future Skills Needs (2021) will not all be required for NDP delivery. However, what seems clear is that an expansion of the NDP, when combined with increased housing output through the private sector, will result in significant increases in demand for labour inputs and gives rise to the question of where the extra employees will come from. It is also important to note that the figures from both studies should be seen in the context of construction employment of about 160,000 currently.

According to the CSO, the unemployment rate has now fallen to 3.8 per cent. As shown in Figure 2.1, this is the lowest rate of unemployment recorded this century, even lower than that recorded during the Celtic Tiger years. It is uncertain as to how low the rate of unemployment can actually fall but at such low levels it is likely that the remaining group of unemployed people is largely made up of people who are experiencing frictional unemployment (moving between jobs) or structural (where skills have become obsolete and re-orientation is required).

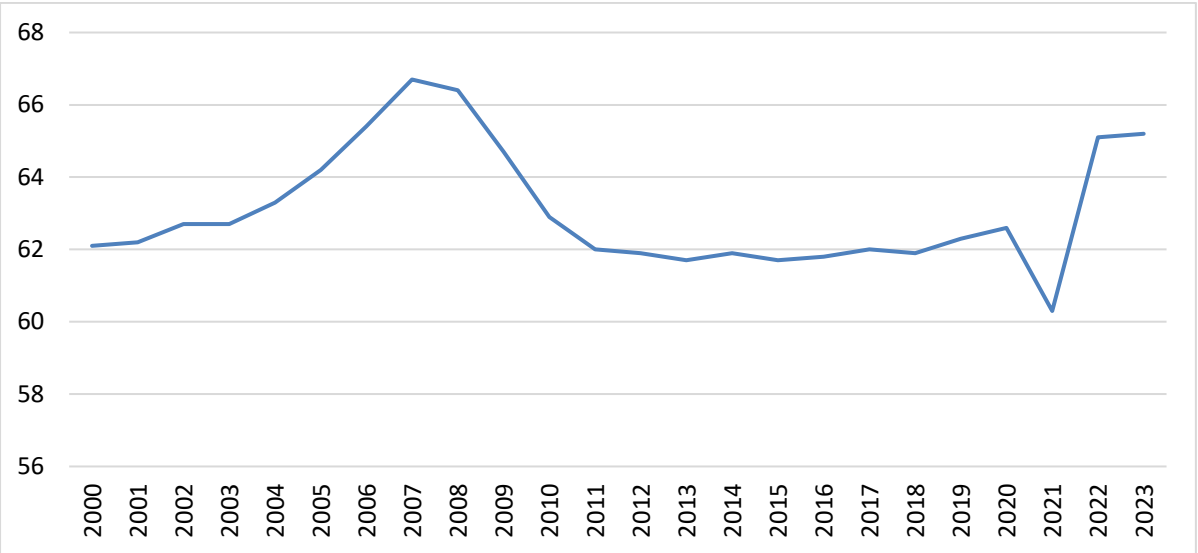
FIGURE 2.1 UNEMPLOYMENT RATE, MAY 2000 – MAY 2023



Source: Central Statistics Office.

Coming out of the COVID pandemic, there was much discussion internationally of the so-called 'great resignation' which was based on a perception of reduced labour force participation rates. This in turn had led to a suggestion that problems around labour shortages can be solved through a return to higher rates of participation. In Figure 2.2, we show the trend in participation rates in Ireland. As can be seen, although participation fell during the pandemic, the most recent figures show a participation rate of 65.2 per cent, which is well above the rates for most of the last decade and just below the highs of the immediate pre-crisis figures in 2007/2008.

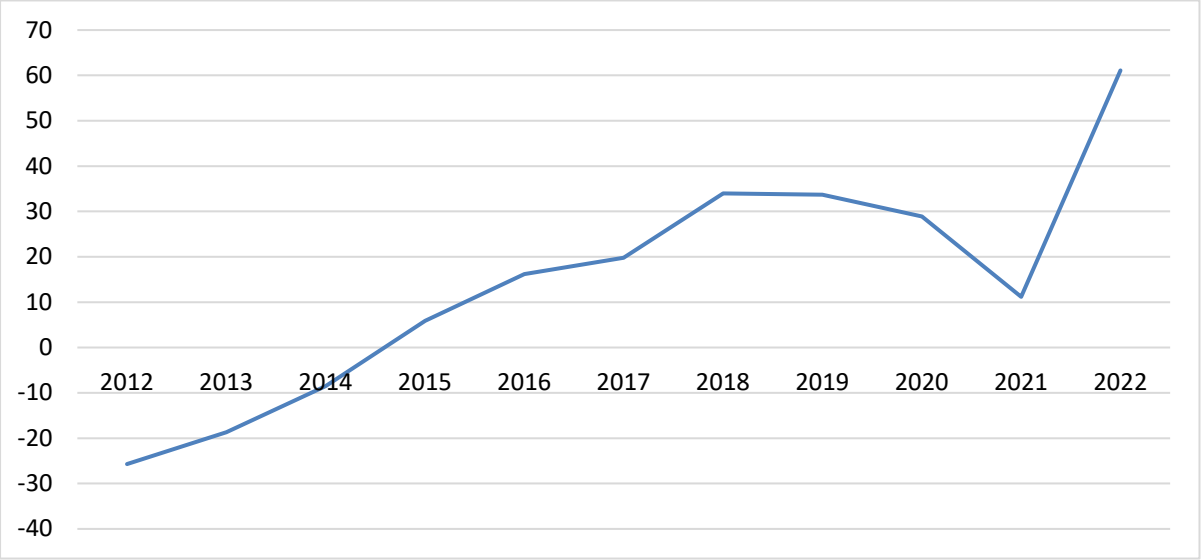
FIGURE 2.2 PARTICIPATION RATE, Q1 2000 – Q1 2023



Source: Central Statistics Office.

If falling unemployment or rising participation are unlikely to yield sufficiently large numbers of additional workers to help deliver on enhanced NDP objectives, inward migration might be another source, so it is useful to look back on recent trends. We do this in Figure 2.3. The trends in the years to April 2021 and April 2022 were impacted by the pandemic so it is possibly more helpful to focus on the years April 2015 to 2020 to get a sense of the magnitude of net inflow. The annual average net inflow between 2015 and 2020 was 23,100. Of course, one of the challenges in facilitating inward migration is the lack of housing supply.

FIGURE 2.3 NET INFLOW IN THOUSANDS TO YEAR ENDED APRIL 2012 – 2022



Source: Central Statistics Office.

2.2 A BROADER PERSPECTIVE ON LABOUR MARKET AND ECONOMY-WIDE DYNAMICS

The discussion above has tried to compare the number of extra employees that would be needed for an expanded NDP against possible sources of employees. While this yields insights, the construction sector is not a sealed entity but instead is part of the wider economy and so draws labour and other resources away from other areas as it expands, all else equal. Recognising this broader context, we will draw on two pieces of ESRI research to illustrate some broader possible labour market and economy-wide consequences of an expanded NDP.[3]

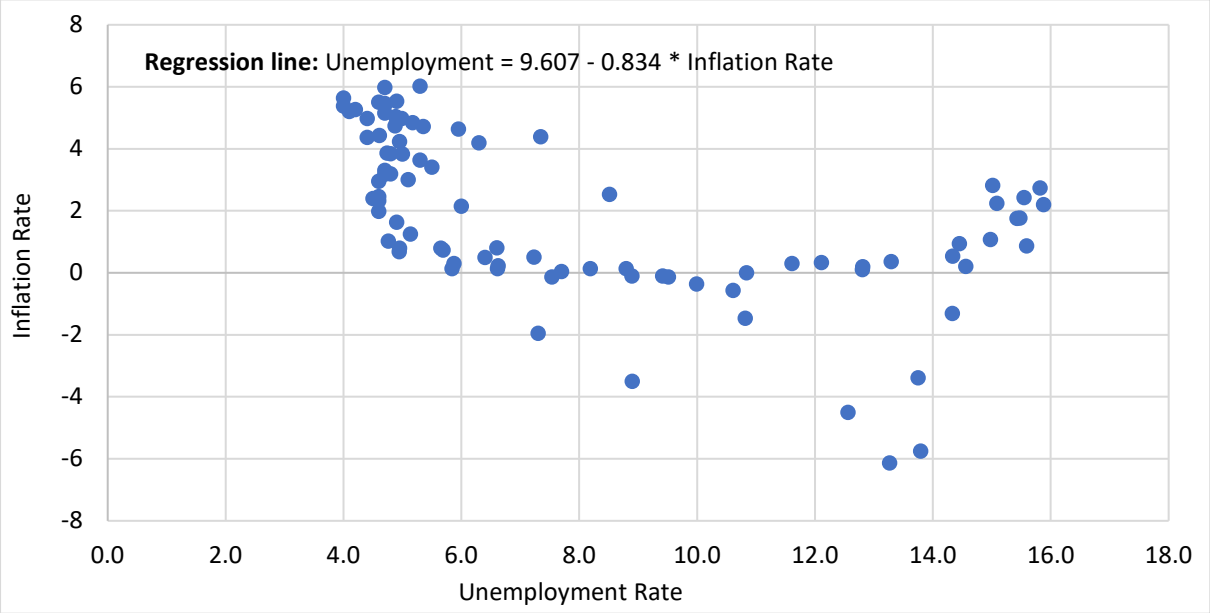
McQuinn (2022) returns to an enduring question which is the relationship between wage inflation and labour market tightness in Ireland. He begins with the observation that wage inflation has been higher in Ireland compared to the EU and

[3] We should note that as the employment growth envisaged is mostly in construction, the pool of labour is even more constrained since only a very small percentage of women work in the sector.

goes on to re-estimate a model of wage inflation which includes a term capturing deviations of the actual rate of unemployment from the non-accelerating inflation rate of unemployment (the NAIRU, which is in turn estimated).

A number of results are worth mentioning. McQuinn assumes that the NAIRU was 5.5 per cent in 2022 and is 5.3 per cent in 2023. Given that the observed rate of unemployment is now 3.8 per cent, the figures suggest that we are now in a situation of wage inflation and the simulations in the paper bear this out with wages inflation forecast to be 4.5 per cent in 2023.[4] Also of interest in the paper is a comparison of Irish inflation rates and unemployment rates over the period 1998-2019. We reproduce the relevant figure here to illustrate a key point.

FIGURE 2.4 SCATTER PLOT OF IRISH INFLATION AND UNEMPLOYMENT RATES, 1998 – 2019



Source: McQuinn (2022).

As noted by McQuinn:

> *a non-linear relationship between these two variables is apparent; there is a significant increase in the domestic inflation rate once unemployment falls below 5 per cent in the Irish labour market.*

While the analysis in the paper does model this non-linearity, Figure 2.4 raises a concern about the potential impacts on domestic inflation of the historically low rate of unemployment. But perhaps of more importance in the current context is

[4] The most recent forecasts for wage inflation in the ESRI's Summer 2023 *Quarterly Economic Commentary* (McQuinn et al., 2023) are 5 per cent and 6 per cent respectively in 2023 and 2024.

the possible inflationary impact of increased public spending in an economy with this low unemployment rate.

Broadening the perspective even further, it is useful to reflect on the analysis presented by FitzGerald and Morgenroth (2006). That report is of particular relevance to the discussion here. The ESRI team of authors had been tasked with providing an ex ante assessment of plans for a National Development Plan which was to be launched in 2008. The context was uncannily similar to the present context. Unemployment was at a historically low level (5 per cent) and yet there was a clear need for significant public infrastructural investment given the rapid economic growth of that period and consequent increases in population.

FitzGerald and Morgenroth (2006) argued that the injection of significant additional public investment expenditure into an economy which was experiencing capacity constraints would initially lead to wage inflation in construction. Workers would be bid away from other sectors of the economy and hence wages would have to rise elsewhere. The increase in wages across the economy would lead to a loss in competitiveness. All else equal, this would lead to a shift in activity from the internationally-traded part of the economy to construction.

In order to quantify the possible scale of the effects just mentioned, FitzGerald and Morgenroth (2006) conducted a simulation exercise in which they increased the size of the NDP capital spend from its then annual baseline of €8.4 billion to just under €10 billion, an increase of almost 20 per cent.[5] They found that after a five-year period, wages in the economy would be 3.7 per cent higher and, crucially, GNP would be 0.3 per cent lower. The decline in GNP was explained by a fall of 0.8 per cent in manufacturing output, reflecting the loss in international competitiveness mentioned above. It should also be noted that the simulation showed building investment prices also rising by 3.1 per cent over the five-year simulation period. This was an important finding because it illustrated how the injection of extra infrastructural spending into a constrained economy led to less output being achieved for a given level of expenditure.

Throughout their discussion, FitzGerald and Morgenroth note how the improved infrastructure envisaged under the then NDP would ultimately yield competitiveness gains through enhanced systems of transport, communications,

[5] In the Housing chapter, a COSMO-based macroeconomic simulation was presented in which the number of new dwellings was increased by 10,000. The impact on construction wage inflation was modest but the FitzGerald/Morgenroth simulation, and another simulation by Egan and Bergin discussed below, are implemented by increasing spending on housing which then leads to an increase in housing output. This latter route to implementing the shock in the macro-model leads to stronger impacts on wage inflation.

water etc. However, in spite of the clear need for enhanced investment and this recognition of the long-term benefits, it is very evident in their report that they wished to caution against any excessive increase in investment at that time. Their concerns are seen in the following quote:

> *…while there is a high rate of return to efficient investment the results presented in this chapter also suggest that the economy will have difficulty delivering the much-needed investment at a reasonable cost. While the funding may theoretically be there to close the infrastructure gap rapidly, the economy does not have the ability to produce all the necessary infrastructure over the period to 2013 without squeezing out other important economic activity. This means that any attempt to close the gap too rapidly will seriously raise the cost of the investment, reducing the potential rate of return.* (p. 72).[6]

A further economy-wide perspective can be taken from Egan and Bergin (2022 and 2023). The purpose of these two papers (where the former is a working paper version of the latter) is to document the development of a construction sector module within the ESRI macroeconomic model COSMO. In so doing, the authors present the results on a number of simulations, but we will focus on one given its direct relevance to the current topic.

Egan and Bergin assess the impact of a 5 per cent increase in government spending, where the shock is implemented in two ways. First, they look at a general increase in government spending; then they look at an increase of the equivalent size but one which is targeted at housing. The results of the two simulations are shown in Figure 2.5.

We will focus on the construction-intensive increase and the first point to notice is the increase in completions. The shock is implemented in 2021, and by 2023 completions are about 3,500 higher than in the baseline. While the increase over the baseline moderates between 2023 and 2029, completions are above the baseline throughout the projection period. The next point to note is the impact on wages in construction. These are seen to rise and so the inflationary impulse discussed above is present. However, another variable which is of interest is house prices and, as can be seen, the effect of the increase in housing supply is to reduce house prices.

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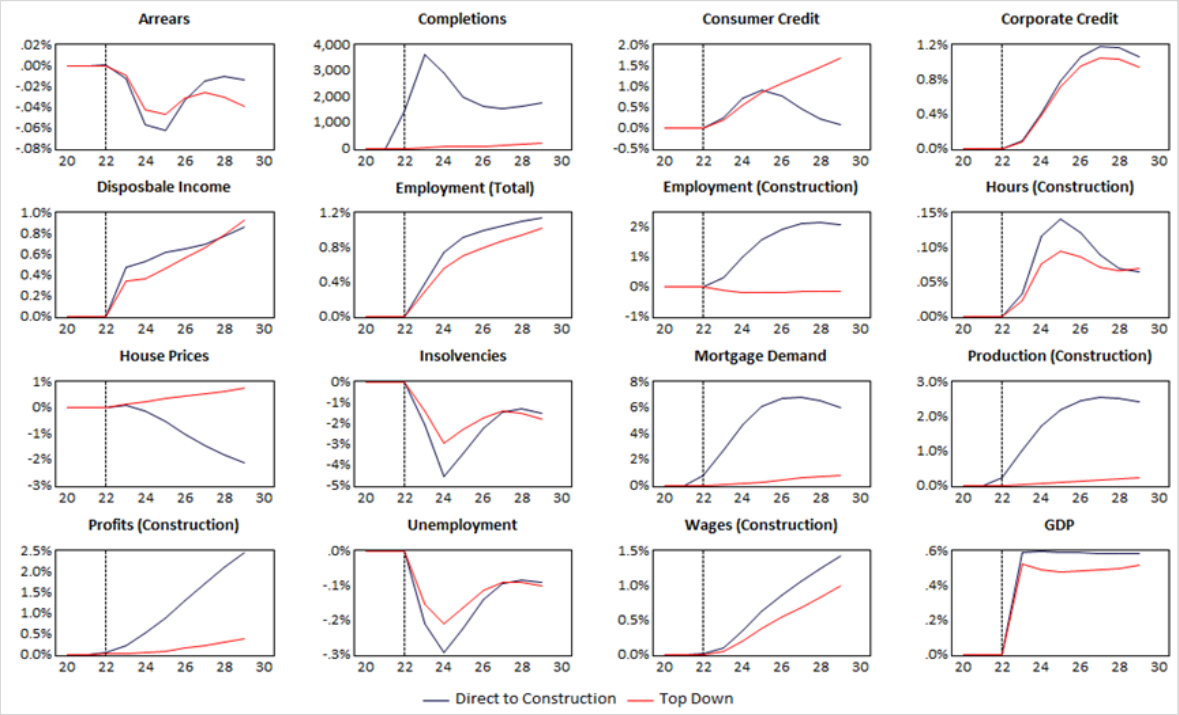
6 Another important point here is the problem experienced in the mid-2000s boom when labour supply was diverted into the construction sector and then shed rapidly, with particularly negative impacts on younger workers (see O'Reilly et al., 2019).

FIGURE 2.5 IMPACTS OF A 5 PER CENT INCREASE IN GOVERNMENT SPENDING WHERE THE INCREASE IS (A) A GENERAL INCREASE (TOP DOWN) AND (B) DIRECTED TO HOUSING CONSTRUCTION



Source: Egan and Bergin (2022).

This observed impact on house prices echoes the findings of Egan et al., 2022, (discussed in the Housing section above) which also showed how house prices react to marginal increases in housing supply. So while an increase in spending on housing can increase the costs of building through the inflationary impulse, somewhat paradoxically this can also lead to a moderation in house prices. And while a moderation in house prices would be positive in many ways including national competitiveness, it should also be noted that the fall could lead to reduced housing completions which are not directly funded by the state. It is this effect which sees the increase in completions easing after 2023 – in a sense, government-funded housing construction is crowding out private-funded activity.

Before concluding, it is important to reconsider Figure 2.4 in the context of the COSMO simulation just discussed. Macroeconomic models perform well when the simulations involve relatively modest shocks and when the baseline variables are at normal levels. As unemployment in Ireland is now at a historically low rate – and well below the critical value of 5 per cent in Figure 2.4 – it could be that non-linear reactions to shocks will arise. In the case of a fiscal stimulus the results shown in Figure 2.5 may be lower-bound estimates, and the effect of the stimulus on inflation could be greater. This is an important cautionary point.

REFERENCES

DPER (2021). *Public Capital programme 2021 – 2030: Labour Intensity of Public Investment.* Dublin: DPER. https://www.gov.ie/en/publication/dd204-public-capital-programme-2021-2030-labour-intensity-of-public-investment/.

Egan, P. and A. Bergin (2022). 'Adding a Construction Sector to COSMO: Structure and Policy Analysis'. ESRI Working Paper No. 738.

Egan, P. and A. Bergin (2023). 'The impact of government spending on Ireland's housing and residential market – Targeted vs economy-wide stimulus', *Journal of Policy Modeling,* Vol. 45 No. 3.

Egan P., E. Kenny and K. McQuinn (2022). 'Increasing future housing supply: What are the implications for the Irish economy?', Special Article, *Quarterly Economic Commentary*, Autumn, Dublin: The Economic and Social Research Institute, Winter 2022.

Expert Group on Future Skills Needs (2021). *Labour Demand Estimates for Ireland's National Housing Targets, 2021-2030.* Prepared for: Department of Enterprise, Trade & Employment.

IFAC (2021). 'Ireland's next ramp-up in public investment'. IFAC Analytical Note No. 13.

McQuinn, K. (2002). 'Forecasting Wage Inflation in the Irish Economy', Box in the ESRI *Quarterly Economic Commentary*, Summer.

Morgenroth, E. and J. FitzGerald (Eds.) (2006). *Ex-ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013.* Dublin ESRI.

O'Reilly, J., R. Grotti and H. Russell (2019). 'Are some sectors more 'youth friendly' than others? Employment regimes, sectors, and gender disparities in the Great Recession', *Hum Resour Manag J.* 2019; 29: 490-508. https://doi.org/10.1111/1748-8583.12242.

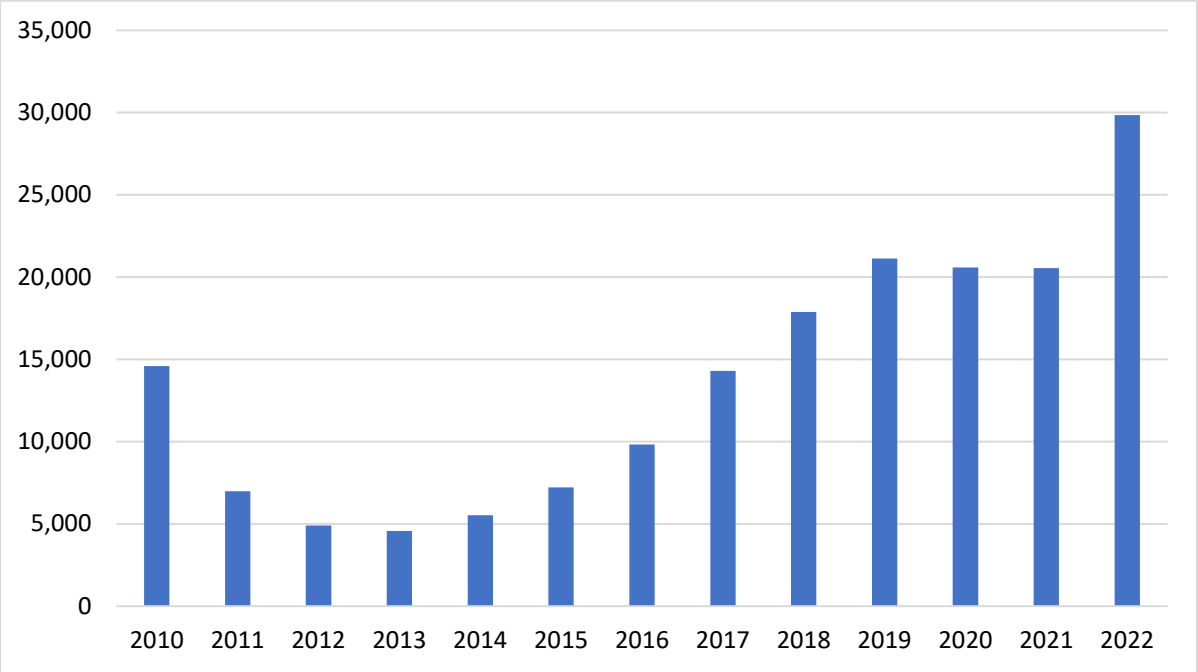
CHAPTER 3 HOUSING

Eoin Kenny and Kieran McQuinn

3.1 BACKGROUND

While housing supply in the Irish market has increased over the last number of years, it is clear from the continuous increases in rents and house prices that housing demand is still increasing at a faster pace than supply. Figure 3.1, for example, plots annual housing supply in the Irish market since 2010.

FIGURE 3.1 ANNUAL HOUSING COMPLETIONS (UNITS) 2010 – 2022

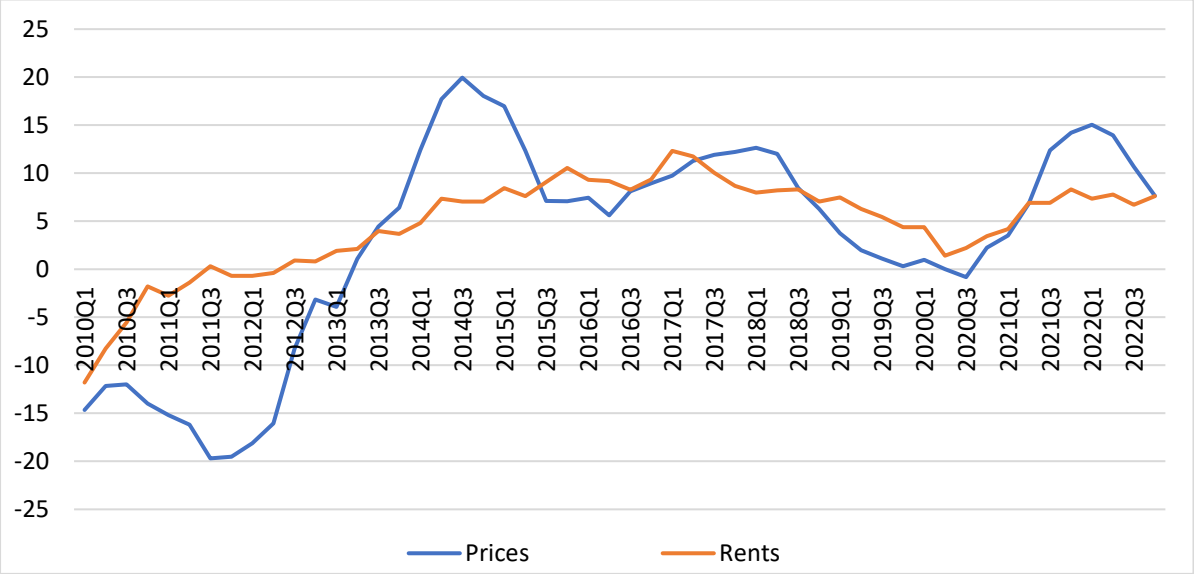


Source: Central Statistics Office.

It is clear that supply has been on an upward trajectory since 2013 when it reached a post-financial crisis low of just 4,500 units. However, as noted in Disch and McQuinn (2023; 2022), it is evident that the COVID-19 pandemic has adversely impacted the increase in supply, due to the closure of construction sites in the initial wave of public health measures in 2019/2020, and the subsequent increase in general price inflation brought about by supply-side bottlenecks in the aftermath of health measures being eased both domestically and abroad. As can be seen from the graph, housing supply levelled off in 2019, 2020 and 2021 before increasing again in 2022.

This negative impact on supply has resulted in additional upward pressures on both house prices and rent levels which can be observed from Figure 3.2, which plots the annual inflation in both.

FIGURE 3.2 ANNUAL HOUSE PRICE AND RENTAL INFLATION (%) 2010 – 2022



Source: House prices from the Central Statistics Office (CSO); rents are from the ESRI/RTB Rent Index for new tenancies.

From the chart, growth in both house prices and rents had begun to slow from mid-2018. However, the pace of inflation in both prices and rents picked up somewhat from 2021 onwards. This likely reflected the adverse impact of COVID-19 on housing supply plus the positive impact of the pandemic on housing demand. As noted in the *Quarterly Economic Commentary* (McQuinn et al., 2023), the increase in personal savings witnessed during the pandemic inevitably stimulated housing demand as it enabled people to accumulate deposits for house purchases. Therefore, the impact of the pandemic on the housing market has been two-fold; on the one hand the pandemic served to stimulate demand while on the other hand it restricted housing supply.

This impact is compounding an imbalance between housing demand and supply which existed already prior to COVID-19. For example, Bergin and Garcia-Rodriguez (2020) estimated that between 30,000 and 35,000 units are required to meet the new additions to housing demand each year due to demographic developments. The most recent level of housing supply (29,851) must be seen in that context. It should be noted that this estimate of structural housing demand will be revisited in 2023 Quarter 4 when all of the relevant demographic data from the latest Census can be incorporated. These new data will almost certainly see an increase in the estimate of structural demand. Therefore, any imbalance which previously existed will now be greater due to the higher demand estimate.

It should also be noted that the estimates of structural demand for housing are particularly sensitive to the assumptions underpinning the calculation. Conefrey and Staunton (2019) show that the estimate of demand increases from 34,000 units to 47,000 units a year if the assumption is made that headship rates[7] in Ireland approximate to those of the UK over the forecast period in question.

Other significant developments which have had implications for the housing market over the last number of years include the additional inflationary pressures fuelled by the invasion of Ukraine by Russia, which caused significant increases in energy prices. This increase in inflation has prompted monetary authorities globally to tighten monetary policy by increasing select policy rates. As a result, the European Central Bank (ECB) has increased its policy rate by 4 percentage points from July 2022 to date. As evidenced in McQuinn and O'Reilly (2008), increasing interest rates has an almost immediate impact on housing demand via an affordability channel; mortgages become more costly to service as credit institutions increase their lending rates. However, increasing interest rates also has an impact on the supply side of the housing market; higher lending rates to the construction sector will, ceterus paribus, result in higher costs for the sector and hence less supply than would have been expected in the lower interest rate environment.

3.2 KEY DEVELOPMENTS SINCE NDP 2021

3.2.1 Population and demographics

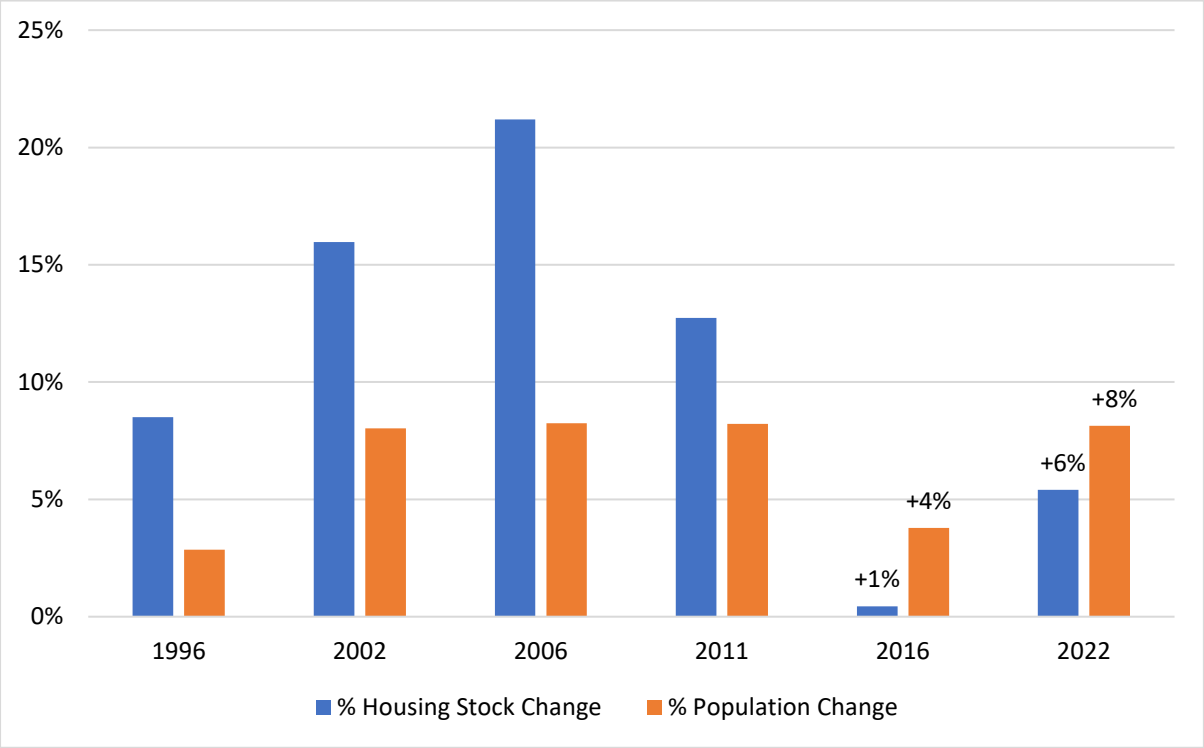
Population growth has a substantial impact on housing demand, and international migration is a key driver of population growth. Given that migration flows are sensitive to economic conditions, the strong economic environment in Ireland over the last number of years has seen increased levels of immigration. Political instability and war in the Middle East and more recently Ukraine have also led to a large inflow of refugees/asylum seekers. These factors have led to strong positive net migration since 2016.

This has a significant impact on the housing market, as immigrants tend to remain in the rental sector (Fahey et al., 2019). Therefore, demand for rental properties will be stronger since 2021 due to an inflow of immigrants. Additionally, the longer the conflict in Ukraine continues, the more likely it is for refugees to remain here permanently, as children begin school, people obtain jobs, and so on. Hence, this level of demand is likely to remain elevated. Population growth overall has been

[7] Headship rates refer to the rate of household formation. The difference in estimates underpins the need for full transparency and rigorous analysis of any assumptions made in the associated work.

higher than expected. In fact, the rate of growth of the population exceeded that of the housing stock in 2022 as can be seen in Figure 3.3.

FIGURE 3.3 CHANGES IN HOUSING STOCK AND POPULATION (%) 1996 – 2022



Source: Central Statistics Office.

The full extent of recent changes in demographic variables will only be understood when the structural demand for housing is updated.[8] While it is not possible to quantify the potential changes at this stage, it is very likely, given the preliminary data from the Census, that the revised estimates of structural demand will be somewhat larger than the existing ones.

3.2.2 Economic growth and recent global developments

Another important factor in terms of recent developments for the housing market is economic performance. The Irish economy as a whole has performed well and showed resilience over the course of the pandemic, in particular. A number of economic indicators have been stronger than expected, which leads to more demand for housing as more people seek to buy their own home, or upgrade into better quality housing.

8 In a forthcoming study by colleagues in the ESRI funded under the joint research programme between the ESRI and the Department of Housing, Local Government and Heritage, previous estimates of structural demand (see Bergin and Garcia-Rodriguez, 2020) will be updated with the latest demographic data from Census 2022.

Table 3.1 presents a summary of the main economic forecasts from the Autumn 2021 *Quarterly Economic Commentary* (*QEC*) at the time of the last NDP (McQuinn et al., 2021). These are compared with the latest estimates for the same variables from the Spring 2023 *QEC*.

TABLE 3.1 COMPARISON OF AUTUMN 2021 AND SPRING 2023 QEC FORECASTS AND ACTUAL ESTIMATES (%)

Variable	Autumn 2021		Spring 2023	
	2021	2022	2021	2022
GDP	12.6	7.1	13.6	12.0
Unemployment	16.3	7.1	16.1	4.9
GGB	-3.4	-1.7	-1.7	1.0
MDD	7.2	7.2	5.8	8.2

Source: *Quarterly Economic Commentary* Autumn 2021 (McQuinn et al., 2021).
Note: GGB = General Government Balance, MDD = modified domestic demand.

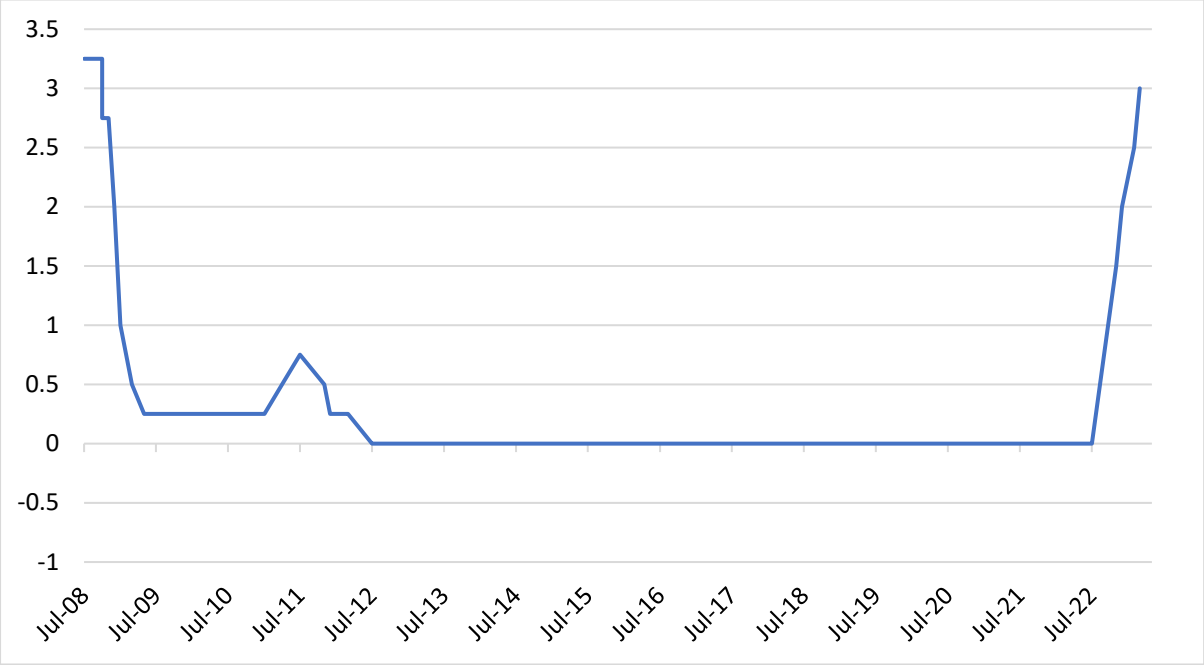
Comparing the forecasts and associated actual estimates, it is clear that the economy has performed much better through 2021 and 2022 than had been expected back in Autumn 2021. This is particularly the case with respect to the unemployment rate; in 2021 it was expected that unemployment would be over 7 per cent in 2022, however it turned out to be less than 5 per cent. Unemployment levels have been found to be a key driver of housing demand in the Irish case (Kelly and McQuinn (2014)). Lower rates of unemployment lead to greater levels of affordability and also bolster confidence in the domestic economy.

However, there are certain economic challenges that have arisen since the initial post-pandemic recovery which pose some downside risks to the economy.

As mentioned, a significant development across the globe has been elevated inflation rates and subsequent interest rate increases by many central banks, including the ECB. This higher policy rate and inflationary environment will have two direct effects. The extent of changes in the ECB policy rate can be seen from Figure 3.4 with policy rates having increased significantly in the past 12 months.[9]

[9] The full implications of changes in the ECB policy rates in terms of the domestic mortgage market can be assessed in Egan and McQuinn (2023), which examines recent trends in the 'pass-through' relationship between the ECB policy rate and mortgage market rates in individual euro area countries.

FIGURE 3.4 EUROPEAN CENTRAL BANK DEPOSIT FACILITY RATE (%) 2008 – 2022



Source: European Central Bank.

This higher set of interest rates has a number of implications for the domestic housing market. The first is that it will make it more expensive for builders and developers to obtain credit, as the higher policy rates will lead to higher borrowing rates from commercial banks and hence the cost of credit will increase. This will likely mean lower levels of housing supply compared to what would have prevailed under the previous lower interest rate environment.

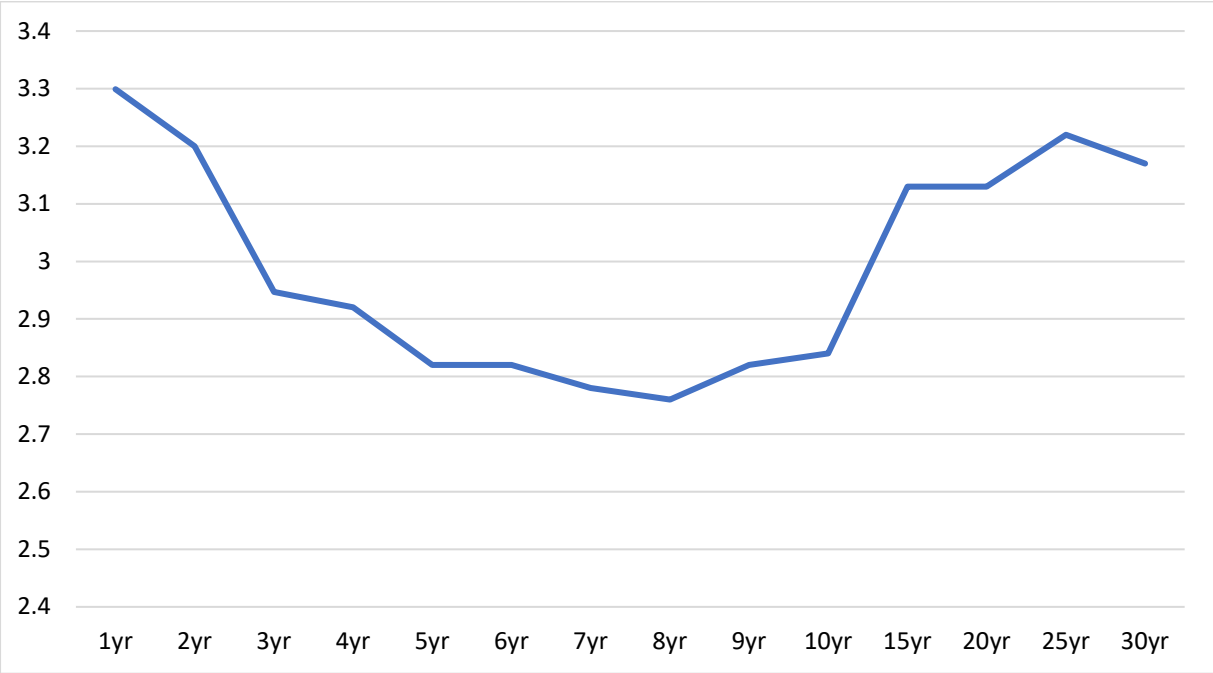
Consequently, the private market will be further limited in its ability to produce sufficient levels of housing supply.

The second effect the increased policy rates will have is on house prices. It has been recognised by some commentators that house prices have risen above the natural market price. In the *Quarterly Economic Commentary* (McQuinn et al., 2022) estimated that house prices are at least 7 per cent higher than their equilibrium level. Higher interest rates mean mortgages will become more expensive, hence demand for property purchases will likely decrease. This will exert a downward pressure on house prices.

In a higher interest environment such as the present macro-environment, it is important to look at yield curves as these affect the cost of borrowing and hence will affect investment. As noted by Furman and Summers (2020), the neutral safe real rate (the rate which maintains aggregate demand at potential output) across

countries has been consistently falling since the 1980s. Within a euro area context, the low cost of borrowing for sovereigns has also been greatly facilitated by the policies initiated and maintained by the European Central Bank (ECB) since 2012 (see Schnabel, 2020, for more on these). These policies have kept the yield curves for Member States relatively flat even in the presence of the increased borrowing necessitated by COVID-19. However, it is evident that as inflationary pressures mounted, monetary authorities globally have responded by increasing policy rates. This, in turn, has impacted market interest rates and the cost of sovereign debt. The impact for the Irish sovereign can be observed from Figure 3.5.

FIGURE 3.5 IRISH GOVERNMENT BONDS – YIELD CURVE (%) JULY 2023



Source: Bloomberg and own calculations.

Clearly, borrowing costs for the Irish sovereign have increased recently owing to the tightening generally of monetary policy. For example, McQuinn (2021) noted that the equivalent to the one-year bond price was just -0.6 per cent in April 2021; it now stands at 3.3 per cent. Therefore, it is clear that borrowing costs have increased somewhat for governments in recent years.

However, as can be seen, the Irish yield curve is inverted in long-term versus short-term maturities. An inverted yield curve in this case usually implies that investors expect lower interest rates at some point in the future; that current rates of inflation are higher than longer-term rates are likely to be. Therefore, over the medium term, borrowing costs are likely to ease somewhat.

3.2.3 Housing For All

The most significant policy development in the Irish housing market over the last number of years was the publication by the Department of Housing, Local Government and Heritage of 'Housing For All' in September 2021. In Housing For All, the Government committed to increase funding mainly for the provision of social and affordable housing, with an annual average investment in excess of €4 billion being set as the spending target. Specific targets were also set for completions, with 33,000 units per annum being pursued. This is to consist of over 10,000 social homes and 6,000 affordable homes for purchase or rent.

Both the National Development Plan and Housing For All also set out other areas through which supply can be increased, such as the vacant housing stock and addressing land market difficulties. The document outlines several measures, such as providing State lands to the Land Development Agency (LDA) to bring forward housing units, and funding Local Authorities for land acquisition. Additionally, the Croí Cónaithe fund was established to service sites for new homes in regional towns and villages, but also to support refurbishment of vacant housing. Vacant property taxes are also discussed to incentivise individuals to bring vacant houses onto the market for rent/sale.

A key policy target within Housing For All is that of 33,000 units per annum. It now appears likely with more up-to-date demographic data and given the increase in inward migration particularly associated with the war in the Ukraine, that this figure is too low and will likely be revised upwards.

3.3 NEW RESEARCH INSIGHTS

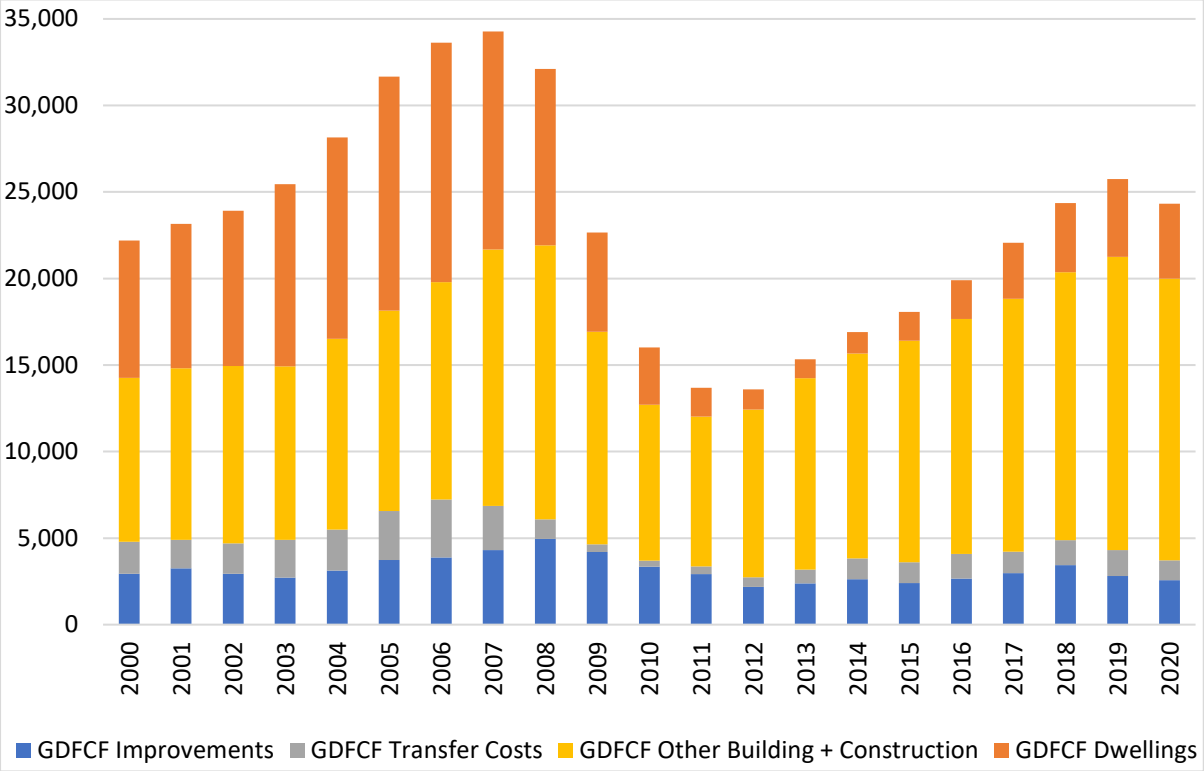
In a paper published by Egan et al. (2022), the possible challenges facing significant increases in housing supply are examined. Some policy proposals are also put forward. A number of possible constraints are identified in the paper: labour supply in the construction sector; the increase in input costs due to recent inflationary pressures; and funding of private sector development. The paper also examines the macroeconomic effects of the substantial increase in construction activity required.

3.3.1 Labour supply

Recent commentary has made note of the low unemployment rate and resulting tight labour market in Ireland. With a fixed amount of labour available, this may be a constraint on increasing housing completions, given that people can only work on so many projects in a given time. However, it is shown in Egan et al. (2022) that

levels of investment into 'other building and construction'[10] have been much higher than that of dwellings (e.g. offices, hotels, etc.).[11] Some evidence of this can be observed from Figure 3.6 which charts investment by sector in the Irish economy.

FIGURE 3.6 BREAKDOWN OF INVESTMENT (€000) IN THE IRISH ECONOMY, 2000 – 2020



Source: Central Statistics Office.

This indicates that there is a higher level of construction activity in the non-residential side of the sector compared to the residential side. If resources and activity could be allocated to the residential side of the market, it would alleviate some of the constraints posed by the tight labour market. This would increase the speed of delivery of additional residential housing supply. Egan et al. (2022) contains some scenario estimates as to how many workers could possibly be re-orientated from the non-residential construction sector to the residential one.

The shift towards hybrid working models and more flexible arrangements will likely have an adverse impact on the demand for office space in the future. This presents an opportunity for shifting labour resources away from office construction to the

10 'Other building and construction' refers to the building of offices, hotels, bridges, roads, and so on.

11 Investment is measured by Gross Domestic Fixed Capital Formation, which is defined as 'acquiring buildings and machinery to produce more goods'. See: Capital Formation and Fixed Assets - CSO - Central Statistics Office.

residential side of the sector. For example, the skills and resources required for office-building and apartment-building are relatively similar.

Another area in which to target labour supply is through migration. The level of immigration from non-EU countries has been significantly higher in recent years than has historically been the case. It has been suggested by Egan et al. (2022) that certain construction skills be added to the Critical Skills Employment Permit (CSEP) to facilitate certain types of inward migration. This has been successful in attracting ICT, health and engineering professionals in the past and hence could be a means of increasing the labour supply in the construction sector.

Other labour supply policies include increased supply and affordability of childcare as well as further expansion of apprenticeship programmes in construction-related trades.

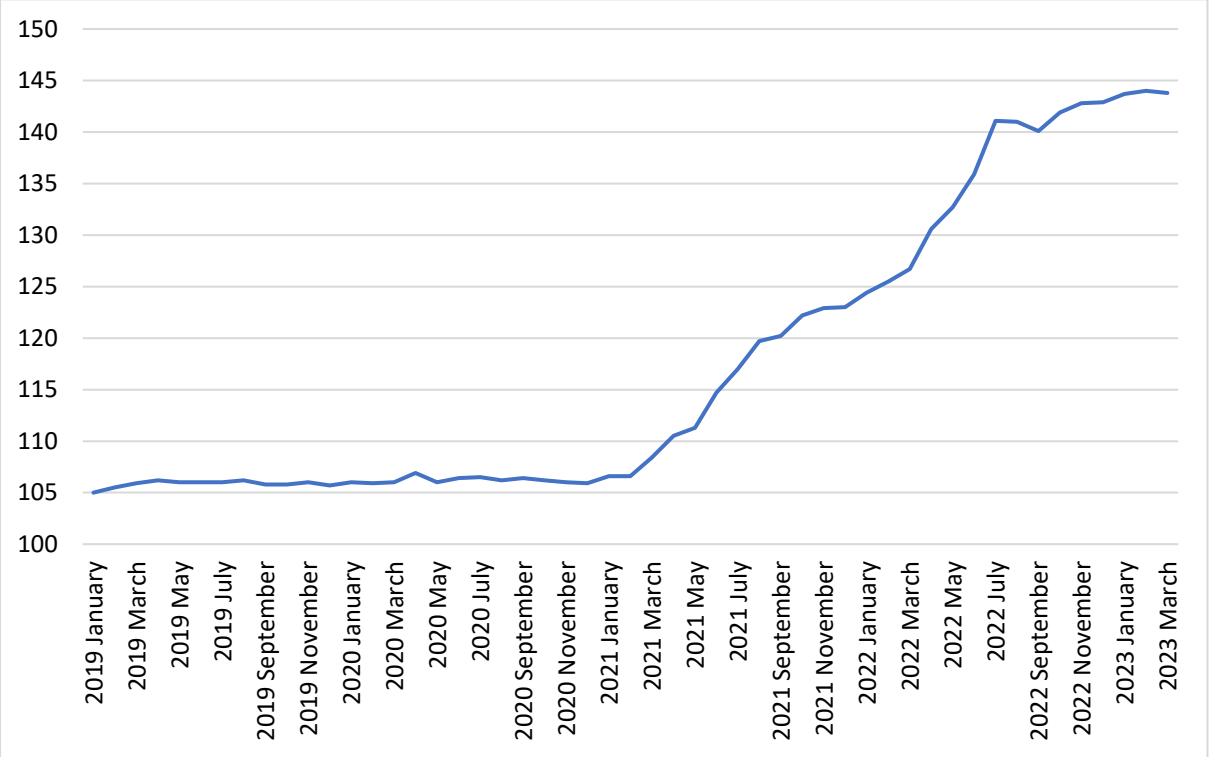
3.3.2 Input costs

Another challenge to the construction sector that has become particularly pressing in the last few years is the cost of inputs. The damage to global supply chains after the pandemic gave rise to bullwhip effects when COVID-19 abated and economies began to recover. Bullwhip effects are a supply chain phenomenon where errors in assessing consumer demand are amplified through supply chains. When demand spiked in the aftermath of COVID-19, supply chains were unable to adjust accordingly, leading to price increases.

As a result, the prices of materials for building and construction rose sharply throughout 2021. This index remains elevated compared to pre-COVID levels. If prices of these materials remain stable, it will give some certainty to the sector as to the cost and viability of projects. On the other hand, if more supply-side shocks were to occur causing further uncertainty surrounding prices of materials, it would pose further challenges to housing supply.

The wholesale price index for buildings and construction is shown in Figure 3.7.

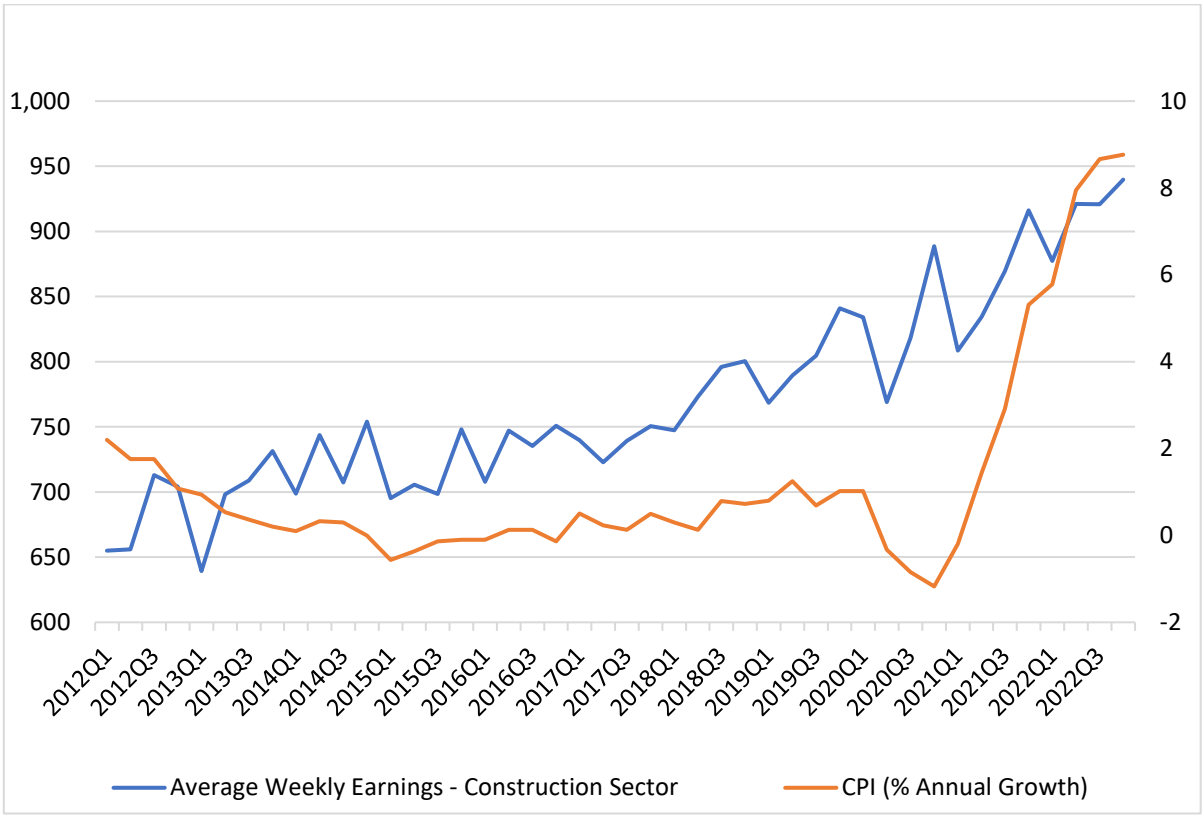
FIGURE 3.7 WHOLESALE PRICE INDEX FOR BUILDING AND CONSTRUCTION MATERIALS, 2019 – 2023



Source: Central Statistics Office.

Another important input cost potentially affected by inflation is wages in the construction sector. Average weekly earnings in the sector have been increasing steadily over a number of years now, however recent inflationary pressures have seen these increases become more pronounced. This is shown in Figure 3.8. Ahern-Flynn et al. (2021) estimate that demand for employment in the construction sector could reach 60,000 workers a year by 2025 due to the need for increased housing supply, which will increase labour demand. Therefore it is likely that this trend of increasing wages will continue.

FIGURE 3.8 AVERAGE WEEKLY EARNINGS (€) AND THE RATE OF INCREASE IN THE CPI (RIGHT HAND-SIDE) 2012 – 2022



Source: Central Statistics Office.

A recent report by the Department of Housing, Local Government and Heritage (2023) appraises the costs of construction for house and apartment developments, in Ireland with comparable EU countries. Comparisons are conducted under a number of different scenarios. Crucially, it would appear that costs do not appear to be out of line in the Irish market for apartment developments; however they do appear to be somewhat higher for housing construction. This may be due to scale effects, particularly when compared with the UK property market.

3.3.3 Macroeconomic impacts

Egan et al. (2022) also use COSMO (Bergin et al., 2017), the ESRI macroeconomic model to assess the economy-wide implications of a significant increase in housing investment. One area which is of particular concern is the possibility of increased investment activity pushing up wages, which could in turn lead to higher inflation. This impact can really only be examined with a general equilibrium macroeconomic framework such as COSMO. Another important consideration is the impact of increased housing investment on house prices themselves. COSMO is used to measure these effects.

COSMO's baseline projection for completions over the 2022-2030 period is approximately 25,000 units per annum. Therefore, a representative shock is applied by increasing the number of dwelling completions by 10,000 units. Egan et al. (2022) use this to proxy for the effect of housing supply equalling the structural demand for housing.

Overall, their results suggest that an increase in housing output of 10,000 would increase construction wages by approximately 1 per cent in the long run. This is a relatively small effect, particularly considering the current inflationary and interest rate environment. That suggests that increasing housing output to 35,000 units per annum due to a larger scale of investment would not lead to significant wage inflation in the sector.[12]

Employment both in the construction sector and overall economy would increase as a result of the increased housing supply. Most importantly, house prices are estimated to decrease by over 10 per cent over eight years due to the increased supply. This is due to the large increase in the number of housing completions, which overrides the possible inflationary effects on prices of increased employment and income. In Figure 3.9, the impulse response functions for a set of key macroeconomic variables as estimated by the COSMO model are shown; these highlight the impact on each variable of an increase in the housing stock of 10,000 units.

12 In Chapter 2 'Capacity constraints', another simulation exercise is reported upon where a 5 per cent increase in government spending is directed at housing and larger effects on construction wage inflation are found.

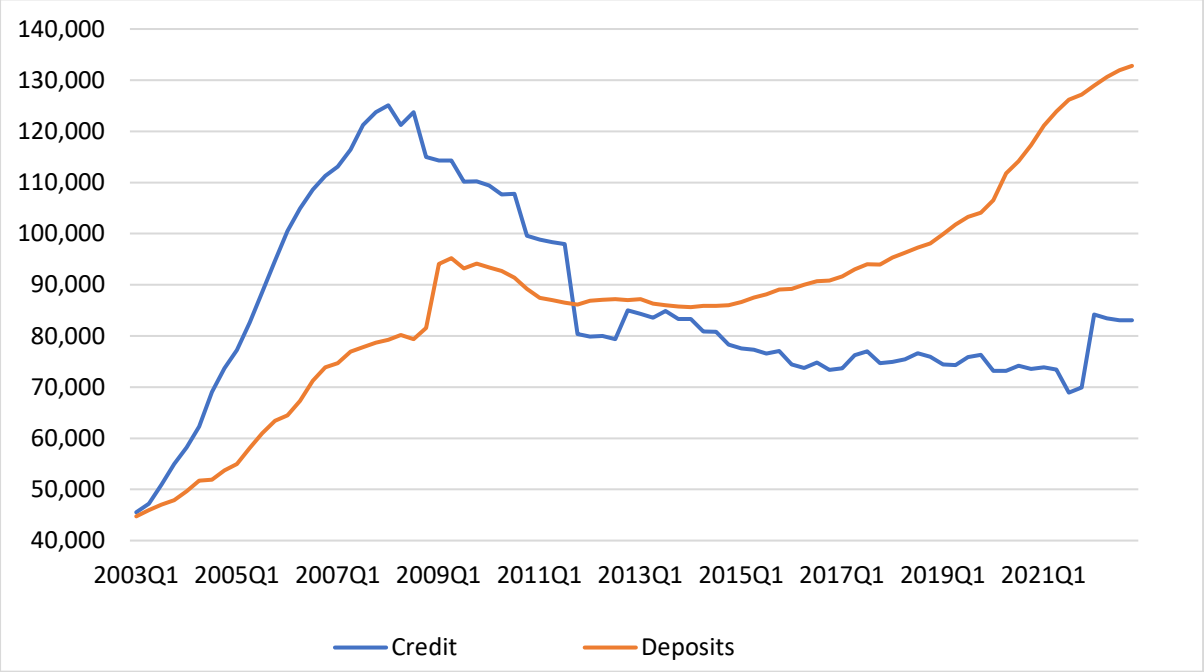
FIGURE 3.9 RESPONSE OF KEY MACROECONOMIC VARIABLES TO A 10,000 UNIT SHOCK TO NEW DWELLING COMPLETIONS

Source: COSMO Model and author's calculations.

3.3.4 Funding

Another significant potential constraint particularly for private housing construction is funding. Since the financial crisis in 2008, Irish financial institutions have to rely on traditional deposits as their main source of funding, whereas before the financial crisis they could use a range of alternative funding sources such as international wholesale deposits as well. This means that a significant increase in the level of deposits would be required to fund a sizeable expansion in bank level credit. This, as well as the macroprudential rules (increased LTVs, LTIs, etc.) introduced in the domestic market and higher levels of capital required for a given level of funding, brought about by changes in international regulatory requirements, means there are significant question marks concerning the potential for the domestic financial system to fund the expansion in housing activity required to meet the underlying demand in the market. This lower level of available credit coupled with increases in interest rates as well as increases in input costs in recent years, as discussed above, has caused the sector to voice concerns about the viability of potential projects.

FIGURE 3.10 TOTAL CREDIT FOR HOUSE PURCHASES ISSUED TO IRISH HOUSEHOLDS AND TOTAL DEPOSITS OF IRISH HOUSEHOLDS (€ MILLION) Q1 2003 – Q1 2023



Source: Central Bank of Ireland.

The changing relationship between total credit issued to and deposits of Irish households over the period 2003–2023 can be observed from Figure 3.10. In the period preceding 2007, credit for house purchases increased sharply as Irish financial institutions increased their exposure to the property market substantially. This was somewhat in excess of the existing deposit base in the Irish financial system and was mainly funded by Irish banks borrowing from foreign financial institutions. However, after the great financial crisis (GFC), there has been a sharp decline in credit extended for house purchases while deposit levels have grown. This highlights the relatively constrained nature of residential mortgage lending in the Irish financial sector at present.

3.4 RECOMMENDATIONS/CONCLUSIONS

Based on their analysis, Egan et al. (2022) offer a number of recommendations. Firstly, it is clear that the State will have to continue to commit significant funds towards the provision of social and affordable housing over the medium term. This is mainly due to the funding difficulties incurred by the domestic financial sector in providing the requisite level of credit to facilitate the level of housing investment required. While greater levels of Government investment in the economy may sometimes end up crowding out private investment, in the case of the housing market Egan et al. (2022) suggest that it could actually result in crowding in, with Government funding enabling greater levels of private investment than would otherwise be the case. Therefore, an important consideration for any government

going forward is how much of a direct role it will play in providing social and affordable housing.

Another area which could be particularly targeted is that of vacant homes. There are over 83,662 vacant homes across the country according to Geodirectory Ireland's residential buildings report in Q4 2022. A large proportion of these vacant homes may represent units that could be added to the housing stock quickly, with a lower requirement of labour and materials. It should be noted that these vacant homes are disproportionately spread, with more vacant units in rural areas. However, there is a shortage of supply throughout the country, hence bringing these units into use would be beneficial to the market and would indeed aid in regional development. Additionally, certain assessments regarding the condition of these units as well as the timeliness of delivery would need to be considered, but vacant/derelict units are an opportunity to increase supply in the short term. Recent policy initiatives such as Croí Cónaithe, as well as the purchase and development of these properties by local authorities, should facilitate greater supply from this source.

Improvements in productivity could also yield greater housing supply. The benefits of increasing the number of units produced with a given level of resources are clear and it is possible with some modern methods. One such method is the building of factory-built/modular homes. This refers to houses that are made in factories off-site. The different elements of the house are then transported and assembled on-site. This method requires much less labour, produces housing units approximately 50 per cent faster than traditional methods and is typically 10-20 per cent cheaper (Eastman and Sacks, 2008; Hussein et al., 2021; MacAskill et al., 2021). This method also ensures a factory-standard house that can be quality-assured. The carbon footprint of these houses is much smaller than traditional houses due to much less waste and higher energy efficiency (Hussein et al., 2021). Finally, these houses can be mass-produced, which could see the delivery of a high volume of housing in a short space of time (Murray, 2018). Alternative methods and materials should be examined to increase the productivity of the construction sector.

To ensure the effectiveness of such schemes more information is required, for example in terms of the number of units required to make the approach cost-effective, as well as certain structures that would need to be put in place. Nevertheless, evidence is available in an international context, (Hussein et al., 2021; MacAskill et al., 2021) to suggest that such an investment would yield benefits in generating greater housing supply. Recently, Department of Housing, Local Government and Heritage and Department Enterprise, Trade and Employment (2023) published a report examining the use of modern methods of construction (MMC) in the delivery of public housing. Amongst other issues

assessed, the report focusses on the role that public procurement can play in enabling greater use of MMC in public housing delivery.

Finally, in generating greater levels of housing supply, two areas which require reform are planning and the land market. Sweeney (2022) outlines key difficulties and highlights the negative impact of volatility in the land market in the past. A key recommendation from Sweeney (2022) is that a national agency such as the Land Development Agency be used to acquire and regulate the use of land for residential development. Such a body would have the capacity to acquire both public and private land and develop the land for residential purposes. This would result in the speculative component of land prices being greatly reduced resulting in a potentially sizeable reduction in a key cost of housing construction. It would appear that this is one area where domestic policy could have a significant impact on the cost of building a house over the medium term.

In terms of Ireland's planning system, it is more complex than European norms, with a four-step system with both appeals and judicial review processes. It has also become a concern that An Bord Pleanála, the State planning agency, is substantially under-resourced. The government has, however, passed a bill which seeks to reform the planning system considerably – the Planning and Development Bill.

REFERENCES

Ahern-Flynn, H., G. Brady and F. O'Brien (2021). *Quarterly Economic Outlook Q4 2021 – IBEC*. Irish Business and Employers Confederation (IBEC).

Bergin A., N. Conroy, A. Garcia-Rodriguez, D. Holland, N. McInerney, E. Morgenroth and D. Smith (2017). 'COSMO: A new Core Structural Model for Ireland', Working Paper WP553, Economic and Social Research Institute.

Bergin A. and A. Garcia-Rodriguez (2020). *Regional demographics and structural housing demand at a county level*, Research Series, Economic and Social Research Institute (ESRI) No. RS111.

Conefrey T. and D. Staunton (2019). 'Population Change and Housing Demand in Ireland'. Central Bank of Ireland Economic Letter Vol. 2019, No. 14.

Department of Housing, Local Government and Heritage and Department Enterprise, Trade and Employment (2023). *Roadmap for increased adoption of Modern Methods of Construction in Public Housing delivery*.

Department of Housing, Local Government and Heritage (2023). *Residential Construction Cost Study Report*, May 2023.

Disch W. and K. McQuinn (2022). *Macro-economic outlook and housing trends, Society of Chartered Surveyors*, Construction and QS conference, 22nd November, Merrion Square, 2022.

Disch W. and K. McQuinn (2023). *Enabling a more sustainable housing system, Public and Private Sector Housing Conference*, 27 April, Online conference, 2023.

Eastman, C.M. and R. Sacks (2008). 'Relative Productivity in the AEC Industries in the United States for On-Site and Off-Site Activities', *Journal of Construction Engineering and Management*, 134, 517-526. https://doi.org/10.1061/(ASCE)0733-9364(2008)134:7(517).

Egan P. and K. McQuinn (2023). 'Interest rate pass-through in Euro Area mortgage markets: The long shadow of the great financial crisis', Paper to the annual meeting of the Irish Economics Association, 4-5 May, Athlone, 2023.

Egan P., E. Kenny and K. McQuinn (2022). 'Increasing future housing supply: What are the implications for the Irish economy?', Special Article, *Quarterly Economic Commentary*, Autumn, Dublin: The Economic and Social Research Institute, Winter 2022.

Fahey, É., H. Russell, F. McGinnity and R. Grotti (2019). *Diverse neighbourhoods: an analysis of the residential distribution of immigrants in Ireland* (Report). ESRI and the Department of Justice and Equality. https://doi.org/10.26504/bkmnext376.

Furman, J. and L. Summers (2020). *A Reconsideration of Fiscal Policy in the Era of Low Interest Rates*, Brookings Institute, Discussion Draft.

Geodirectory Ireland (2022). *Residential Buildings Report Q4 2022* (Report). Available at: https://www.geodirectory.ie/knowledge-centre/reports-blogs/geodirectory-residential-buildings-report-q4-2022.

Hussein, M., A.E.E. Eltoukhy, A. Karam, I.A. Shaban and T. Zayed (2021). 'Modelling in off-site construction supply chain management: A review and future directions for sustainable modular integrated construction', *Journal of Cleaner Production*, 310, 127503. https://doi.org/10.1016/j.jclepro.2021.127503.

Kelly R. and K. McQuinn (2014). 'On the hook for impaired bank lending: Do sovereign-bank inter-linkages affect the net cost of a fiscal stimulus?', *International Journal of Central Banking*, Vol. 10, No. 2, pp. 95-128.

MacAskill, S., S. Mostafa, R.A. Stewart, O. Sahin and E. Suprun (2021). 'Offsite construction supply chain strategies for matching affordable rental housing demand: A system dynamics approach', *Sustainable Cities and Society*, 73, 103093. https://doi.org/10.1016/j.scs.2021.103093.

McQuinn K. and G. O'Reilly (2008). 'Assessing the role of income and interest rates in determining house prices', *Economic Modelling*, Vol. 25 pp.377-390.

McQuinn K. (2021). 'With 'g' greater than 'r', should we be borrowing to increase Irish housing supply', Special Article, *Quarterly Economic Commentary*, Autumn, Dublin: The Economic and Social Research Institute, Summer.

McQuinn, K., C. O'Toole, E. Kenny, E. Shiel and W. Disch (2022). *Quarterly Economic Commentary* Winter 2022. The Economic and Social Research Institute.

McQuinn, K., C. O'Toole, E. Kenny, E. Shiel and W. Disch (2023). *Quarterly Economic Commentary* Spring 2023. The Economic and Social Research Institute.

Murray, P. (2018). *Factory-made Housing: a solution for London?* New London Architecture, London.

Schnabel I. (2020). 'The ECB's response to the COVID-19 pandemic'. Remarks by Isabel Schnabel, Member of the Executive Board of the ECB, at a 24-Hour Global Webinar co-organised by the SAFE Policy Center on 'The COVID-19 Crisis and Its Aftermath: Corporate Governance Implications and Policy Challenges' available online at: https://www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200416~4d6bd9b9c0.en.html.

Sweeney R. (2022). 'Tasc report on land and housing', Tasc, Dublin. Available online at:https://www.tasc.ie/assets/files/pdf/tasc_report_on_land_and_housing.pdf.

CHAPTER 4 ENERGY

Pranav Kakkar, Niall Farrell, Muireann Lynch

4.1 BACKGROUND AND CONTEXT

Ireland is committed to a 51 per cent reduction in greenhouse gas emissions by 2030 (Government of Ireland, 2021a; 2023). In the pursuit of these objectives, Ireland's Climate Action Plan (CAP23; Government of Ireland, 2023) establishes that up to 80 per cent of electricity will be generated using renewable energy by 2030. To achieve these objectives, CAP23 and the National Development Plan (Government of Ireland, 2021a) identify a number of strategic targets with respect to the energy sector. Specifically, these include:

- An additional 2 GW (Gigawatt) capacity of conventional electricity generation;[13]
- At least 5 GW offshore wind capacity;
- 9 GW total onshore wind capacity;
- 8GW total solar photovoltaic (solar PV) capacity;
- the upgrade of 500,000 dwellings to at least a B2 Building Energy Rating (BER).

4.2 REQUIREMENTS TO REACH TARGETS

This chapter will first consider the additional economic activity required to 2030 to achieve the targets outlined. We then compare these requirements to indicators of Irish industrial capacity. Separately, we will investigate capacity additions in relation to onshore wind, offshore wind, solar PV, conventional generation capacity and energy efficiency. For each item, we first investigate the capital investment required, followed by the labour requirement. We consider the additional industrial activity in the context of available economic capacity. The following sections will outline the findings of these calculations, with workings provided in the appendix.

4.3 ONSHORE WIND

4.3.1 Capital investment requirement

CAP23 outlines a target to reach 9 GW total onshore wind capacity by 2030. As of year-end 2022, there was an installed capacity of 4.4 GW onshore wind in Ireland.[14]

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13 Aside from climate objectives, the energy sector requires investment in conventional generation capacity to ensure power system flexibility and security of supply. An investment of 2GW of gas-fired generation is anticipated (CAP21, p. 96 and CAP23; Government of Ireland, 2023).

14 https://www.oireachtas.ie/en/debates/question/2023-05-31/12/.

As such, there is a remaining target of approximately 4.6 GW.Table 4.1 summarises the likely capital investment required to meet onshore wind targets, drawing on a number of sources contained within the literature. We assume that present-day costs prevail between now and 2030.[15] Total investment is expected to be in the region of €9.63 billion, with €2.65 billion retained in the Irish economy. The majority of this is likely to be spent in the construction sector.

TABLE 4.1 CAPITAL INVESTMENT REQUIRED TO MEET 9GW ONSHORE WIND TARGET, 2023 – 2030

Total Investment		
Scenario	**Cost €/kW**	**€ (billion)**
Weighted average	1,509.39	6.943
5th percentile (Low)	1,048.11	4.82
95th percentile (High)	2,029.26	9.33
Ireland (IRENA estimate)	2,092.5	9.63
Expenditure retained in Ireland	575	2.65

Sources: IRENA (2022), WEI (2021)
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

4.3.2 Labour requirement

While it is useful to understand the expenditure that will take place in the construction sector, it is also useful to quantify the employment required to meet these targets. Table 4.2 shows that, to meet the Irish target of 9 GW, at least 5,152 full-time equivalent (FTE) construction workers will be required directly between 2023-2030. An expected mean value of 14,720 is observed. It should be noted that this is direct employment only; indirect or induced employment created by this stimulus is not considered in these estimates.

TABLE 4.2 FTE EMPLOYMENT CREATED IN IRELAND TO MEET ONSHORE WIND TARGET, 2023 – 2030

Scenario	FTE/MW	Total Irish employment (9GW)
Mean	3.2	14,720
Low	1.12	5,152
High	6.1	28,060

Sources: IRENA (2022)
Note: The Total Irish e mployment has been estimated by multiplying FTE/MW (full-time equivalent per Megawatt) with Onshore wind target of 9GW.

15 While there may be cost reductions due to efficiency and learning by doing, there may also be short-term inflationary pressures due to supply constraints. We, therefore, assume constant costs as a central estimate, with lower bound values providing insight should cost reductions be expected.

4.4 OFFSHORE WIND

4.4.1 Capital investment requirement

Ireland's 2023 Climate Action Plan sets a target of at least 5 GW offshore wind capacity. We exclude the proposed 2 GW of additional offshore capacity for hydrogen production in this estimation to provide a lower bound calculation. Drawing on estimates observed in the literature, the total investment required to meet the offshore wind targets could range from €8 billion to €32 billion (see Table 4.3). Assuming Irish costs are similar to costs experienced in the UK context, expected investment comes to approximately €14 billion.

TABLE 4.3 CAPITAL INVESTMENT REQUIRED TO MEET 5GW OFFSHORE WIND TARGET, 2023 – 2030

Total Investment		
Scenario	**Cost €/kW**	**Total cost (€ billion)**
Global Mean	2,657.94	13.28
Europe		
Low	1,728.87	8.64
Mean	2,580.75	12.90
High	6,432.81	32.14
UK	2,843.01	14.21

Sources: IRENA (2022); IRENA Renewable Cost Database.
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

To approximate the investment retained in the Irish economy, we exclude foundation/turbine manufacture and installation costs. The Appendix shows that these costs are likely to fall between €1.47 – €8.36 billion. Our preferred range is €2.42 billion to €3.69 billion, corresponding to UK cost data.[16]

4.4.2 Labour requirement

Leahy et al. (2020) provide an estimate of employment inputs required to serve 3.5GW of offshore wind capacity in Ireland. Installation activities are most likely to involve Irish industry. Excluding manufacturing, transport and logistics (much of which is likely to be served by international vessels) and operational/ decommissioning expenditures, this suggests that approximately 2.056 FTE[17]/MW may be created in the offshore wind sector in Ireland. Scaling this to a 5GW installation requirement, approximately 10,280 FTE may be required in Ireland between 2023 and 2030.

16 Authors' calculations using IRENA (2021) and Lorenczik (2020) data. See Appendix for further details.
17 FTE: full-time equivalent.

4.5 SOLAR PV GENERATION

4.5.1 Capital investment requirement

CAP23 states a target of achieving 8GW of electricity generation by Solar PV by 2030. The Irish Solar Energy Association reports that approximately 680MW solar capacity has been installed by 20 June 2023.[18] We therefore consider the installation of an additional 7.32 GW in this scenario.

Table 4.4 estimates the likely range of potential installation costs for solar PV, with further calculation details in the Appendix. Taking Irish capital cost estimates as our preferred value, the total installed cost of achieving our solar PV targets is expected to be in the region of €7.26 billion.

As with other renewable energy technologies, much of the manufacturing activity will take place outside of Ireland. Analyses by IRENA (2022) show that construction and installation comprise c.28 per cent of the total capital cost. The final column of Table 4.4 shows the proportion of the total investment that is likely to be retained in Ireland, given this breakdown. It is estimated that c.€2.032 billion will be retained in the Irish economy over the 2023 – 2030 period.

TABLE 4.4 CAPITAL INVESTMENT REQUIRED TO MEET AN ADDITIONAL 7.32GW UTILITY-SCALE SOLAR PV, 2023 – 2030

Total Investment Cost Scenario	Cost €/kW	Total cost (€ billion)	Retained in Ireland (€ billion)
Ireland	992.31	7.26	2.032
Global			
Low	531	3.886	1.088
Mean	797	5.834	1.634
High	1843.26	13.492	3.777

Sources: IRENA (2022); IRENA Renewable Cost Database.
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

4.5.2 Labour requirement

Buyens et al. (2021) survey employment required for solar PV deployment, finding that the average direct labour intensity is 4.2 FTE/MW for installations in Western Europe. Using these numbers, we estimate a total employment requirement of c.30,744 FTE during the period 2023 to 2030. Buyens et al. (2021) considers deployment to fall under the category of 'construction', specifically general

[18] https://www.irishsolarenergy.org/_files/ugd/dcb342_ff637a6960104140a73e6dd2b850ad88.pdf.

construction and specialised construction activities for buildings and civil engineering works. This includes, among other activities, the installation of electrical systems in buildings.

4.6 CONVENTIONAL GENERATION CAPACITY

4.6.1 Capital investment requirement

A number of estimates exist in relation to conventional generation capacity. We report relevant estimates in Table 4.5. Combined Cycle Gas Turbines (CCGT) or Open Cycle Gas Turbines (OCGT) are most likely to be installed to meet this requirement. Drawing on estimates presented in Table 4.5, the total investment cost for the 2GW of these new gas plants is likely to be somewhere in the region of €0.93 – €1.26 billion. This assumes all expenditure takes place in Ireland, which is a likely upper bound, as a portion of this is likely to be imported.

TABLE 4.5 EUROPE AND COUNTRY AVERAGE TOTAL INSTALLED COSTS FOR CCGT AND OCGT TECHNOLOGY

	(€/kW)	Total cost (€ billion)
CCGT		
Italy	548.35	1.10
Belgium	712.85	1.43
Average	631.06	1.26
OCGT		
Italy	302.06	0.60
Belgium	622.7	1.25
Average	462.84	0.93

Sources: Lorenczik et al., 2020.
Note: Costs mentioned include pre-construction, construction (engineering, procurement, and construction), and contingency costs. Lorenczik et al. (2020) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

4.6.2 Labour requirement

Table 4.6 breaks down the employment requirement per unit of generation installed. For both OCGT and CCGT, the required FTE/MW for both construction and installation activities is 1.3FTE/MW. This suggests that installing 2GW would be an additional employment requirement of c.2,600 FTE between 2023 and 2030.

TABLE 4.6 WORKFORCE REQUIRED TO DELIVER ADDITIONAL CONVENTIONAL GENERATION CAPACITY (FTE/MW)

Technology	Manufacturing	Construction & Installation	Operations and Maintenance	Decommissioning
OCGT	0.93	1.30	0.14	0.21
CCGT	0.93	1.30	0.14	0.21

Source: Rutovitz et al., 2015.

4.7 ENERGY EFFICIENCY

4.7.1 Capital investment requirement

CAP23 highlights a desire to upgrade 500,000 dwellings to B2 BER status by 2030. Many estimates exist concerning the cost of such investment. If one follows estimates taken from the Climate Action Plan 2021 (Government of Ireland, 2021b), the gross investment required to meet 2030 targets will be in the region of €28 billion. Assuming that efforts are spread evenly over the ten-year duration of 2020-2030, this schedule implies an annual target of 50,000 retrofit installations with a heat pump at an annual cost of €2.8 billion. It should be noted that this cost estimate includes the installation of 500,000 heat pumps.[19]

4.7.2 Labour requirement

To estimate the labour requirement, the Department of the Environment, Climate and Communications indicate that 3,870 workers were involved in retrofitting 12,900 houses to B2 standard in 2019. Assuming that the ratio of employees to retrofit completion is constant going forward, and that efforts are spread evenly over the ten-year 2020-2030 period (i.e. an annual target of 50,000 retrofit installations), this would imply that 15,000 workers would be required per annum to carry out the required works. This number corresponds to an expansion of around 22,779 net recruits identified by Government of Ireland (2022a; 2022b) to meet this challenge. This is a considerable expansion.

4.7.3 Total capacity requirement

The final section of this chapter is to consider the aggregated requirement relative to indicators of capacity in the Irish economy.

[19] Alternative estimates exist. If one employs cost estimates from Balyk et al. (2022), the gross investment required is likely to be in the range of €4.5 billion to €12.2 billion. Assuming that this begins in 2023, this translates into €0.45 billion – €1.22 billion per annum, assuming that efforts are spread evenly over the ten-year duration to 2030. This cost estimate does not include the cost of heat pumps.

Table 4.7 summarises the total investment required in the Irish economy to meet energy-related targets, with an investment of approximately €4.17 billion per annum required. CSO data (2023a) illustrate the size of the construction sector in Ireland over recent years, ranging in size from a low of €10 billion in 2012 to a high of €50 billion during the 2005 – 2008 peak. In 2021, the construction sector had an output of approximately €28 billion (Central Statistics Office, 2023a).

If we employ the Government of Ireland's (2021a) estimates of energy efficiency expenditures, where they projected a total spend of €28 billion to achieve 500,000 energy efficiency and heat pump installations, it may be the case a large stimulus could be necessary.

Together, these additional investments comprise an annual expenditure that is approximately 15 per cent of the size of the Irish construction sector.[20] Egan et al. (2022) highlight the many constraints in delivery related to construction sector investments, particularly in relation to labour supply.

TABLE 4.7 ANNUAL LOCAL EXPENDITURE REQUIRED TO ACHIEVE RENEWABLE ENERGY TARGETS

Item	Expected annual investment in Irish economy (€ billion)
Onshore wind	0.37
Offshore wind	0.53
Solar PV	0.29
Conventional generation	0.18
Energy efficiency upgrades (CAP21 cost estimate)	2.80
Sum	4.17

Source: Authors' calculations.
Note: Government of Ireland's (2021a) estimates of energy efficiency expenditures employed in calculation, with energy efficiency cost inclusive of retrofit and heat pump installation costs. Calculations inclusive of conventional generation investment which is likely to occur during a three-year window. Investment required for remaining years should exclude this number. Conventional generation investment number is an upper bound, an unquantifiable portion of this is likely to be imported. For offshore estimate, we employ the UK estimate relating to a 'high' share of retained expenditure. This is close to the mean of the stated range. Annualised costs for renewables are calculated proportional to the seven-year period of 2023-2030. Annualised costs for energy efficiency are calculated proportional to the ten-year period of 2020-2030, reflecting the fact that this target has been in place since 2021 and efforts are currently underway.

A second method with which one may compare the capacity requirement is in relation to labour demands. Data from CSO (2023b) outline the total construction employment in Ireland from 1998 to 2017. These data show that employment in this sector has ranged from a high of c.275,000 in 2007 to a low of c.100,000 in the 2010-2013 period, to c.146,000 in 2017. These numbers provide useful

20 As noted above, alternate energy efficiency cost estimates exist. However, capacity pressures remain. Should the estimates of Balyk et al. (2022) be employed, the additional annual investment required remains substantial, corresponding to approximately 8-10 per cent of the size of the 2021 construction sector size per annum.

benchmarks against which we may compare the annual labour requirement in this sector to meet energy targets.

Table 4.8 shows that the stimulus required to achieve renewable energy and energy efficiency targets is large relative to the Irish construction sector, as measured by employment. Additional annual employment approximately equal to 16 per cent of the 2017 capacity will be required. This represents a considerable stimulus, much of which is attributable to the energy efficiency programme. Indeed, if one excludes the energy efficiency investments, the annual additional economic activity represents 6 per cent of total capacity. This will have less, but still considerable, economic pressure. Once again, we see that energy efficiency activity comprises the greatest stimulus to the Irish economy and is most likely to lead to the greatest inflationary pressures and potential for substitution between activities.

TABLE 4.8 EMPLOYMENT REQUIREMENT: RENEWABLE ENERGY TARGETS

Item	Expected annual employment requirement
Onshore wind	2,103
Offshore wind	1,469
Solar PV	4,392
Conventional generation	867
Energy efficiency	15,000
Sum	23,831

Source: Authors' calculations.
Note: Figures inclusive of conventional generation investment, which is likely to occur during a three-year window. Investment required for remaining years should exclude this number. Annualised calculations for renewables are calculated proportional to the seven-year period of 2023-2030. Annualised calculations for energy efficiency are calculated proportional to the ten-year period of 2020-2030, reflecting the fact that this target has been in place since 2021.

4.7.4 Non-financial constraints to energy infrastructure delivery

In addition to construction sector constraints, the planning and regulatory environment has imposed constraints on the delivery of energy infrastructure in Ireland. Energy infrastructure projects generally enter the planning process as Strategic Infrastructure Development (SID). In 2021, the average time to approve SIDs was 39 weeks. No further detail is available from An Bord Pleanála, but industry sources indicate that many energy projects do not receive planning permission even within a year, and the probability of Judicial Review is high. The recent Planning and Development (2022) Bill contains legislative changes designed to reduce the probability of Judicial Review, along with the associated delays. In addition to Judicial Review, the sequencing of planning permission, grid connection, and RESS auction participation led to delays in bringing renewable projects onstream, while uncertainties in grid connection costs, particularly at the DSO level, add to project risk. Additional risk can have implications for the cost of

delivery. Increased project risk is often associated with a higher cost of capital. Planning delays may therefore contribute to higher than necessary costs of delivering infrastructure.

On the conventional generation side, planning and regulatory constraints have contributed to the closure of the West Offaly and Shannonbridge power stations, and to delays or cancellations in delivering several new power plants that were contracted under the capacity remuneration mechanism, contributing to the shortfall in conventional generation. The delivery of several emergency generators that were approved outside of the capacity remuneration mechanism, in an attempt to ensure security of supply, was also delayed due to regulatory constraints.

The provisional results of the first Offshore Renewable Energy Support Scheme (O-RESS) auction saw 3.074GW of capacity secure O-RESS contracts. However, the delivery of these projects requires the use of specialised ships and suitable ports, neither of which is guaranteed. While the O-RESS results are encouraging regarding the probability of the successful firms in booking sufficient capacity on existing and new ships, at present only Belfast Port has the infrastructure necessary to accommodate offshore wind turbine construction activity. The ability to secure availability in Belfast Port is not guaranteed, in which case ports in Britain or France will have to be utilised.

CSO (2021) reports that the majority of households in Ireland have a C rating (aggregating C1, C2 and C3 we get 47 per cent) followed by B at 21 per cent (aggregating B1, B2 and B3). Similarly, D rating is at 19 per cent, E, F and G combined are at 11 per cent. As this distribution outlines, a considerable number of dwellings require 'deep' retrofits: a retrofit that leads to a considerable shift up the BER scale. Delivery of this and many of the Climate Action Plan targets therefore require significant behavioural change from households and businesses, including but not limited to significant financial investments. The probability of the required behavioural response occurring will impact on whether the investments in retrofits and heat pumps are made, but also on the utilisation of many of the transport investments envisaged under the NDP. The necessary investments in the power system also depend, albeit to a lesser degree, on the extent to which the heating and transport sectors electrify, as well as underlying changes in how and (crucially) when households and businesses use energy. These uncertainties are difficult to quantify due to limited data on behavioural responses, but the low uptake of electric cars, heat pumps and smart tariffs to date, while in line with the international literature, indicate that there is uncertainty around whether these investments and behavioural responses will manifest.

4.8 CONCLUSIONS

This chapter has sought to quantify the economic stimulus required to meet many of Ireland's energy targets as stated in the Climate Action Plan and National Development Plans. We have provided an approximate calculation as to the likely economic stimulus and labour input required for stated objectives. We have compared these to the current size of the construction sector, the economic sector likely to deliver the majority of these services.

The activity required to meet these activities, particularly energy efficiency upgrades, is considerable with a sizeable burden placed on Irish industrial capacity even when a lower bound estimate is assumed. It should be noted that this chapter has assumed a constant rate of activity in the ten-year 2021-2030 time period. As 2021 and 2022 rates of energy efficiency installation have lagged behind the assumed rate of 50,000 per annum (SEAI, 2023), this is likely to be a lower bound on the capacity requirement; to make up this shortfall, industrial capacity in excess of that assumed will be required to meet 2030 targets in the latter years of this decade.

Given these findings, achieving climate targets relating to renewable electricity deployment and dwelling energy efficiency will require an unprecedented reprioritisation of construction sector resources or a considerable increase in the size of the sector.

REFERENCES

Balyk, O., J. Glynn, V. Aryanpur, A. Gaur, J. McGuire, A. Smith, X. Yue and H. Daly (2022). 'TIM: modelling pathways to meet Ireland's long-term energy system challenges with the TIMES-Ireland Model (v1. 0)', *Geoscientific Model Development*, 15(12), pp.4991-5019.

Buyens, L., B. Lauwers and H.-J. Louwaege (2021). 'Solar PV Job Market Study for the European Union', *SolarPowerEurope* [online]. Available: https://repository.vlerick.com/handle/20.500.12127/7030. Accessed: 19 September 2023.

Central Statistics Office (2021). 'Domestic Building Energy Ratings Quarter 1 2021'. https://www.cso.ie/en/releasesandpublications/er/dber/domesticbuildingenergyratingsquarter12021/ [Accessed: 26 June2023].

Central Statistics Office (2023a). 'OVA05 - Output and Value added ESA2010'. Available: data.cso.ie/ [Accessed: 26 June2023].

Central Statistics Office (2023b). 'QNQ03 Person aged 15 years and over in Employment'. Available: data.cso.ie/ [Accessed: 26June2023].

Eirgrid (May 2023). *Renewable Electricity Support Scheme* (ORESS 1 Provisional Auction Results).

Government of Ireland (2021a). 'National Development Plan 2021-30 (NDP)', [online]. Available: https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/ [Accessed: 15 May 2023].

Government of Ireland (2021b). 'Climate Action and Low Carbon Development (Amendment) Act 2021' [online]. Available: https://www.irishstatutebook.ie/eli/2021/act/32/section/15/enacted/en/html [Accessed 31 May 2023].

Government of Ireland (2022a). 'Report on the Analysis of Skills for Residential Construction & Retrofitting 2023–2030' [online]. Available: https://www.gov.ie/en/publication/10ae6-report-on-the-analysis-of-skills-for-residential-construction-retrofitting-2023-to-2030/ [Accessed: 6 June 2023].

Government of Ireland (2022b). 'Draft Planning and Development Bill 2022' [online]. Available: https://www.gov.ie/en/publication/c6f60-draft-planning-and-development-bill-2022/ [Accessed: 7 June 2023].

Government of Ireland (2023). 'Climate Action Plan 2023 (CAP23)' [online]. Available: https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/ [Accessed: 15 May 2023].

IRENA (2022). 'Renewable Power Generation Costs in 2021', *International Renewable Energy Agency,* Abu Dhabi.

Leahy, L., D.K. Spearman, R. Shanahan, E. Martins, E. Northridge and G. Mostyn (2020). 'Harnessing our Potential: Investment and Jobs in Ireland's Offshore wind Industry', *Carbon Trust*, p.18.

Lorenczik, S., S. Kim, B. Wanner, J.M. Bermudez Menendez, U. Remme, T. Hasegawa, J.H. Keppler, L. Mir, G. Sousa, M. Berthelemy and A. Vaya Soler

(2020). *Projected costs of generating electricity-2020 edition* (No. NEA--7531). Organisation for Economic Co-Operation and Development.

Rutovitz, J.E. Dominish, and J. Downes (2015). 'Calculating global energy sector jobs: 2015 methodology'.

Sustainable Energy Authority of Ireland (SEAI) (2023). 'National Retrofit Plan Quarterly Report –Full Year 2022' [online]. Available: SEAI-Retrofit-Annual-Report-2022.pdf [Accessed: 7 June 2023].

Smyth, R. (2021). 'Economic Impact of Onshore Wind in Ireland' KPMG. Available at: windenergyireland.com/images/files/economic-impact-of-onshore-wind-in-ireland.pdf.

Theodoropoulos, K., S. Daly and M. Dinan (2018). 'Cost of new entrant peaking plant and combined cycle plant in I-SEM', *A report to the Utility Regulator and the Commission for Regulation of Utilities*.

Wind Energy Ireland (WEI) (2021). 'Economic impact of onshore wind in Ireland', A report prepared by KPMG for Wind Energy Ireland [online]. Available: https://windenergyireland.com/images/files/economic-impact-of-onshore-wind-in-ireland.pdf [Accessed: 19 September 2023].

CHAPTER 5 TRANSPORT

John Curtis

5.1 BACKGROUND

The benefits from good transport services and infrastructure are wide ranging. Within the economy they facilitate access to markets and are critical for international competitiveness and connectivity, contributing to economic growth. Within the labour market, good transport increases accessibility and flexibility both from the perspective of employers and employees. Transport also enables participation in an extensive array of social, cultural, recreational and sporting events. Consequently, continued investment in transport infrastructure and services will deliver benefits across the economy and society. However, the transport sector has substantial associated negative externalities. The carbon intensity of the transport sector is second after agriculture in terms of national sectoral share. The scale of the challenge to reduce emissions from transport is massive. There are also associated air pollutants, with transport being the principal source of NOx emissions, as well as emissions of sulphur dioxide, ammonia and particulates. Traffic impacts well-being and quality of life, while congestion has wider impacts on economic activity. Investment in quality sustainable mobility will improve quality of life and support the transition to a low-carbon society, while simultaneously enhancing economic competitiveness.

5.2 KEY DEVELOPMENTS SINCE NDP 2021

There have been several transport policy announcements since NDP 2021 (DPER, 2021a), including a strategy for the road haulage sector, and an electric vehicle (EV) charging infrastructure strategy; however the most significant announcement was the publication of the National Sustainability Mobility Policy (SMP) in April 2022 (DoT, 2022), though the policy itself was being finalised at time of NDP publication. The SMP sets out a strategic framework to 2030 for active travel and public transport. The SMP builds upon prior policy iterations and recommendations from the OECD's Environmental Performance Review (OECD, 2021a). The OECD's review highlighted a lack of an effective implementation structure, and a need for cross-government coordination to implement the policy in Ireland. The SMP was also developed to align with, and complement, the OECD's 'well-being lens' framework as applied to the transport sector (OECD, 2021b). At the invitation of the Climate Change Advisory Council, the OECD applied its 'well-being lens' framework to the Irish passenger transport sector, including the National Planning Framework, National Development Plan, National Sustainable Mobility Policy, Climate Action Plan, Sustainable Mobility Policy, National Investment Framework for Transport in Ireland, and Common Appraisal Framework for Transport (OECD, 2022). The OECD's analysis, which follows a systemic approach rather than assessing specific

projects or initiatives, represents an important yardstick of progress across the transport sector. It is worthwhile repeating some of the OECD's conclusions:

- 'Ireland has a car-dependent transport system and that this system is unfit to help the country meet its greenhouse gas emission reduction goals for the sector while improving well-being.'
- 'Achieving Ireland's ambitious climate target… requires transformational change in the direction of a low-demand, high-access and low-emission system.'
- 'Ireland has prioritized efforts and attention on policies that this analysis finds have a low potential to help the country transition away from car dependency and towards systems able to deliver sustainable accessibility.'
- 'Recommending that policies with high transformative potential should be scaled up does not imply that policies with low or medium transformative potential are necessarily 'wrong' or useless. The analysis reveals, however, that these policies are unable on their own to trigger behavioural change away from car use since they do not transform the system that influences these behaviours; the system remains car dependent and cars are still the most convenient transport mode.'
- 'Actions with medium to high transformative potential exist in Ireland, and more recent documents, such as the new Sustainable Mobility Policy (SMP), reflect an effort to make these more central. … As of 2022, however, transformative policies are still marginal and implemented only on a small scale or as pilot projects.'
- 'Actions with higher potential to trigger a systemic transformation, …, remain marginal'.
- 'Ireland's current sub-targets assign excessive weight to vehicle and fuel replacement…. They reflect the assumption and reinforce the mindset that the current car-dependent system will prevail, needing only to be 'fixed' via electrification and better fuels. The unambitious current sub-target for active travel and public transport further reflects this thinking.'
- 'Hardly any evaluations are being conducted to monitor changes in mode shares, increased active travel, accessibility improvements, or health and environmental benefits from road space reallocation and redesign projects, and that this lack of evidence makes it difficult for such projects to gain visibility and priority.'

The OECD's recommendations include; to redefine the goal of the transport system as sustainable accessibility, to focus on policies to transform the car dependent system, to redefine the EV strategy (i.e. technology focus) towards sustainable options (i.e. mode choice), and to embrace a systemic approach to policy decision-

making across government departments. Such transformational change is complex to implement and will take time to achieve. The recently published *Long-term Strategy on Greenhouse Gas Emissions Reduction* (DECC, 2023b) includes discussion of the transport sector's pathway to climate neutrality. Though the strategy's vision is not inconsistent with the OECD's recommendations, there is little detail on what actions will be implemented, when, and by whom.

The announcement in April 2023 of a new National Demand Management Strategy to develop plans to free up road space to accommodate better public transport and active travel is closer to the OECD's recommendations. Some potential measures for consideration include what the OECD calls reactive or anticipatory in nature, including removing free workplace parking; increased parking charges; introduction of congestion and road user charging; and increased fossil fuel prices. Reactive and anticipatory policies are defined as having low to medium transformative potential since they do not aim to address root causes of poor transport outcomes. However, other potential measures to be considered for the strategy, such as road space reallocation and mobility-as-a-service (i.e. enabling users to plan, book, and pay for multiple types of mobility services including both from public and private transportation), could be classed as highly transformative actions.

While there are indications that traffic levels have returned to pre-pandemic levels,[21] it is also clear that nature of traffic movements has evolved, especially passenger car travel. The widespread adoption of hybrid working for many means that commutes into the place of work do not occur every day. This has enabled longer commutes and commuting time has been substituted with other trips. The release of the Census 2022 – Place of Work, School, College – Census of Anonymised Records (POWSCAR) in October 2023 will provide the first comprehensive assessment of evolving transport patterns. While more data will benefit the development of specific transport projects, the situation overall is that any changes in travel behaviours post-pandemic will not lessen the need for investment in sustainable transport options.

5.3 NEW RESEARCH INSIGHTS

Several recent modelling papers demonstrate that existing transport policies will not be sufficient to achieve the level of sectoral emissions reductions envisaged. For instance, the modelling rationale for EV diffusion to achieve current policy targets is based on price or cost parity between EVs and internal combustion engines; however Aryanpur et al. (2022) conclude that other factors are also critical, and reliance on price parity will overestimate the penetration of EVs within

21 https://trafficdata.tii.ie/.

vehicles fleets. Additionally, EV supports already have poor cost-benefit ratios (DPER, 2019). It is likely that cost-parity between EVs and internal combustion engines will not be achieved internationally until after 2030 (Caulfield et al., 2020). Transport policies focusing on traffic management (e.g. fleet composition, speed limits) are likely to spatially reallocate the impacts (i.e. pollution, health impacts) but there is little net contribution to the improvement of public health (Tang et al., 2020). On the public transport side, Carroll et al. (2019) show that while the policy incentives available to encourage a mode shift from private to public transport modes will have a positive impact, the scale of the impact is relatively modest. The research, which focuses on the greater Dublin area, finds a switch to public transport of less than 3 per cent. A common theme across these studies is that only marginal evolution in underlying transport behaviours will occur, and that reliance on private cars will persist. If inherent transport behaviours (i.e. reliance on private cars) do not radically change there will be little net impact in terms of emissions outcomes, even where there are relatively strong parallel policy interventions, such as concentrating new development within existing urban footprints (Curtis and Kelly, 2023).

A study of commuting into Galway city (Curtis and Kelly, 2023) demonstrated that the factor most likely to have the greatest impact on commuting with a discrete rather than marginal reduction in emissions is hybrid working (i.e. working from home). Stefaniec et al. (2022) investigate this in more detail and draw two conclusions. First, hybrid working is likely to lead to a decrease in commuter trips, particularly peak hour commuting, but the decrease will not be uniform across the working week. Such an evolution means that transport service provision becomes more difficult to plan, however there is no evidence that demand for transport service is diminished. The second conclusion is that working from home does not necessarily equate with fewer journeys and that commute times can increase, i.e. working from home facilitates both living further from work locations and new trips that would not have occurred otherwise. The longer commuting distances may not only reflect the adoption of hybrid working but are also associated with rising housing costs and supply constraints (Ahrens and Lyons., 2021). Overall, hybrid working is not the envisaged panacea for curtailing transport emissions. At best, it is associated with a redistribution of emissions from commuting to other trip types and more domestic heating emissions, or at worst is associated with increased emissions overall.

Most transport policy documents cite high-level mode share statistics to underpin policy options (e.g. DoT, 2022). O'Riordan et al. (2022) provide valuable new insights by examining the motivation, and emissions intensity by travel mode. While the reliance on private cars is well known, less is understood about the motivation underpinning journeys. Commuting for work is the most emissions intensive but is closely followed by shopping trips, and companion/escort journeys

(e.g. school-runs). While a policy focus rightly relates to commuting, these two other trip types should face equal policy attention. For instance, emissions from commuting accounts for approximately 20 per cent of total emissions from passenger transport, whereas the three trip types combined account for approximately two-thirds of passenger transport emissions. Alternative sustainable travel options are likely to differ depending on trip purpose. Not surprisingly the highest emission intensity is associated with longer trips, however approximately one-sixth of emissions originate from trips less than 6km. Sustainable options are also likely to differ substantially depending on trip length. Policies and infrastructure to achieve more sustainable transport outcomes need to be mindful of the diversity of trip types.

In summary, recent research confirms the OECD's assertion that current transport policy initiatives will have low transformative potential. This points to the need for policies and initiatives that will lead to transformative or systemic change. The widespread advent of working from home or hybrid working due to the COVID pandemic lockdowns was initially advocated as potentially benefitting transport emissions, however evolving research suggests no substantial net improvement in emissions. Finally, the research by O'Riordan et al. (2022) illustrates the important point that transport policy is not simply about fuels and technology, nor about high level mode choice; rather understanding the circumstances and motivation underpinning journeys is central to finding sustainable alternatives. Though not unique, the paper by O'Riordan et al. (2022) is among few research studies investigating behavioural issues underlying transport choices in Ireland. In contrast to the emissions intensive topics related to home heating and energy efficiency retrofits where SEAI fund extensive research programmes, there is relatively little research focus on behavioural and other aspects within the transport sector.

5.4 CONCLUSIONS

€35 billion is allocated to transport in the NDP, which covers a broad range of projects, including road network upgrades, as well as large public transport initiatives such as MetroLink, BusConnects, and Connecting Ireland. Within the limited scope of this report, the objective is not to evaluate specific NDP allocations, rather it is to provide ideas on prioritisation of future NDP spending. In that context, the OECD's recent assessment of the Irish transport system is a good reference point. The OECD concluded that the existing transport system fosters growing car use and emissions by design and will be unable to sufficiently contribute to national greenhouse gas reduction goals. The OECD's primary criticism is that the transport system is car centric and that behavioural change needs to occur at the system structure level, rather than simply emphasising individual behaviour. The OECD's analysis and conclusions remain valid and should be reflected in government's planning and infrastructure decisions.

Possibly the most publicly recognisable transport-related policy relates to the EV target. Though the aim is to reduce transport emissions, the policy is car-centric and ignores other externalities associated with a car dependent system, such as congestion. EV grants incentivise electric vehicle deployment and are not necessarily complementary with ambitions to encourage mode switching to either public transport or active modes. EV grants encourage car-based rather than sustainable transport options. EV grant supports are also regressive in nature with more affluent households being the primary beneficiaries (Caulfield et al., 2022), with a poor cost-benefit ratio (DPER, 2019). Electrification of transport is an important component of the Climate Action Plan and merits public investment, however further investment in network infrastructure (e.g. public charging) or public shared services (e.g. shared bicycles, electric bicycles, electric cargo bicycles and scooters) may represent a better and more equitable use of public funds (LaMonaca and Ryan, 2022; Charly et al., 2023).

With respect to NDP projects, the Department of Transport has responsibility for delivery of 120 projects, 29 of which are roadway projects, eight relate to public transport (e.g. Luas, Metro, rail), with the remaining projects comprising 'Greenway' routes. The large number of greenway projects will enhance active mode infrastructure, but given the location of many of the routes, they will be primarily used for recreational or tourism purposes. Additional cycling and micro mobility infrastructure investment may be best targeted in more densely populated areas, as a viable alternative to private car transport and where congestion is most acute (Timmons et al., 2023; DPER, 2021b). OECD (2022) advocates road space reallocation. Specifically, projects should be developed to provide sustainable alternatives to the most emissions intensive trip types (e.g. commuting, shopping, and companion/escort trips).

Road investment projects have multiple potential benefits, including economic (e.g. efficient access to markets) and societal benefits, as well as improving road safety. Transport Infrastructure Ireland (TII) produces a variety of road operational capacity metrics to underpin investment priorities. However there is also clear evidence that increasing road capacity can result in increased demand for road travel, i.e. new vehicle traffic that would not have occurred without the increase in road capacity (Dunkerley et al., 2018; DPER, 2021b). Induced road traffic demand is most likely to occur in urban areas (or congested routes) with less evidence of it occurring on the national road network (Dunkerley et al., 2018). The expanded capacity on the M50 is possibly evidence of this.

The public transport projects in the NDP will enhance mode shifting, but there is a dearth of projects that the OECD (2022) would acknowledge as having high transformative potential (e.g. road space reallocation; the mainstreaming of on-

demand shared services, i.e. shared use vehicles, etc.). In the case of the 32 'Climate Action' projects within the NDP, three are wind farm projects with the balance being urban flood relief schemes. What is stark in its absence are any specific climate change transport adaptation projects (EEA, 2014; TII, 2022). Work on climate adaptation in the transport sector is more advanced than evident from the NDP and the *Long-term Strategy on Greenhouse Gas Emissions Reduction* (DECC, 2023). The Department of Transport's *Climate Change Sectoral Adaptation Plan* (DoT, 2019) outlines a series of actions across three climate adaption objectives, but the actions are ascribed as 'soft' and relate to improving knowledge and enabling adaptation measures in transport planning and investment. Such measures are most likely to improve the climate resilience of new transport network investments. Additional emphasis may be necessary to ensure the resilience of the existing network. Overall, there appears to be a disconnect between the objectives of the Climate Action Plan and the scope of transport projects in the National Development Plan where more urgency is merited.

In relation to new transport infrastructure, the Government is committed to a 2:1 ratio of expenditure between new public transport infrastructure and new roads over its lifetime. OECD (2023) specifically classified the policy as having low transformative potential. The new roads element of the policy is synonymous with vehicular traffic, but roads projects should also include active travel modes. Broadening the policy to encompass road space reallocation would be highly transformative.

A core element of all transport policy measures is behavioural response of travellers. There is extensive research that people respond across multiple attributes of the transport options available to them. For instance, there is a strong relationship between public transport modal shares and travel time ratios (i.e. the relative travel time between car and public transport), with the cars often favoured over public transport or cycling, except for destinations closer to the city centre where density is higher (Lunke et al., 2021; Liao et al., 2020; Saunier and Chabin, 2020). Other factors such as whether public transport options have direct routes or few transfers, service frequencies, or parking availability also impact strongly on mode choice (Pritchard and Froyen, 2019; Lunke et al., 2021). The implication of this research is that policies that focus on single aspects of transport options (e.g. public transport fares) ignore the fact that transport decisions are made across multiple criteria (e.g. price, convenience, frequency, speed, etc.). NTA's fare-free travel policy analysis illustrates this point (NTA, 2022). The analysis finds that free fares on public transport would lead to just a 22 per cent increase in public transport patronage, with almost negligible switching from private cars (i.e. almost all mode switching is anticipated from active modes of walking and cycling). Price is not the predominant factor affecting the decision to switch from private cars to public transport; on the contrary, travelling by private car is relatively expensive

compared to public transport. Consequently, public transport fares are unlikely to be the determining factor in switching from private cars to public transport. Policies focusing on a single mode or attribute are likely to have only low transformational potential. The BusConnects initiative (a programme for sustainable transport in Dublin, Cork, Galway, Limerick and Waterford) attempts to simultaneously address multiple aspects, including service speed, service frequency and congestion. The transformative potential of BusConnects depends on building fast, direct, and quality transport services, as well as parallel measures to disincentivise the use of private cars where sustainable alternatives are available (e.g. extensive road space reallocations, congestion charges, parking measures, etc.). Potentially the greatest cost associated with BusConnects is widening roads, and the accompanying planning delays, objections, and judicial reviews, all of which impinge on the ability to deliver on associated 2030 emissions benefits. Road widening in most instances is to maintain a minimum of two lanes for cars, which preserves and prioritises a car-centric transport system that OECD has cautioned against. Connecting Ireland is a similarly transformative initiative, which aims to improve mobility in rural areas, providing better connections between villages and towns and linking to regional transport networks.

The State funds research across multiple areas to aid policy development with respect to national greenhouse gas emissions challenges. For example, the EPA Research Programme 2021-2030 funds research that addresses climate change evidence needs, among other themes. The SEAI's National Energy Research Funding Programme covers a broad range of energy topics, including energy efficiency, energy poverty and energy storage amongst others. The Department of Agriculture, Food and the Marine funds research across a climate mitigation and adaption theme. While transport does feature among topics funded via the SEAI programme, there is no transport research programme. With transport responsible for the second largest sector share of greenhouse gas emissions, and with massive transformational change necessary to achieve sectoral and national emissions targets, a national research programme on transport is fundamental. A research programme would provide a strong basis to develop more holistic policy approaches to tackling emissions from the second largest emitting sector, to ensure transformational and sustainable approaches are adopted, and design the behavioural interventions required to deliver reforms.

REFERENCES

Ahrens, A. and S. Lyons (2021). 'Do rising rents lead to longer commutes? A gravity model of commuting flows in Ireland', *Urban Studies*, 58(2):264-279. https://doi.org/10.1177/0042098020910698.

Aryanpur, V., O. Balyk, H. Daly, B. Ó. Gallachóir and J. Glynn (2022). 'Decarbonisation of passenger light-duty vehicles using spatially resolved TIMESIreland Model', *Applied Energy*, 316:119078. https://doi.org/10.1016/japenergy.2022.119078.

Carroll, P., B. Caulfield and A. Ahern (2019). 'Measuring the potential emission reductions from a shift towards public transport', *Transportation Research Part D: Transport and Environment*, 73:338-351. https://doi.org/10.1016/j.trd.2019.07.010.

Caulfield, B., P. Carroll and A. Ahern (2020). 'Transitioning to low carbon and sustainable mobility'. Climate Change Advisory Council Working Paper Series, 8. https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/contentassets/publications/Working%20Paper%20No.%208.pdf.

Caulfield, B., D. Furszyfer, A. Stefaniec and A. Foley (2022). 'Measuring the equity impacts of government subsidies for electric vehicles', *Energy*, 248:123588. https://doi.org/10.1016/j.energy.2022.123588.

Charly, A., N.J. Thomas, A. Foley and B. Caulfield (2023). 'Identifying optimal locations for community electric vehicle charging', *Sustainable Cities and Society*, p. 104573. https://doi.org/10.1016/j.scs.2023.104573.

Curtis, J. and E. Kelly (2023). 'Population growth: implications for commuting', *Economic and Social Review*, 54(1):101-121. https://www.esr.ie/article/view/2249/752.

DECC (2023a). *Climate Action Plan 2023: Changing Ireland for the Better*. Department of the Environment, Climate and Communications. https://assets.gov.ie/249626/1c20a481-bb51-42d6-9bb9-08b9f728e4b5.pdf.

DECC (2023b). *Ireland's Long-term Strategy on Greenhouse Gas Emissions* Reduction. Department of the Environment, Climate and Communications. https://assets.gov.ie/255743/35b2ae1b-effe-48af-aaf3-156dc5b01ee6.pdf.

DHPLG (2018). *National Planning Framework*. Department of Housing, Planning and Local Government. https://assets.gov.ie/246231/39baaa8c-48dc-4f24-83bd-84bbcf8ff328.pdf.

DoT (2019). *Transport Sector: Climate Change Sectoral Adaptation Plan*. Department of Transport, Tourism and Sport. https://www.gov.ie/pdf/75640/?page=null.

DoT (2022). *National Sustainable Mobility Policy*. Department of Transport. https://assets.gov.ie/220939/15aab892-f189-4ab6-8448-0c886176faac.pdf.

DPER (2019). *Spending Review 2019: Incentives for personal Electric Vehicle purchase*. Department of Public Expenditure and Reform. https://assets.gov.ie/25107/eb5a541e3b614c94a3e47c8d068e72c9.pdf.

DPER (2021a). *National Development Plan 2021-2030. Department of Public Expenditure and Reform*. https://assets.gov.ie/200358/a36dd274-736c-4d04-8879-b158e8b95029.pdf.

DPER (2021b). *NDP Review: Infrastructure Demand Analysis across Selected Sectors*. Department of Public Expenditure and Reform. https://assets.gov.ie/133821/322b0560-4537-4116-98d0-cc5bedb7ddc0.pdf.

Dunkerley, F., J. Laird and B. Whittaker (2018). *Latest evidence on induced travel demand: An evidence review. Department for Transport*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762976/latest-evidence-on-induced-travel-demand-an-evidence-review.pdf.

EEA (2014). *Adaptation of transport to climate change in Europe: Challenges and options across transport modes and stakeholders*. European Environment Agency. https://www.eea.europa.eu/publications/adaptation-of-transport-to-climate/download.

LaMonaca, S. and L. Ryan (2022). 'The state of play in electric vehicle charging services–a review of infrastructure provision, players, and policies', *Renewable and sustainable energy reviews*, 154:111733. https://doi.org/10.1016/j.rser.2021.111733.

Liao, Y., J. Gil, R.H. Pereira, S. Yeh and V. Verendel (2020). 'Disparities in travel times between car and transit: Spatiotemporal patterns in cities', *Scientific Reports*, 10(1):4056. https://doi.org/10.1038/s41598-020-61077-0.

Lunke, E.B., N. Fearnley and J. Aarhaug (2021). 'Public transport competitiveness vs. the car: Impact of relative journey time and service attributes', *Research in Transportation Economics*, 90:101098. https://doi.org/10.1016/j.retrec.2021.101098.

NTA (2022). *Fare-free Transport Policy Analysis. National Transport Authority*. https://www.nationaltransport.ie/wp-content/uploads/2023/03/EY_Fare-Free-Travel-Report_Final-To-Publish.pdf.

OECD (2021a). *OECD Environmental Performance Reviews: Ireland 2021*. Organisation for Economic Co-operation and Development (OECD). https://doi.org/10.1787/9ef10b4f-en.

OECD (2021b). *Transport Strategies for Net-Zero Systems by Design*. Organisation for Economic Co-operation and Development (OECD). https://doi.org/10.1787/0a20f779-en.

OECD (2022). *Redesigning Ireland's Transport for Net Zero: Towards Systems that Work for People and the Planet*. Organisation for Economic Co-operation and Development (OECD). https://doi.org/10.1787/b798a4c1-en.

O'Riordan, V., F. Rogan, B. Gallach´oir, T. Mac Uidhir and H. Daly (2022). 'How and why we travel–mobility demand and emissions from passenger transport', *Transportation Research Part D: Transport and Environment*, 104:103195. https://doi.org/10.1016/j.trd.2022.103195.

Pritchard, R. and Y. Froyen (2019). 'Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike', *European Transport Research Review*, 11(1):1-20. https://doi.org/10.1186/s12544-019-0348-6.

Saunier, N. and V. Chabin (2020). 'Should i bike or should i drive? Comparative analysis of travel speeds in Montreal', *Transport Findings*, p. 11900. https://doi.org/10.32866/001c.11900.

Stefaniec, A., W. Brazil, W. Whitney and B. Caulfield (2022). 'Desire to work from home: Results of an Irish study', *Journal of Transport Geography*, 104:103416. https://doi.org/10.1016/j.jtrangeo.2022.103416.

Tang, J., A. McNabola and B. Misstear (2020). 'The potential impacts of different traffic management strategies on air pollution and public health for a more sustainable city: A modelling case study from Dublin, Ireland', *Sustainable Cities and Society*, 60:102229. https://doi.org/10.1016/j.scs.2020.102229.

TII (2022). *Climate Adaptation Strategy*. Transport Infrastructure Ireland. https://www.tii.ie/technical-services/environment/changing-climate/Climate-Adaptation-Strategy-2022_v2.pdf.

Timmons, S., Y. Andersson, F. McGowan and P. Lunn (2023). 'Using Behavioural Science to Design and Implement Active Travel Infrastructure: A Narrative Review of Evidence', ESRI Working Paper 745, Dublin: ESRI, https://www.esri.ie/system/files/publications/WP745.pdf.

CHAPTER 6 HEALTH

Sheelah Connolly

6.1 BACKGROUND

Irish healthcare expenditure lagged behind that of other European countries for a number of years (Hennessey et al., 2021). However, while there have been significant increases in both current and capital healthcare expenditure in recent years, capacity issues within the healthcare system remain. This was brought to the fore with the onset of the COVID-19 pandemic in 2020 when existing capacity constraints including a weak digital infrastructure, relatively low levels of staffing across a number of sectors, outdated hospital infrastructure, low number of hospital beds and weak intensive care facilities constrained the response to the pandemic (Sicari and Sutherland, 2023; Shine and Hennessey, 2022). Consequently, the most recent set of reform proposals for the Irish healthcare system (Sláintecare) (Houses of the Oireachtas Committee on the Future of Healthcare, 2017) and the 2021-2030 National Development Plan (NDP) (Government of Ireland, 2021) have identified an ambitious reform and expenditure plan for the Irish healthcare system in the coming years.

The 2021-2030 NDP notes that capital investment in health has a key role to play in enhancing healthcare service provision and in enabling the reform proposals outlined in the Sláintecare report (Government of Ireland, 2021). The plan identified a number of key areas for investment including (but not limited to) ehealth and ICT, the new Children's hospital, acute bed capacity, the development of primary care centres, decongregation from long-term residential care (LTRC) centres for people with disabilities, and the replacement (where necessary) of diagnostic equipment.

6.2 KEY DEVELOPMENTS SINCE 2021

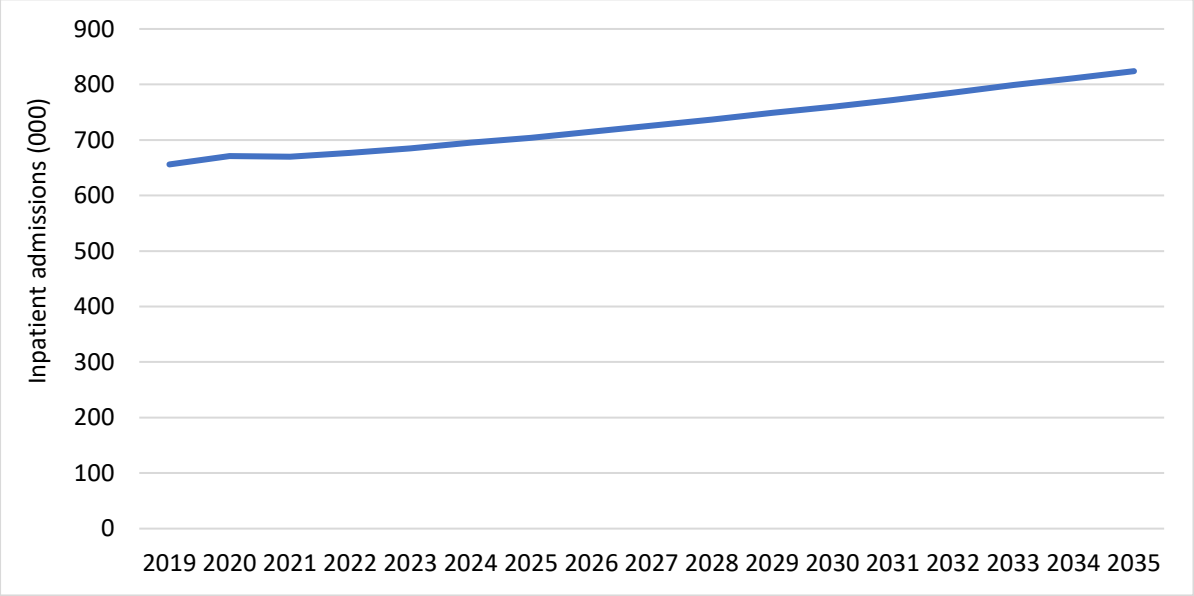
6.2.1 Demographics

The size and age-distribution of the population strongly influence the demand for healthcare, with demand tending to be higher in the first and later years of life and during maternity years for women (European Commission, 2015). Analysis from 2021 estimated that the population of Ireland could increase from 4.9 million in 2019 to 5.4 million in 2035, corresponding to an average annual growth rate of around 0.6 per cent (Walsh et al., 2021). The largest growth rates were projected to occur in the older age-groups: while the overall population is expected to increase by 9 per cent between 2019 and 2035, the corresponding increases in the population aged 65 and over and 85 and over are 56 per cent and 118 per cent

respectively (Walsh et al., 2021). It should be noted that these population projections pre-date the 2022 Census finding of higher-than-expected population growth and consequently may be an underestimate of size of the population in the coming years.

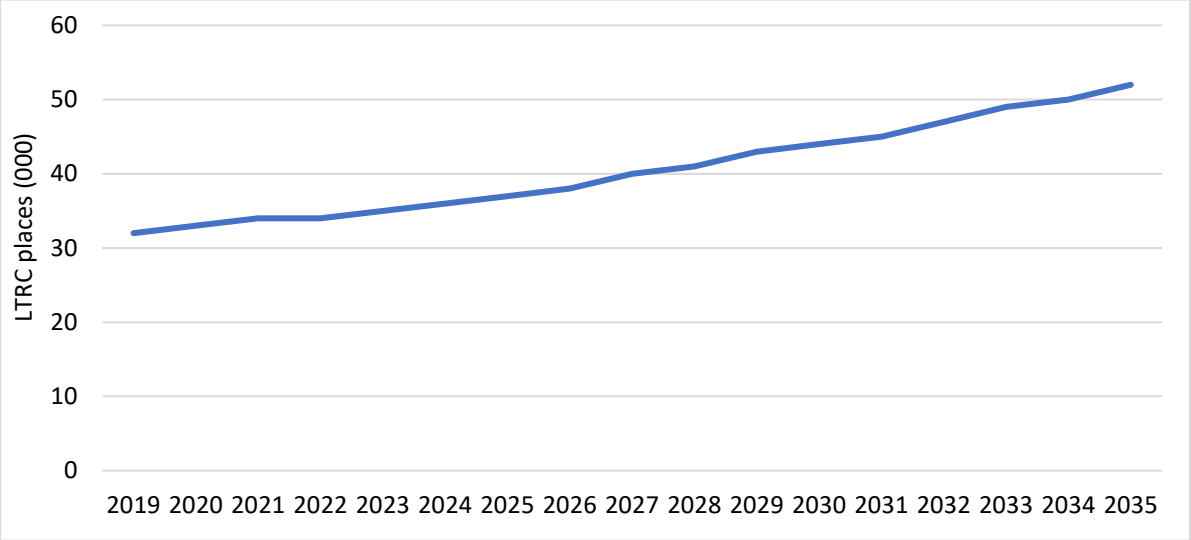
Reflecting the increase and ageing of the population, projected demand for healthcare is also expected to increase significantly in the coming years. Figures 6.1 and 6.2 show the projected increases in demand for inpatient admissions in public hospitals and LTRC from 2019 to 2035 based on projected changes in population growth and (to a lesser extent) population health. Under the central population growth scenario (Keegan et al., 2020), it shows that demand for inpatient admissions would increase by 23 per cent, while demand for LTRC would increase by 63 per cent between 2019 and 2035. Demand for services which are heavily concentrated in older people (e.g. inpatient admission, LTRC and home-based care) will see the largest increases over time, while demand for other services (e.g. maternity services) would experience smaller increases.

FIGURE 6.1 PROJECTED DEMAND FOR INPATIENT ADMISSIONS (PUBLIC HOSPITALS) 2019 – 2035



Source: ESRI Hippocrates query interface.
Note: Based on assumptions of central population growth and dynamic equilibrium healthy ageing and complexity adjusted (Keegan et al., 2020). The central population growth scenario makes a number of assumptions in relation to life expectancy, migration and fertility. For example, life expectancy is projected to increase from 79.5 years for males and 83.4 years for females in 2015, to 82.7 for males and 85.8 for females in 2035 (See Table 3.2 of Keegan et al., 2020 for further detail). The dynamic equilibrium assumption assumes that for every one-year increase in life expectancy, the relevant age-specific healthcare activity rate shifts back one year (See Figure 4.2 of Keegan et al., 2020 for further detail).

FIGURE 6.2 PROJECTED DEMAND FOR LONG-TERM RESIDENTIAL CARE, 2019 – 2035



Source: ESRI Hippocrates query interface.
Note: Based on assumptions of central population growth and dynamic equilibrium healthy ageing (Walsh et al., 2021). The central population growth scenario makes a number of assumptions in relation to life expectancy, migration and fertility. For example, life expectancy is projected to increase from 80.5 years for males and 84.5 years for females in 2019, to 83.5 for males and 86.5 for females in 2035 (See Table 3.2 of Walsh et al., 2021 for further detail). The dynamic equilibrium assumption assumes that for every one-year increase in life expectancy, the relevant age-specific healthcare activity rate shifts back one year.

Arising from the invasion of Ukraine, the CSO notes that 74,458 personal public service numbers (PPSNs) have been allocated to arrivals from Ukraine by the week ending 12 February 2023 (Central Statistics Office, 2023). These additions to the population have not yet been incorporated into the population and healthcare demand projections identified above. While little information is available on the health status and healthcare needs of those arriving from Ukraine or how long they will remain in Ireland, the relatively large numbers involved will likely result in an increase in demand for healthcare services in the short run at least, which will be concentrated in particular regions reflecting the areas in which the arrivals settle. In addition, while the arrivals are on average younger than the general population (and consequently may not be high users of healthcare services), they may have specific health needs due to increased incidence of various infectious diseases in Ukraine, disrupted living conditions before and after leaving Ukraine, as well as difficulties accessing healthcare (Conlon, 2022).

6.2.2 Health status and health treatments/technologies

Over the past 30 years there have been significant improvements in life expectancy in Ireland. However, while people are living longer it is less clear what is happening to health status for these additional years of life. A number of theories have been put forward about the relationship between increased life expectancy and health (Gruenberg, 1977; Fries, 1980; Manton, 1982) with little consensus on which theory is consistent with past trends. Consequently, it is difficult to project how

health status and healthcare needs and demand for different cohorts will change in the future, over and above the change in the composition of the population.

In addition to existing health conditions, new health issues can emerge over time. The recent COVID-19 pandemic showed how a previously unidentified virus can unexpectedly and rapidly take hold causing significant health issues for the population and disruption to the delivery of healthcare. While the COVID-19 pandemic is potentially a once-in-a-lifetime event, the emergence of previously unidentified viruses in the past number of years (including the Ebola virus and SARS) are unlikely to be isolated events and require forethought and planning so that the health system can better respond to new health threats. In particular, there is an urgent need to improve public health infrastructure and information systems (McNicholas et al., 2023) to ensure that Ireland is better placed to respond to future public health threats.

Along with changes in the health status of the population are developments in the treatment and management of a range of health conditions and issues leading to further increases in demand for healthcare services. Of particular relevance in recent years is the development of pharmaceutical products; examples include a number of new drugs to facilitate weight loss. While expenditure on pharmaceuticals is already high in Ireland (Walsh et al., 2021), the development of new drugs (along with projected increases in the number of people who are overweight or obese (Keaver et al., 2013)) will potentially result in an increase in the number of people prescribed these drugs and an associated increase in current healthcare expenditure (Cullen, 2023a) in the short term. What remains unclear is how such developments will impact on the demand for other healthcare services in the longer term including hospital-based activity.

6.2.3 Health system and policy drivers of demand

Many of the proposals in the 2017 Sláintecare report centred on improving access to a range of healthcare services, in part by reducing or removing user fees; such a reduction in user fees will increase demand for healthcare services. For example, a key component of the Sláintecare proposals was the extension of eligibility for GP services free at the point of use to the whole population. Recent analysis found that such an increase in eligibility would result in an additional 1.9 to 2.3 million GP visits in 2026 (Connolly et al., 2023), representing a significant increase in demand for a sector that is already experiencing a high level of demand. Previous analysis by Connolly et al. (2022) estimated that an additional 521 GPs would be required to deliver the additional demand associated with extending eligibility for GP care to the whole population, while the growing and ageing population will further increase the need for GP services.

Sláintecare also recommended the introduction of a statutory home support scheme. While details of the scheme have yet to be finalised, Walsh and Lyons (2021) found that the introduction of such a scheme would significantly increase the demand for home support services. The extension of eligibility will give rise to recurring current expenditure; however the implementation of such significant reforms would also require capital investment in primary and community-based services.

6.2.4 New research insights

The NDP committed to an ambitious programme of capital investment for the health sector. In this section, some recent developments and research findings which may have implications for the capital investment plan are identified and discussed.

6.2.5 Integration across healthcare sectors

Recognising pressures on the hospital system, a key component of the NDP is to significantly increase hospital bed numbers. Notwithstanding some debate about the number of hospital beds that have been added within the last two years (Cullen, 2023b), Walsh and Brick (2023) recently estimated that in 2023 there may be a shortfall of over 900 beds in Irish public acute hospitals. Previous estimates of the need for hospital beds in future years may be underestimated due to higher-than-expected population growth as well as assumptions about how changes in the health system might influence the demand for beds in public hospitals.

The Sláintecare report recommended the removal of private practice from public hospitals as a means of increasing capacity for public patients. However, the amount of increased capacity is likely to be relatively small. Keegan et al. (2018) estimated that in 2015, of the total activity undertaken in Irish public hospitals, private patients accounted for 14 per cent of day patient discharges and 19 per cent of in-patient bed days. The authors further note that most private patients in public hospital under the current system would likely become public patients under the proposed reform. Later work found that an increase in activity in private hospitals arising from the removal of private activity from public hospitals would have implications for capital investment and workforce requirements in private hospitals (Keegan et al., 2021). If the private hospital system fails to increase supply along with demand this could have implications for the public hospital system; for example, the National Treatment Purchase Fund purchases spare capacity in the private hospital system to treat people who have been on the public waiting lists for a long time.

Another key objective of the Sláintecare strategy is to reduce the reliance on acute care facilities through the greater delivery of healthcare in more appropriate

settings including primary and community care facilities. A small body of Irish research has examined potential substitution between hospital and community-based care. There is little evidence to suggest that increasing eligibility for GP care for the under sixes reduced demand for emergency department services for this group (Walsh et al., 2019a; McDonnell et al., 2021). However, other work found that lengths of stay in hospital for older patients were shorter for those living in local health areas with a better supply of home support (Walsh et al., 2020), suggesting that the different types of investment in primary and community care might have different implications for demand for hospital-based services.

Recognising the significant increase in private LTRC (relative to public) facilities in Ireland in recent years, the NDP also committed to increasing public LTRC care capacity. Given the closure of a number of LTRC facilities since the onset of the pandemic (Walsh and Connolly, forthcoming), as well as the projected increases in the demand for LTRC in the coming years (Figure 6.2), there is a need to increase the supply of such facilities. However, there is potential to decrease the number of people requiring LTRC in the future by expanding the provision of community-based services through the implementation of the Statutory Home Support scheme (Walsh and Lyons, 2021).

6.2.6 Workforce

A key concern for the healthcare system is whether there are sufficient healthcare professionals in place for the delivery of healthcare. Recent analysis by Fleming et al. (2022) found that during the recession period 2009-2014 (following the recruitment moratorium), there was a decrease of 8 per cent (n = 9,333) in the publicly employed workforce. However, between 2014 and 2019, staffing levels increased by 15 per cent (n = 16,789) (Fleming et al., 2022), with a further 15 per cent increase between 2019 and 2022 (HSE, 2023). However, changes in the publicly employed workforce have not been consistent across staff groups and services. For example, before the 2008 recession there were 4,485 more full-time equivalent (FTE) staff based in community services compared to acute settings; however, in the subsequent years, staff increases were greater in the acute setting so that by August 2021, there were 13,645 more FTEs in the acute setting (Fleming et al., 2022).

Due to a lack of safe staffing levels, guidelines, and limited data on the privately employed workforce, it is difficult to quantify if, and the extent to which, there are workforce shortages within the Irish healthcare sector. However, the need for healthcare professionals will increase in the coming years in line with the increased demand for healthcare services. Recent analysis examining public acute hospital workforce requirements to 2035 found that there is a need for an additional 2,575 to 3,236 medical staff (FTE) nationally, representing an increase of between 1.7 and 2.1 per cent on average per annum (Keegan et al., 2022). Further, the

implementation of some Sláintecare proposals (including extending eligibility for GP care and the introduction of a statutory home support scheme) will result in further increases in the need for healthcare workers in various categories over and above that arising from demographic changes (Connolly et al., 2022; Walsh and Lyons, 2021).

6.2.7 Regional distribution of resources and investment

Recent analysis by Shine and Hennessey (2022) showed considerable variation in healthcare infrastructure across regional health authorities (RHAs); for example, the number of patients on waiting lists per ambulatory beds available varied from 36 patients waiting per bed in one RHA to 12 in another; while there were 8.4 X-rays machines per 100,000 population in the best served RHA relative to 5.5 in the worst served RHA. While some of these differences are due to the location of centres of excellence and healthcare need (Shine and Hennessey, 2022); earlier analysis by Walsh et al. (2019b) found large inequalities in the supply of a range of community-based health services after adjustment for healthcare needs, suggesting that there are regional inequalities in the supply of a range of healthcare services. In addition, the regional supply of private health and social care services varies, though a lack of data on private services means that it is difficult to quantify these regional differences.

A particular area of concern in this regard is the supply of LTRC facilities. Figure 6.2 showed that the demand for LTRC places would increase by 63 per cent between 2019 and 2035. While in the past public and voluntary facilities were the predominant source of LTRC, in 2022 the private sector accounted for nearly three-quarters of all LTRC beds. In recent years, a number of international private operators have entered the Irish LTRC market with foreign capital having acquired part, or all, of eight of the largest 15 private operators in the country in 2021 (Kehoe, 2021). Such private facilities are motivated by profit which will likely influence where such facilities are located.

6.3 CONCLUSIONS

A growing and ageing population, an ageing capital stock, potential new health threats and treatments, and changes in eligibility will likely lead to increased current and capital expenditure requirements in the coming years. In addition, the COVID-19 pandemic and the Cyberattack of 2021 have highlighted the urgent need to upgrade and develop ICT across the health system. The 2021-2030 NDP provides an ambitious capital investment plan for the health sector which should help to mitigate some existing capacity constraints within the system.

In some instances, investment plans might need to better align with projected demand and supply of healthcare, as well as existing health system reform proposals.

A key principle of the Sláintecare reform proposals (and previous reform proposals) is the re-orientation of the Irish healthcare system away from the hospital sector towards greater delivery of services in the community. Such a reform requires significant investment in primary and community-based services, and a greater understanding of where investments in the community sector might lead to reductions in the demand for hospital-based services. However, currently there may not be sufficient investment in community-based services to facilitate a reduction in the hospital sector. Walker et al. (2021) note that for the 2018-2027 NDP, the majority of planned capital investment was in the acute care setting (with a 70 per cent acute to 30 per cent community care expenditure ratio across the health portfolio). While there is inevitably a need for investment in the acute sector, without reducing inflows to and outflows from the hospital sector (including through greater investment in primary and community-based services including social care for older people), it is likely that demand for hospital-based services will continue to increase significantly in the coming years.

Increasing physical resources and infrastructure is essential to address existing capacity constraints and future healthcare needs. However, equally important is having the appropriate workforce in place. A number of approaches can be adopted to increase and retain the health and social care workforce with the relevant approach likely to differ depending on the category under consideration and including whether there they are publicly employed. Recent increases in the number of GP training places, for example, should help address potential future shortages of GPs. However, there may also be a need to consider working conditions, including pay, in particular for lower paid staff categories including those providing social care within the community and LTRC facilities.

There are existing regional differences in the supply of healthcare infrastructure. Such differences can give rise to inequalities in access to healthcare depending on where a person resides. Consequently, there is a need to consider these existing inequalities (as well as future healthcare needs across areas) when deciding on the allocation of capital investments. For example, the government plan to increase public LTRC capacity should consider the distribution of existing facilities and future projected needs by region to ensure that any imbalances resulting from the increased private provision of LTRC does not lead to further regional inequalities in supply. Walker et al. (2021) note that even when national investment is excluded, Dublin continues to account for the majority of capital investment in the 2018-2027 NDP portfolio at 47 per cent of overall investment; followed by Galway (7 per cent), Cork (6.5 per cent), Limerick (5.5 per cent) and Sligo (2 per cent). Further analysis is required to identify how this allocation aligns with existing and future healthcare needs.

REFERENCES

Central Statistics Office (2023). *Arrivals from Ukraine in Ireland, Series 9*. CSO Frontier Series Output https://www.cso.ie/en/releasesandpublications/fp/p-aui/arrivalsfromukraineinirelandseries9/.

Conlon, C. (2022). 'Health issues among Ukrainian refugees will challenge health systems response', *Irish Medical Times*, 12 May 2022. www.imt.ie/opinion/health-issues-among-ukrainian-refugees-will-challenge-health-systems-response-12-05-2022/.

Connolly, S., C. Keegan, S. O'Malley and M. Regan (2023). *Extending eligibility for general practitioner care in Ireland: cost implications, ESRI Research Series 156*. Dublin: Economic and Social Research Institute.

Connolly, S., M. Wren, C. Keegan and A. Garcia Rodriguez (2022). 'Universal Primary Care in Ireland: Cost and Workforce Implications', *The Economic and Social Review*, Vol. 53, No. 4, pp. 281-298.

Cullen, P. (2023a). **'**Ireland on the cusp of obesity treatment revolution but high cost of drugs causing disquiet', *Irish Times*, 15 April 2023 (accessed 3 May 2023). www.irishtimes.com/health/2023/04/15/new-obesity-drugs-are-highly-effective-but-a-giant-cost-headache-for-the-hse/.

Cullen, P. (2023b). 'Beds in €1 bn HSE capital plan below level needed to cater for growing population', *Irish Times*, 4 April 2023 (accessed 10 May 2023). https://www.irishtimes.com/health/2023/04/04/beds-in-hse-capital-plan-below-level-needed-to-cater-for-growing-population/.

European Commission (2015). *The 2015 Ageing Report: Economic and budgetary projections for the 28 EU Member States (2013-2060).* Brussels: European Commission.

Fleming, P., S. Thomas, D. Williams, J. Kennedy and S. Burke (2022). 'Implications for health system reform, workforce recovery and rebuilding in the context of the Great Recession and COVID-19: a case study of workforce trends in Ireland 2008-2021'. *Human Resources for Health,* Vol. 20, article no. 48.

Fries, J.F. (1980). 'Aging, natural death, and the compression of morbidity', *New England Journal of Medicine, Vol.* 303, pp. 1369-70.

Government of Ireland (2021). *National Development Plan 2021-2030*. Dublin: Government of Ireland.

Gruenberg, E.M. (1977). 'The failures of success', *Milbank Memorial Fund Q Health Society*, Vol. 55, No. 1, pp. 3-24.

Hennessey, M., C. Shine and E. Walker (2021). *Healthcare capital investment in Ireland: analysis of historical capital investment in healthcare*. Dublin: Government of Ireland.

Houses of the Oireachtas 'Committee on the Future of Healthcare' (2017). *Sláintecare report*. Dublin: Houses of the Oireachtas.

HSE (2023). *Health Sector Workforce Report: 2022 Annual Turnover Rates*. Dublin: Health Service Executive, https://www.hse.ie/eng/staff/resources/our-workforce/workforce-reporting/turnover-report-2022.pdf.

Keaver, L., L. Webber, A. Dee, F. Shiely, T. Marsh, K. Balanda and I. Perry (2013). 'Application of the UK foresight obesity model in Ireland: the health and economic consequences of projected obesity trends in Ireland', *PLoS One*. Vol. 8, No. 11, e79827.

Keegan, C., A. Brick and M. Wren (2018). *An examination of activity in public and private hospitals in Ireland, 2015,* ESRI Working Paper 601. Dublin: Economic and Social Research Institute.

Keegan, C., A. Brick, A. Bergin, M. Wren, E. Henry and R. Whyte (2020). *Projections of expenditure for public hospitals in Ireland, 2018–2035, based on the Hippocrates Model,* ESRI Research Series 117. Dublin: Economic and Social Research Institute.

Keegan, C., A. Brick, E. Henry and A. Bergin (2021). 'Projected private hospital expenditure in Ireland, 2018-2035: What role for demographics, cost, and Sláintecare?', *International Journal of Health Planning and Management*, Vol. 37, No. 2, pp. 999-1017.

Keegan, C., A. Brick, A. Garcia Rodriguez and L. Hill (2022). *Projections of workforce requirements for public acute hospitals in Ireland, 2019–2035: a regional analysis based on the Hippocrates model,* ESRI Research Series 147. Dublin: Economic and Social Research Institute.

Kehoe, I. (2021). 'Inside Ireland's nursing home sector: The main players, the profits and the deals', *The Currency*, 19 October 2021, 2021. (Accessed 8 May 2023).

Manton, K.G. (1982). 'Changing concepts of morbidity and mortality in the elderly population', *The Milbank Memorial Fund Quarterly Health and Society*, Vol. 60, No. 2, pp. 183-244.

McDonnell T., E. Nicholson, M. Barrett, G. Bury, C. Collins, F. Cummins, C. Deasy, K. Denny, A. De Brún, C. Hensey and E. McAuliffe (2021). 'Policy of free GP care for children under 6 years: The impact on emergency department attendance', *Social Science & Medicine*, Vol. 279, No. 113988.

McNicholas T., L. Hendrick, G. McDarby, S. Mustafa, Y. Zhang, S. Saikat, Z. Jakab and T. Holohan (2023). 'A novel approach to utilizing the essential public health functions in Ireland's health system recovery and reform', *Frontiers in Public Health*, Vol 11, No. 1074356.

Moriarty, J., J. Manthorpe and J. Harris. (2018). *Recruitment and retention in adult social care services. London:* Social Care Workforce Research Unit, King's College London.

Oderkirk, J. (2021). 'Survey results: national health data infrastructure and governance, OECD health working papers 127. Paris: OECD Publishing.

Shine, C. and M. Hennessey (2022). *Health Capital Investment in Ireland: An Analysis of Healthcare Infrastructure Capacity.* Dublin: Government of Ireland.

Sicari, P. and D. Sutherland (2023). 'Health sector performance and efficiency in Ireland'. OECD Economics Department Working Papers, No. 1750. Paris: OECD Publishing.

Walker, E., M. Hennessey and C. Shine (2021). *Strategic considerations for future capital investment in healthcare*. Dublin: Government of Ireland.

Walsh B. and A. Brick (2023). *Inpatient bed capacity requirements in Ireland in 2023: evidence on the public acute hospital system.* ESRI Research Note. Dublin: The Economic and Social Research Institute.

Walsh, B. and S. Connolly (forthcoming). *Long-term residential care in Ireland: developments since the onset of the Covid-19 pandemic*, ESRI Survey and Statistical Report. Dublin: The Economic and Social Research Institute.

Walsh, B. and S. Lyons (2021). *Demand for the Statutory Home Care Scheme, ESRI Research Series 122.* Dublin: Economic and Social Research Institute.

Walsh, B., A. Nolan, A. Brick and C. Keegan (2019a). 'Did the expansion of free GP care impact demand for Emergency Department attendances? A difference-in-differences analysis', *Social Science & Medicine*, Vol. 222, pp. 101-111,

Walsh, B., S. Smith, M. Wren, S. Barron, E. Morgenroth, J. Eighan and S. Lyons (2019b). *Geographic profile of healthcare needs and non-acute healthcare supply in Ireland,* ESRI Research Series 90. Dublin: Economic and Social Research Institute.

Walsh, B., S. Lyons, S. Smith, M. Wren, J. Eighan and E. Morgenroth (2020). 'Does formal home care reduce inpatient length of stay?', *Health Economics*, Vol. 29, No. 12, pp. 1620-1636.

Walsh, B., C. Keegan, A. Brick, S. Connolly, A. Bergin, M. Wren, S. Lyons, L. Hill and S. Smith (2021). *Projections of expenditure for primary, community and long-term care in Ireland, 2019-2035, based on the Hippocrates model.* ESRI Research Series 126. Dublin: The Economic and Social Research Institute and the Minister for Health.

CHAPTER 7 EDUCATION

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7.1 EDUCATION IN THE NATIONAL DEVELOPMENT PLAN

The National Development Plan (2018) set 'access to quality childcare, education and health services' as a strategic objective. In relation to early years education, the NDP emphasised the twin goals of supporting child development and enhancing female labour force participation. To these ends, the plan indicated the need to upgrade and modernise existing facilities as well as address capacity issues in particular areas. At primary and secondary level, the plan indicated the continued prioritisation of the delivery of additional school places to meet demand in specific areas as well as the necessity to modernise existing facilities to support learning (especially in Science and Physical Education) and to facilitate climate action through the energy retrofitting of schools. The ongoing embedding of digital technology in teaching, learning and assessment was specified as an important policy goal, requiring investment to deliver high speed broadband in all areas. In relation to further education (FE) and higher education (HE), the plan highlighted the infrastructural implications of the development of technological universities and the expansion of FE pathways as well as the need to upgrade existing building stock.

In 2021, the review conducted by DPER (Government of Ireland, 2021) highlighted a number of developments since the NDP, including that revised population projections meant that school enrolments were expected to fall at a slower rate than previously forecast, with significant variation in demand across regions. The report indicated that demand for higher education was expected to rise more than had been previously predicted.

7.2 KEY DEVELOPMENTS SINCE NDP 2021 AND INSIGHTS FROM RESEARCH

7.2.1 Early education and care

Although the NDP highlights early learning and childcare as a strategic investment priority, this issue is not discussed in the 2021 review. ESRI central population projection estimates indicate a slight fall (around 10-12,000) in the number of one- to four-year-olds between 2021 and 2035 while high projection estimates (largely driven by migration assumptions) suggest an increase of around 40,000, with the extent of change varying across counties (Keegan et al., 2022). However, recent initiatives to enhance affordability through the National Childcare Scheme could be anticipated to increase future parental demand for provision. In particular, take-up of the second year of the Early Childhood Care and Education (ECCE)

programme is not as high as the almost-universal take-up of year one (Curristan et al., 2023) so there is scope to extend participation. In addition, efforts to enhance affordability are likely to increase take-up among groups previously reliant on informal care (such as family), though the extension of the National Childcare Scheme to childminders may reduce pressure for places in centre-based care (Doorley et al., 2023). Interviews with stakeholders highlight the lack of ready availability of places for very young children[22] and geographical variation in access to places (Curristan et al., 2023). Under the NDP, grants are being offered to providers to help upgrade facilities to improve the quality of the learning environment and their energy efficiency. However, the largely market-led nature of provision in Ireland makes centralised planning of new provision and refurbishment very challenging. Providers tend to be small, with half having under 40 places (Pobal, 2022), meaning that funding needs to be dispersed to a large number of separate providers. For example, the NDP-funded Building Blocks Improvement Grant Scheme provided funding for 141 settings in 2023, representing around 3 per cent of all providers. Further, the lack of systematic data on the quality of existing infrastructure means it is not possible to evaluate the adequacy of NDP capital expenditure for the sector.

7.2.2 Primary education

Planning for school places is based on the Department of Education's Geographic Information System and an inventory of school capacity as well as engagement with stakeholders. At the time of writing, information was not available from the Department's inventory of school capacity to determine how many primary schools had available places. Department of Education projections for 2021 to 2036 indicate an overall fall of around 20 per cent in the primary school-going population until 2033, with some increase thereafter, and a shift in demand towards the Mid-East and Midlands regions. However, these estimates are highly sensitive to migration flows. ESRI projections for a high population scenario (Keegan et al., 2022) suggest that the number of five- to nine-year-olds will decline by 12 per cent until 2028 and increase thereafter to reach levels close to 2021 numbers by 2035.

Existing population projections were estimated before the invasion of Ukraine. CSO figures indicate that for the academic year 2022/2023, 10,089 children from Ukraine enrolled in primary schools. Ukrainian children have generally been accommodated within existing school provision, but it is useful to benchmark the scale of increased enrolment. Given a mean primary school size of 177, in the absence of capacity at school level, this amounts to 57 additional primary schools. There have been arrivals to schools across all counties and the challenges around

22 The Pobal Early Years Sector Profile Report for 2020-2021 indicated that there was a waiting list of 1.5 infants for every place provided to those under one year.

providing accommodation to newly arrived refugees mean that families are not necessarily allocated to areas with spare school capacity. In addition, in 2022, first-time asylum applications were received in relation to 1,930 children and young people under 14 years of age (Eurostat database), leading to additional demands for primary and junior cycle school places. It is difficult to predict how many Ukrainian families will remain in Ireland, though a recent survey indicated that 41 per cent reported intending to stay permanently.[23] It is also likely that there will continue to be a flow of new asylum seekers to Ireland, with consequences for demand for school places.

Government policy on class sizes at primary level will also impact upon the size of school buildings needed. Since 2021, there have been two rounds of reductions to student-teacher ratios in mainstream schools (to 23:1 in 2023), with a lower ratio provided in DEIS Urban Band 1 schools. It would seem reasonable to assume that further reductions in ratios will take place over the course of the period covered by the NDP, given the commitment in the Programme for Government to a continuing reduction. Changes to the student-teacher ratio will have direct consequences for both staffing resource requirements and capital requirements, through additional need for classrooms where schools lack available capacity. The roll-out of the hot meals programme to all DEIS primary schools in 2023/2024, with an extension to all primary schools on a phased basis from 2024,[24] may also have implications for capital expenditure. At present, most schools have meals prepared off-site, though an evaluation of the scheme suggests the need for capital expenditure to ensure places in schools for social eating (DSP, 2022).

While demographic and policy factors play an important role, patterns of school choice at primary level, and especially at second level (see below), make it difficult to draw firm conclusions about the demand for places in particular (types of) schools. *Growing Up in Ireland* (GUI) data from 2017/2018 indicate that multidenominational, minority religion and Irish-medium schools are more likely to be oversubscribed (having more applicants than places) than other school types. In 2021, 89.2 per cent of primary school children attended Catholic ethos schools, down slightly from 91.7 per cent in 2014. This shift has largely been driven by the opening of new multidenominational schools rather than the divestment of Catholic schools, posited by the report on the Forum on Patronage and Pluralism in the Primary Sector (2012).

As well as new school buildings, capital expenditure at primary and second level has been directed towards the provision of special classes or units for children and

23 https://www.ukrainianaction.ie/research-2/ukrainian-action-survey-of-ukrainians-in-ireland-2023.

24 https://www.gov.ie/en/press-release/3d5f9-minister-humphreys-announces-plans-for-roll-out-of-hot-school-meals-to-all-primary-schools/.

young people with special educational needs (SEN) and by the need to upgrade (and retrofit for energy purposes) existing school buildings.

Recent years have seen a growing number of special classes in mainstream schools. Between 2014 and 2021, the number of students attending such classes at primary level increased by 129 per cent (to 8,740) (Department of Education, 2023; see also Daly, 2021). National Council for Special Education (NCSE) figures indicate that the most common designation is for Autism/Autistic Spectrum Disorders (ASD) or ASD Early Intervention. Research conducted before the recent expansion of special class provision highlighted 'the need for greater discussion around how best to provide for the full diversity of need within the school system' (Banks et al., 2016). It is likely that demand for special class places will continue to increase, with an increase in the number of special classes already announced for 2023/2024, with resulting implications for capital expenditure. Further research as well as the current review of the *Education for Persons with Special Needs Act (2004)* could usefully inform the future development of the model for children and young people with diverse types of SEN.

Systematic information on the quality of infrastructure in primary (or second-level) schools is not available to the research team, with the need for a fully integrated asset management system on the condition of schools indicated by the CNAG (2019a). However, GUI data collected from school principals in 2017/2018 provide useful insights into their perceptions of facilities. A significant minority of primary school children are attending schools where different types of facilities are described as poor or fair (as opposed to good or excellent), including sporting facilities (40 per cent), playgrounds[25] (39 per cent), toilet facilities (36 per cent), facilities for children with SEN (34 per cent) and the condition of the building (28 per cent). Smaller schools tended to report poorer quality sports facilities and facilities for children with SEN. Over four-in-ten of the sampled nine-year-olds were attending a school built before 1965 and smaller schools were more likely to be based in older buildings. Older buildings were somewhat less likely to have been refurbished in the five years prior to the survey. Research indicates that, in older schools, restricted space is seen as constraining the range of teaching methodologies, thus impinging on the ability to fully deliver the curriculum (Darmody et al., 2010). Over a quarter of the GUI sample were attending a school where one or more prefabs was being used. The use of prefabs is more common in larger schools but does not vary markedly by the building being older or recently refurbished. The scale of upgrading of school buildings required can only be assessed with access to an up-to-date audit of existing facilities. However, existing

[25] Previous research has highlighted the centrality of outdoor space in children's experiences of primary school (Darmody et al., 2010), suggesting the need for greater attention to the design and layout of outdoor space, incorporating a variety of play surfaces and playground equipment along with a school garden.

survey data suggest the need for large-scale upgrading of existing primary schools in order to facilitate the provision of engaging teaching and learning, the inclusion of children with SEN, meeting energy efficiency goals, and promoting physical activity among children. The latter point is particularly important given recent evidence that regular sports participation among nine-year-olds has declined over a decade (Smyth, 2022).

7.2.3 Second-level education

Department of Education projections indicate that the demand for second-level places is expected to rise by 8 per cent, peaking in 2024 and then falling by 20 per cent by 2036. ESRI projections for a high-migration scenario (Keegan et al., 2022) suggest a smaller drop in numbers for 10–19-year-olds (around 8 per cent) after 2024. As at primary level, there is a predicted shift towards greater demand in the Mid-East and Midlands. CSO figures indicate that for the academic year 2022/2023, 5,484 young people from Ukraine enrolled in second-level education. To indicate the scale of this increase, given a mean second-level school size of 599, in the absence of capacity at school level, this amounts to nine additional second-level schools. In addition, in 2022, first-time asylum applications were received in relation to 490 young people aged 14 to 17 years of age (Eurostat database), leading to additional demands for second-level school places.

Data provided by the Department of Education (as of February 2023) indicate that only eight (out of a total of 314) planning areas have utilised capacity in second-level schools of below 90 per cent, with 44 having capacity below 95 per cent. Capacity appears to be greater outside the areas with higher levels of future predicted demand.

Active school choice is even more evident at second-level than at primary level, with around half of students not attending their nearest (or most accessible) school (Smyth et al., 2004). GUI data indicate significant variation between schools in levels of oversubscription, with single-sex schools more likely to be oversubscribed than coeducational schools, in a context where no new single-sex schools have been opened in recent years and a number of single-sex schools have been amalgamated.

In 2015/2016,[26] a significant minority of principals described facilities in their schools as poor or fair, especially in relation to sports facilities (37 per cent) and lab/science facilities (32 per cent). Sports and science labs were seen as poorer quality in smaller schools, with DEIS and girls' schools also more likely to have poorer quality sports facilities. Figures from the Department of Education in 2023

[26] At the time of writing, GUI data collected from second-level principals in 2022 have not yet been released.

indicate that a tenth of second-level schools do not currently have access to a PE hall either on the school campus or nearby.[27] The NDP commitment to modernise PE/sports and science laboratory facilities is therefore to be welcomed in order to facilitate schools fully delivering the curriculum. In 2015/2016, GUI survey data indicate that a third of second-level students were attending schools built before 1960, with 43 per cent attending schools refurbished in the five years prior to the survey. Older buildings were less likely to have been recently refurbished. As at primary level, smaller schools tended to be located in older buildings.

As at primary level, there has been a significant growth in the number of second-level students in special classes, with consequences for the level of capital expenditure needed. Although overall numbers involved are smaller than at primary level, the pace of growth has been even greater. Between 2014 and 2021, the number of second-level students attending such classes increased by 204 per cent (to 3,178) (Department of Education, 2023), with a further expansion planned for 2023/2024.

7.2.4 Common issues for primary and second-level schools

In addition to delivering the formal curriculum, schools in Ireland play an important part in facilitating access to the kinds of sports and cultural activities that enhance in-school learning and broader socioemotional development. Provision of these extracurricular activities is lower in small schools (Nolan and Smyth, 2020; Smyth, 2020). The challenges for smaller schools suggest the potential for cross-school cooperation in provision and/or an enhanced role for community-based provision in some areas, highlighting the importance of a coordinated approach between education stakeholders and investment priorities for sports facilities under the National Sports Policy 2018-2027.

There is no information available to the research team on the needs of schools regarding energy retrofit. The Department of Education has commenced an energy assessment of over 500 schools and is planning to secure funding to assess all schools in order to identify and target schools for upgrading (Department of Education, written communication). The prevalence of older buildings and, at primary level, small schools means that retrofitting all schools is likely to be highly resource intensive.

The Digital Strategy for Schools sets priorities for investment in infrastructure and for the need to embed technologies in teaching, learning and assessment. School access to high-speed broadband is fundamentally contingent on the roll-out of the

[27] https://data.oireachtas.ie/ie/oireachtas/debateRecord/joint_committee_on_education_further_and_higher_education_research_innovation_and_science/2023-01-31/debate/mul@/main.pdf.

National Broadband Plan. The pandemic experience highlighted the fact that around half of children did not have access to sufficient quality broadband to engage in remote learning (GUI Study Team, 2021; see also MacDomhaill et al., 2021). Research suggests that the embedding of technology in teaching and learning is crucially dependent on professional development for teachers (initial and continuous) as well as school access to technical support (McCoy et al., 2016). Thus, the full value of investment in technology will not be fully realised without these prerequisites.

There is a clear case for significant capital expenditure on new school buildings in certain regions given demographic projections and, on the basis of available evidence, for the upgrading of existing schools. However, the effective use of capital investment to enhance educational outcomes is crucially dependent on levels of current expenditure and broader challenges in the education sector. A report on teacher supply is forthcoming, though there is evidence of difficulties recruiting teachers for STEM subjects, posing challenges in leveraging improved school facilities to enhance student outcomes. Furthermore, continuous professional development is key given ongoing curriculum reform and subject review, as well as developments around digital learning. The pandemic has had significant effects on learning loss and well-being. Measures to address student needs as a result of the pandemic have included an expanded summer programme (for students with special needs and those at risk of educational disadvantage)[28] and the COVID Learning and Support Scheme (CLASS). The latter provided additional teaching hours for schools on a one-off basis for a single school year, with a modest level of support (an additional 625 teaching hours per year for a school of 600 students). Furthermore, there are ongoing issues around access to mental health services for children and young people, creating difficulties for some to engage in learning.

7.2.5 Further and higher education

The NDP provides for funding to build or upgrade facilities to enhance teaching and learning but there is also capital investment to enhance the research infrastructure in higher education institutions (and beyond). The period since the NDP has seen significant policy change in relation to further and higher education, with the Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) set up in 2020 and ambitious plans by DFHERIS and SOLAS to expand apprenticeships, integrate FE into the CAO application process and establish new pathways between FE and HE. The period has also seen the roll-out of technological universities, a development that involves consortia of former Institutes of Technology coming together to address regional social and economic needs,

[28] In 2021, the summer programme was offered in 39 special schools, 586 primary schools and 99 second-level schools.

engage in industry-focused research and play a strong role in facilitating access through relationships with the further education sector.

The 2021 NDP review (Government of Ireland, 2021) states that demand for higher education is expected to rise until 2030 but does not quantify the level, and does not give any projections of demand for further education. ESRI projections (Keegan et al., 2022) suggest that the numbers of 20–24-year-olds will continue to rise until 2032, indicating a larger potential pool of HE entrants. Broderick and Smith (2022) use a detailed projection model based on different levels of transfer rates between second-level and higher education as well as assumptions about the number of international students. All scenarios predict a substantial increase in HE enrolment until the early 2030s, with falls thereafter still remaining above 2020/2021 levels. This spending review looks at the implications for current rather than capital expenditure, but the scale of the numbers predicted would suggest the need for greater capital investment. The *Funding the Future* policy (DFHERIS, 2022) commits to an increase in core funding for HE institutions and recognises the need to reduce student-staff ratios in the sector. Such a reduction would likely have capital implications in terms of requirements for additional spaces for learning.

Further education is less dependent on demographic projections of the numbers of young adults because of its role in the provision of second-chance education and upskilling for adults (McGuinness et al., 2014). However, Post-Leaving Certificate and apprenticeship courses attract significant numbers of young people so the demographic patterns will likely result in rising demand. There are also important interdependencies between FE and HE so, for example, expansion of apprenticeship places may impact on HE entry, or new pathways from FE may lead to more HE students. Further, labour market changes resulting from automation and digitisation as well as the need to provide education and training in the field of energy retrofitting are likely to require new FE provision. The expansion of apprenticeships (with a target of annual recruitment figures of 10,000 by 2025), the development of new pathways from FE to HE and the inclusion of FE courses in the CAO process would all be expected to further increase demand. Other aspects of the NDP including housing, healthcare and climate action will have implications for the type of education and training at both FE and HE levels needed to support these goals (see Chapters 3, 7 and 9). There has been a recent announcement of increased healthcare places and a commitment for the HEA to identify how such capacity can be expanded on a sustainable basis. The funding of 50 healthcare places for Irish students in Northern Ireland provides a potential model for better utilising capacity on an all-Ireland basis.

The research team does not have access to information on potential capacity at FE or HE levels or on the quality of existing infrastructure, making it difficult to assess

whether planned expenditure matches needs.[29] Information from a survey of PLC providers (McGuinness et al., 2018) indicated that almost half (45 per cent) saw the condition of their building as poor or fair, with the majority dissatisfied with sports and library facilities and around half dissatisfied with facilities for students with SEN. A survey of Youthreach coordinators and Community Training Managers (Smyth et al., 2019) indicated that over half were 'not satisfied' with facilities for young people with SEN and six-in-ten were dissatisfied with the space for sport and other activities; over a quarter were not satisfied with the condition of the building, with many Youthreach centres located in adapted schools or industrial premises. Significant capital investment in FE has taken place since the period of these surveys but there is no available information on the current quality of infrastructure. The importance of FE for young people with SEN and for those who had previously disengaged from education means that the upgrading of these facilities should be a priority.[30] At HE level, *Funding the Future* proposes improvements in student grant levels but rising student costs, particularly in terms of accommodation, are likely to pose a challenge to continuing expansion (see Expert Group on Future Funding for Higher Education, 2016; DFHERIS, 2022). Furthermore, the Comptroller and Auditor General (CNAG, 2019b), in a review of ten projects, suggested there may be a lack of capacity within the sector to manage large-scale capital projects and that learning from the experience of such projects could be better shared across the sector.

7.3 CONCLUSIONS

The implications of demographic trends for capital expenditure on education are highly sensitive to assumptions around migration. 'Central' assumptions indicate a slight fall in the early years cohort to 2035, a more substantial fall in the primary cohort and (after 2024) in the secondary cohort, and a continued rise in the potential pool of school-leaver entrants to further and higher education. However, assuming higher levels of inward migration suggests an increase in the under-4s, only a temporary decline in the under 10s and a smaller drop for 10-19-year-olds. Despite the assumptions made, there is a shift in demand towards the Mid-East and Midlands regions, meaning ongoing need for new school buildings in some areas. Potential increased demand for early years provision and for further and higher education places will also require investment in new (or extended) buildings.

A key issue is the lack of systematic evidence on the quality of infrastructure across the system from early years to higher education, creating challenges in providing specific recommendations as to priorities. In the absence of such information, we

29 The HEA annual report for 2020 references a space survey being conducted on the quality of HEI infrastructure but no results have been published to date.

30 Evidence from England points to positive impacts for young adult learners from large-scale capital investment in further education (Gibbons et al., 2021).

can only rely on available survey evidence. This suggests a large proportion of older school buildings at primary and second level experience challenges around facilitating full access to learning opportunities during and outside the school day; this is particularly so for small schools. There is therefore a strong case for large-scale investment in the upgrading of facilities. The case for energy retrofitting of schools, which will be resource intensive given the number of small and/or older schools, relates to largely climate goals rather than direct benefits to students (though the reduction, for example, in damp or cold rooms may benefit them). Similar issues of older buildings appear evident for many FE providers. The effectiveness of capital investment is fundamentally dependent on the levels of current expenditure and their efficient use. Tackling any issues around teacher supply, ongoing curriculum review and reform, and the professional development needed to support this are all key in ensuring the best use of capital investment. The education sector faces similar challenges around building planning, costs and delivery as other sectors of the economy, issues that are discussed in the other chapters of this report.

REFERENCES

Banks, J., S. McCoy, D. Frawley, G. Kingston, M. Shevlin and F. Smyth (2016). *Special classes in Irish schools phase 2: A qualitative study*. Dublin: ESRI.

Broderick, R. and J. Smith (2022). *Spending Review 2022: Demographics in the Higher Education Sector*. Dublin: Government of Ireland.

Comptroller and Auditor General (CNAG) (2019a). *Annual report, Chapter 7*. Dublin: CNAG.

Comptroller and Auditor General (CNAG) (2019b). *Delivery of capital projects in the higher education sector*. Dublin: CNAG.

Curristan, S., F. McGinnity, H. Russell and E. Smyth (2023). *Early childhood education and care in Ireland and Northern Ireland*. Dublin: ESRI.

Daly, L. (2021). *Spending Review 2021: Disability and Special Education Expenditure*. Dublin: Government of Ireland.

Darmody, M., E. Smyth and C. Doherty (2010). *Designing primary schools for the future*. Dublin: ESRI.

Department of Education (2023). *Education indicators for Ireland*. Dublin: Department of Education.

DFHERIS (2022). *Funding the Future: Investing in Knowledge and Skills*. Dublin: DFHERIS.

Doorley, K., D. Tuda and L. Duggan (2023). *Extending the National Childcare Scheme to Childminders: Cost and Distributional Effect.* Dublin: ESRI.

DSP (2022). *Evaluation of the School Meals Programme.* Dublin: DSP.

Expert Group on Future Funding for Higher Education (2016). *Investing in National Ambition: A Strategy for Funding Higher Education*. Dublin: Government of Ireland.

Forum on Patronage and Pluralism in the Primary Sector (2012). *Report of the Forum's Advisory Group*. Dublin: Government of Ireland.

Gibbons, S., C. Hupkau, S. McNally and H.G. Overman (2021). *The Effects of College Capital Projects on Student Outcomes*. London: LSE.

Government of Ireland (2021). *National Development Plan 2021-2030*. Dublin: Government of Ireland.

GUI Study Team (2021). *Growing Up in Ireland Key Findings: Special COVID-19 Survey*. Dublin: DCEDIY/ESRI/TCD.

Keegan, C., A. Brick, A. García-Rodríguez and L. Hill (2022). *Projections of workforce requirements for public acute hospitals in Ireland, 2019-2035: A regional analysis based on the Hippocrates model*. Dublin: ESRI.

Mac Domhnaill, C., G. Mohan and S. McCoy (2021). 'Home broadband and student engagement during COVID-19 emergency remote teaching', *Distance Education*, 42(4), 465-493.

McCoy, S., S. Lyons, B. Coyne and M. Darmody (2016). *Teaching and learning in second-level schools at the advent of high-speed broadband.* Dublin: ESRI.

McGuinness, S., A. Bergin, E. Kelly, S. McCoy, E. Smyth, D. Watson and A. Whelan (2018). *Evaluation of PLC programme provision*. Dublin: ESRI.

McGuinness, S., A. Bergin, E. Kelly, S. McCoy, E. Smyth, A. Whelan and J. Banks (2014). *Further education and training in Ireland: Past, present and future*. Dublin: ESRI.

Nolan, A. and E. Smyth (2020). *Clusters of health behaviours among young adults in Ireland*. Dublin: ESRI.

Pobal (2022). *Annual early years sector profile 2020/21*. Dublin: Pobal.

Smyth, E. (2020). *Arts and cultural participation among 17-year-olds*. Dublin: ESRI.

Smyth, E. (2022). *The changing social worlds of 9-year-olds*. Dublin: ESRI.

Smyth, E., J. Banks, J. O'Sullivan, S. McCoy, P. Redmond and S. McGuinness (2019). *Evaluation of the National Youthreach Programme*. Dublin: ESRI.

Smyth, E., S. McCoy and M. Darmody (2004). *Moving up: The experiences of first year students in post-primary education*. Dublin: ESRI.

CHAPTER 8 CROSS-CUTTING THEMES

Kelly de Bruin, John Curtis, Conor O'Toole and Alan Barrett

8.1 CLIMATE COMMITMENTS AND POLICIES

Kelly de Bruin

8.1.1 Introduction

Climate considerations are crucial in policy-setting due to the urgency of climate change. By incorporating climate factors into policy decisions, governments can effectively address climate change while advancing multiple societal goals. Climate will need to play an overarching role in policy-making across the board, particularly given Ireland's ambitious emission reduction target. Ireland has committed to reducing its greenhouse gas (GHG) emissions by 51 per cent by 2030 compared to 2018 (Government of Ireland, 2021a; 2023) and an alignment between climate policies to reach this target and government investment plans is essential. This chapter discusses Ireland's climate commitments, national policies and EU policies in regard to the NDP and the challenges that we face in reaching this target.

8.1.2 Ireland's commitments

Global recognition of the need to limit climate change has driven global negotiations concerning combined efforts to decrease GHG emissions over the past decades within the United Nations Framework Convention on Climate Change (UNFCCC). In 2015, the Paris Agreement was adopted and to date has been ratified by 195 states and the European Union; the global commitment to this agreement was reinforced in the Conference of Parties (COP) held in November 2022 and the resulting Glasgow Climate Pact. Under the Paris Agreement, the EU has submitted its EU-wide emissions targets (through Nationally Determined Contributions (NDCs)). The EU has committed to a GHG emissions reduction goal of at least 55 per cent compared to 1990 levels by 2030 and net-zero emissions target for 2050. This target has been legislated through the EU Climate Law, making it legally binding.

To achieve these targets at the least cost, the EU has implemented a cap-and-trade system, namely the EU Emissions Trading System (ETS). It operates in all 28 EU countries as well as in Iceland, Liechtenstein and Norway, and covers 45 per cent of EU GHG emissions. In this system, large energy-using installations (power stations and industrial plants) and airlines in the EU must buy emissions allowances. Companies can trade emissions allowances throughout the EU, ensuring that emissions are reduced where it costs the least to do so. The remaining 55 per cent of emissions fall under non-ETS emissions and are to be reduced through Member State (national) policies, where the EU sets individual binding targets for each Member State. Non-ETS emissions are the result of three

main sources: agriculture, transport and residential heating. The non-ETS legally binding target for Ireland is set at a reduction of 30 per cent compared to 2005 levels by 2030, where Ireland will face financial consequences should it not meet its targets. Ireland needs to set its own climate policies to ensure the non-ETS targets are met in addition to the EU climate policies.

Ireland has committed to reducing its emissions, where the Programme for Government of 2020[31] included an annual emission reduction target of 7 per cent, resulting in a 51 per cent reduction of emissions by 2030 (Government of Ireland, 2021; 2023). This target was made legally binding by the recent *Climate Action and Low Carbon Development (Amendment) Act* of 2021 and further commits to net-zero emissions by 2050. The Government has also made significant efforts over the past years to formulate and introduce policies needed to ensure these targets are met. The Climate Action Plan provides a plan of measures designed to achieve this goal.

8.1.3 Climate Action Plan

Ireland's Climate Action Plan (CAP23; Government of Ireland, 2023) is a comprehensive strategy developed by the Irish government to address climate change, reduce greenhouse gas emissions, and transition to a low-carbon economy. The plan outlines a roadmap with specific targets, policies and measures across various sectors. The CAP23 includes an extensive range of actions covering the energy sector; transport sector; building and heat; agriculture and land use; waste management; research, innovation and education and a just transition. The CAP23 is ambitious, and the implementation and success of the associated actions will be challenging. Here we discuss the current achievement of the plan and several of the main challenges concerning its implementation.

Concerning the energy sector, CAP23 includes the increase of the renewable share in electricity generation (RES-E) to 80 per cent by 2030 (5 GW from offshore wind, 9 GW from onshore wind, and 8 GW from solar photovoltaics (solar PV)) involving large-scale investments. The potential cost of these were discussed in the Energy chapter, where several regulatory, planning and supply constraints were identified. The government set a target for RES-E of 40 per cent for 2020 and Ireland fell just short of this target, achieving 39.1 per cent RES-E in 2020.

The National Residential Retrofit Plan sets out the Government's approach to achieving the CAP23 target of 500,000 homes retrofitted to a Building Energy Rating of B2 by the end of 2030. The plan estimates that 120,000 residential

[31] https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/.

retrofits will be needed by 2025. Currently, the number of upgrades to B2 achieved is only 18,527 (SEAI, 2023) despite generous government retrofit grants over the past years. Behavioural change plays a crucial role in the successful adoption and long-term effectiveness of building retrofit measures and more research needs to be conducted and policies designed to ensure the needed changes are made. Furthermore, recent empirical literature shows that the level of emissions reduction achieved by upgrading to a B2 BER is lower than expected due to behavioural changes after upgrading, see e.g. Meles et al. (2023).

The CAP23 targets 945,000 Electric Vehicles (EVs) on the road by 2030; this will require significant investment in EV charging infrastructure and large-scale behavioural change by households. Currently, there are approximately 70,000 EVs in Ireland representing 3 per cent of total vehicles. In 2022, a record number of EVs were purchased; however EVs still only accounted for 20 per cent of passenger vehicles sold. Besides concerns from the demand side, concerns have been raised whether the supply of EVs will rise fast enough to keep up with demand. Supply chain constraints and limited minerals (such as lithium) are a concern, however IEA (2023) estimates that battery supply can meet demand.

Another concern is that even with the CAP23 measures, the resulting emission reduction will fall short of the 7 per cent annual target. The latest EPA emissions projections (EPA, 2023) show an *increase* in emissions of 6 per cent in 2022 compared to 2021. The EPA estimates a With Additional Measures (WAM) scenario which includes the bulk of the CAP23 actions; however it does not include an approximate 9 Mt CO_2 emission reduction that is included in the CAP23. This emissions reduction refers to unallocated emission reduction (no source or means are identified in CAP23) and hard to model forms of reduction such as low carbon construction. The WAM emission reduction falls short by almost 20 Mt CO_2 in 2030. The development of additional policies is needed to ensure targets are met. The implementation of the Sectoral Emissions Ceiling is a welcome development in this regard. Nonetheless, regular monitoring, review, and adjustment of the plan's implementation will be necessary to ensure progress towards the target, where adjustments and increased efforts seem necessary.

8.1.4 Macroeconomic impacts of climate policies

The transition to a low-carbon economy will have significant macroeconomic impacts that can affect various sectors, employment, investments, and overall economic growth. These impacts need to be estimated and considered in policy-making and investment choices. Given the large-scale transition required across all sectors and households, estimating the overall macroeconomic impacts is no easy task and a significant research effort is needed.

Climate policies in the form of taxation, such as carbon taxation or the reduction of fossil fuel subsidies will have a dampening impact on the economy. De Bruin and Yakut (forthcoming, a) estimate that without additional policies the government carbon taxation path will result in a decrease of GDP of 1.4 per cent by 2030, whereas the removal of fossil fuel subsidies will result in a decrease of 1.6 per cent in the same period. However, compensating policies that boost the economy such as reduced other taxation, investments in renewable energy generation etc. can reduce these impacts. De Bruin and Yakut (forthcoming, b) show that when combined with carbon tax revenue recycling, where carbon tax revenues are earmarked for a specific purpose, carbon taxation can help reduce emissions and increase economic growth and household equality. The continued rise in the EU ETS price will also have dampening effects on the economy. Recent EU projections estimate an ETS price of €410 per tonne of CO_2 in 2050, which will have large impacts on the economy. To ensure an efficient and smooth transition to a low carbon economy, the overall impacts of the complete climate policy bundle need to be considered. This will also identify pressure points, such as the construction sector, which is facing high levels of demand which will continue in the future as discussed in Chapter 3.

8.1.5 Conclusions

Ireland's legally binding emission reduction targets need to be considered in all aspects of policy-making. The current achieved emission reduction and planned actions under the CAP23 if implemented do not guarantee these targets will be met. Our climate policy efforts need to increase rapidly to ensure our targets are met. This requires a continued assessment of policies and their emission reduction results to allow for necessary adjustments. Finally the overall macroeconomic impacts of climate policies and their interaction should be considered to ensure a feasible, efficient and just transition to a low carbon economy.

REFERENCES

de Bruin, K. and A.M. Yakut (forthcoming, a). *The Mixology of a Triple Dividend: An Investigation of Mixed Carbon Tax Revenue Recycling Schemes.*

de Bruin, K. and A.M. Yakut (forthcoming, b). 'The Impacts of Removing Fossil Fuel Subsidies and Increasing Carbon Taxation in Ireland', *Environmental and Resource Economics*, 85(3-4), 741-782 (2023). https://doi.org/10.1007/s10640-023-00782-6.

EPA (2023). 'Ireland's Greenhouse Gas Emissions Projections 2022-2040'. https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2022-2040.php.

Government of Ireland (2021). *Climate Action and Low Carbon Development (Amendment) Act 2021* [online]. Available: https://www.irishstatutebook.ie/eli/2021/act/32/section/15/enacted/en/html [Accessed 31 May 2023].

Government of Ireland (2023). 'Climate Action Plan 2023 (CAP23)' [online]. Available: https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/ [Accessed: 15 May 2023].

IEA (2023). 'Global EV Outlook 2023'. IEA, Paris https://www.iea.org/reports/global-ev-outlook-2023, License: CC BY 4.0

Meles, T.H., N. Farrell and J. Curtis (2023). 'Are energy performance certificates a strong predictor of actual energy use? Evidence from high-frequency thermostat panel data'. Economic and Social Research Institute. ESRI Working Paper No. 749.

Sustainable Energy Authority of Ireland (SEAI) (2023). 'National Retrofit Plan Quarterly Report –Full Year 2022'. [online]. Available: SEAI-Retrofit-Annual-Report-2022.pdf [Accessed: 7 June 2023].

8.2 PLANNING

John Curtis and Conor O'Toole

8.2.1 Background

Over the course of the NDP and beyond, there will be substantial investment in new housing and national infrastructures. Tens of thousands of new housing units are urgently needed with a high level of demand (from both natural demographic increase as well as migration) set to continue beyond the next decade. Additionally, in line with the targets of the Climate Action Plan, there will be considerable new investment in renewable energy generation (e.g. wind, solar, etc.) and other associated infrastructure (e.g. transmissions lines, storage, etc.) required to meet climate targets. All of these activities will draw on the already constrained capacity of the construction sector.

Most of the projects under the NDP will be subject to planning and so will place additional demands on a system which is already under strain. Additional to the reform of the planning system, and in the absence of increased resourcing to the operation of the planning process, this will likely lead to increased bottlenecks and so slower progress in NDP delivery, as well as other projects both public and private.

While the possible creation of additional delays is a concern, we consider below the direct impact of planning regulations (such as zoning, land use, time and efficiency of the planning process) and building requirements (such as density limits, environmental regulations, green space etc.) on infrastructural development, including housing. Increasingly there is evidence that planning and regulatory delays have impeded investment with associated significant impacts on the economy and wider society. In discussing these issues in the sections below, we are not arguing that planning requirements be weakened. Instead, we want to discuss the trade-offs which arise between, for example, the protection of existing environmental features in a specific location and the capacity to house people.

8.2.2 Existing literature

While most of the international research on housing markets has focused on the determinants of house prices and their interaction with the credit market, more papers are turning to the issue of housing supply, planning, and land use. Quigley and Raphael (2005) use data on land use zoning in California and show that stricter land use restrictions had a notable impact on housing output. Indeed, in a broader review of the impact of land use regulations on housing supply in the US, Quigley and Rosenthal (2005) also note that when local regulators remove land from supply though policies such as zoning or growth management, this can have a detrimental effect on housing output levels and raise prices. They find that caps on

development, restrictive zoning limits on allowable densities, urban growth boundaries, and long permit processing delays, have all been associated with increased housing prices.

In the UK, Hilber and Vermeulen (2016) explore the impact of supply on prices across 353 local planning authorities, finding that regulatory constraints have a substantive positive impact on prices, particularly in urban areas with tight supply. Similar findings have been noted for Brazil by de Andrade Lima and Neto (2019), where land use regulations are linked to higher rents. In the United States Albouy and Ehrlich (2018) find that land-use restrictions impose costs that appear to exceed quality-of-life benefits, whereas in California the requirement for additional regulatory reviews by governmental agents to gain approval of new developments is associated with a 4 per cent increase in the prices (Quigley et al., 2008). In summary, there is evidence from the international literature that while the regulatory control of housing is necessary for orderly development, that its implementation does impose costs on society. The challenge for policymakers is to minimise that regulatory burden while ensuring standards of quality for the built environment and a public safety perspective, as well as meeting other policy goals such as reducing emissions and ensuring balanced regional development.

Two research papers on planning and regulation in Ireland are particularly relevant. Lyons (2015) considers the impact of costs and regulations on housing supply. He finds that the median time to a planning application was 61 days. He also finds that planning conditions did not loosen with the housing market bubble and an important distinction must be made between regulation of the planning process (permit) and the regulation of the output (building). Most notably, the study reports research on the impact of building regulations on the cost of construction as follows:

> *the figures indicate that the construction cost of a three-bedroom semi-detached house, the most common unit built, rose by almost €10,000 a year on average between 2009 and 2014. This substantial increase of almost one third in construction costs, at a time of static incomes and falling house prices, was driven by regulatory changes, with increased minimum sizes (in 2010) accounting for 40 per cent of the increase, greater required energy efficiency (Part L, 2011) for a further 40 per cent and costs relating to the 2014 Building Control (Amendment) Regulations adding 10 per cent.*

In the case of nationally important infrastructure the impacts can be more pervasive. Longoria et al. (2022) examine the impact of planning and regulatory delays for major energy infrastructure. They find that delays have meaningful impacts on electricity prices, system emissions, infrastructure investment and system operating costs. While their analysis is illustrative, it shows that delays in

the regulatory process out to 2030 for renewable energy infrastructure could lead to up to a 10-percentage point increase in electricity prices and also higher carbon dioxide emissions than would otherwise arise. Their analysis draws attention to the linear sequencing of authorisations for energy infrastructure (i.e. planning permission and/or ABP, grid connection, licence to generate, authorisation to construct, renewable electricity support scheme), which with better coordination across public bodies could substantially shorten the development length of new projects.

8.2.3 Irish policy context and issues to consider for NPF review

The above evidence clearly highlights the importance of zoning, land use, planning and building regulations in terms of determining housing supply. In terms of understanding the delivery of the NDP and its ability to achieve stated objectives, detailed research is required to understand the role of planning and building regulations on the cost side of the housing supply, as few studies have rigorously done this in Ireland to date apart from Lyons (2015). Without an evidence base as to how planning, zoning, building regulations and construction interact, it is not possible to consider the appropriate policies or institutional reforms that could increase housing supply. Indeed, Lyons (2015) indicates that some of the regulatory choices after the financial crisis have substantially increased the cost of construction. While these changes may be needed and meritocratic, more focus on the broad impact of all these restrictions (such as density) need to be examined. Furthermore, many of the themes could also apply to the delivery of critical infrastructure, and trade-offs must be examined specifically in relation to impediments to the provision of energy efficiency and renewal infrastructure.

Several further issues are worth focusing on in this context. First, further research is needed on the *efficiency of the planning system* itself. For example, an analysis of the number of planning appeals and the length of time taken for their adjudication should be factored into timelines for delivery of capital projects. Latest data from An Bord Pleanála indicate a 20-week wait period for planning appeal case decisions in 2021 (ABP, 2022); however, more detail is needed on the type of appeal, the number of units affected and what this means for delivery objectives. One aspect is that An Bord Pleanála's remit is quite broad, adjudicating on planning issues with respect to large-scale national infrastructure, as well as minor issues with respect to private dwellings. Final decisions on local projects might be more efficiently administered locally either via a local planning appeal or building controls processes.

Some nationally important projects require more than just planning. For example, energy projects may require authorisations to connect to the grid, to operate, etc. At present the planning process, i.e. the final grant of planning permission, is utilised as a gate-keeper to control entry into subsequent processes. While that

approach may efficiently manage the administrative burden post-planning permission, it is not efficient overall. In the first instance, it creates a linear sequencing process that is inefficient, as illustrated by Longoria et al. (2022). From the State's perspective there should be much greater coordination between regulatory and planning authorities, streamlining the entire regulatory process, for large-scale developments with national level significance (e.g. energy and transport infrastructure).

All new construction projects have environmental consequences. Many development projects require an Environmental Impact Assessment (EIA) and/or Appropriate Assessments (AA) for example, which ultimately can constrain the nature of development. AAs are intended to safeguard the most valuable and threatened species and habitats. Natura 2000 sites are particularly relevant in this context. Natura 2000 sites constitute 13 per cent of Ireland's land area so are not just in remote rural locations but also include areas with substantial levels of existing development. Within the existing regulatory framework, new development projects must comply with very stringent thresholds on environmental impact. It is increasingly the case that nationally important projects that are designed to facilitate decarbonisation and address the potential impacts of climate change, especially those related to the energy network (e.g. electricity generation, transmission, etc.) or sustainable mobility will be substantially delayed, reduced in scale, or abandoned.

Environmental protection regulatory measures, while crucially important, are also challenging hurdles to achieve decarbonisation and adaptation for climate change. All development has environmental impact, while climate change itself is already impacting on the environment, fauna and flora. Future sustainable development requires striking a balance between the absolutes of local projects and the wider national significance and contribution of projects, especially in the context of national housing and climate targets.

Given the long planning and regulatory processes associated with new renewable electricity generation and transmission, as illustrated in Longoria et al. (2022), the available timeframe to fully deliver CAP 2030 targets is at best very challenging but more likely infeasible. The existing legislated timeframe for An Bord Pleanála decisions is 18 weeks. For large projects such a timeline is unrealistic. For comparison, the decision timeframe for national infrastructure planning in England and Wales is just over a calendar year with several interim hurdles and legislated timelines.[32] Equally important is coordination between regulatory bodies involved in consenting national infrastructure projects to improve the efficiency of the entire regulatory process.

[32] https://infrastructure.planninginspectorate.gov.uk/.

REFERENCES

ABP (2022). *Annual Report 2021 Appendices*, An Bord Pleanála, https://www.pleanala.ie/getmedia/fb1501d7-d0ea-4686-8429-79f256f3b58f/Annual-Report-2021-Appendices-EN.pdf?ext=.pdf.

Albouy, D. and G. Ehrlich (2018). 'Housing productivity and the social cost of land-use restrictions', *Journal of Urban Economics*, 107:101-120. https://doi.org/10.1016/j.jue.2018.06.002.

de Andrade Lima, R.C. and R.d.M.S. Neto (2019). 'Zoning ordinances and the housing market in developing countries: Evidence from Brazilian municipalities', *Journal of Housing Economics,* 46:101653. https://doi.org/10.1016/j.jhe.2019.101653.

Hilber, C.A. and W. Vermeulen (2016). 'The impact of supply constraints on house prices in England', *The Economic Journal*, 126(591):358-405. https://doi.org/10.1111/ecoj.12213.

Longoria, G., M. Lynch, N. Farrell and J. Curtis (2022). 'The impact of planning and regulatory delays for major energy infrastructure', Economic and Social Research Institute (ESRI) Working Paper Series, 725. https://www.esri.ie/pubs/WP725.pdf.

Lyons, R.C. (2015). 'Housing supply in Ireland since 1990: the role of costs and regulation', J*ournal of the Statistical and Social Inquiry Statistical Society of Ireland*, 44:141-155. http://www.tara.tcd.ie/handle/2262/75036.

Quigley, J.M. and S. Raphael (2005). 'Regulation and the high cost of housing in California', *American Economic Review*, 95(2):323-328. https://doi.org/10.1257/000282805774670293.

Quigley, J.M., S. Raphael and L.A. Rosenthal (2008). 'Measuring land-use regulations and their effects in the housing market, in Glaeser, E. L. and J.M. Quigley (Ed), *Housing markets and the economy: risk, regulation, and policy*. Lincoln Institute of Land Policy. https://escholarship.org/uc/item/07t5d0q4.

Quigley, J.M. and L.A. Rosenthal (2005). 'The effects of land use regulation on the price of housing: What do we know? what can we learn?', *Cityscape*, pp. 69-137. https://www.jstor.org/stable/20868572.

8.3 BALANCED REGIONAL DEVELOPMENT

Alan Barrett

8.3.1 Background

One of the underlying principles of the National Development Plan (NDP) is that investment should be spread in a spatial sense. The reasons for this have been articulated previously. Given that a spread of public investment can lead to increased economic activity throughout the country, a well-planned and strategically integrated set of investments opens the possibility that economic growth can be spread more evenly across the country.

Underpinning this goal, the National Planning Framework (NPF) was launched in 2018. It includes clear goals for how expected population growth out to 2040 should be spread across the country. These goals can be summarised as follows:

- 25 per cent is planned for Dublin;
- 25 per cent across the other four cities combined (Cork, Limerick, Galway and Waterford);
- The remaining 50 per cent of growth to occur in key regional centres, towns, villages and rural areas;
- 50 per cent city growth is to be infill or brownfield.

A key task in the implementation of Project Ireland 2024 is to achieve close alignment between the NDP and the NPF and this has been assessed, for example, in National Investment Office, Department of Public Expenditure and Reform (2021) (referred to hereafter as NIO, 2021).[33]

8.3.2 Key developments since NDP 2021

NIO (2021) sought to assess how the alignment of the NDP and the NPF was progressing from two perspectives. First, policy documents from the main agencies were reviewed with a view to assessing whether due consideration was being given to balanced regional development in sectoral plans. Second, the geographic spread of projects was explored to see how the pattern aligned with the regional growth targets set out in the NPF.

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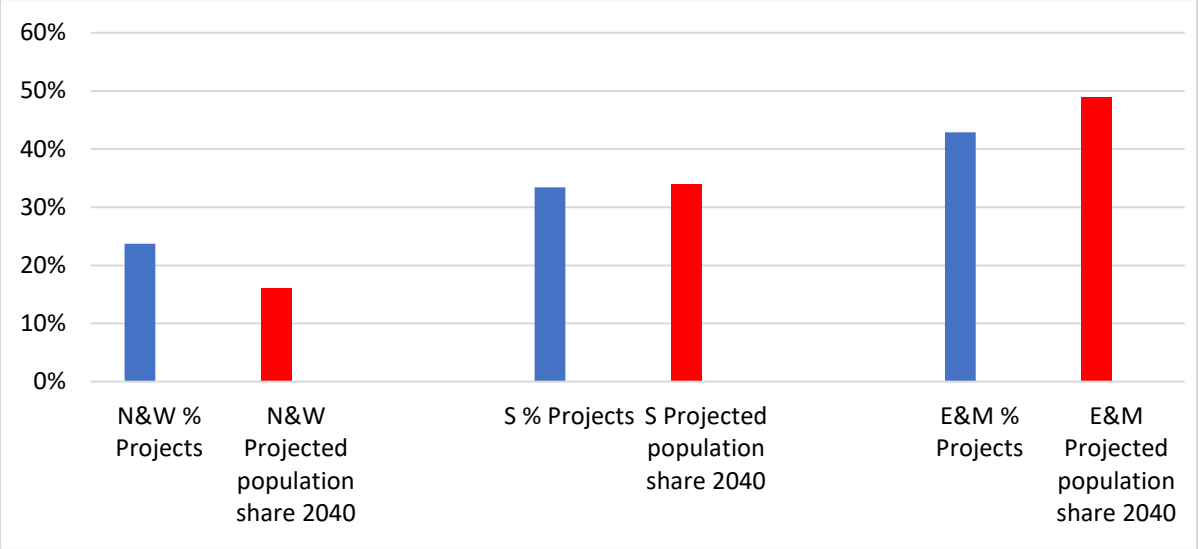
33 The increase in the number of people working remotely is obviously an important development in the context of striving for balanced regional development. In addition, the roll-out of the National Broadband Plan is a key facilitator. A detailed investigation of the impacts and interactions of these factors is beyond the scope of the current study, but clearly further study is warranted.

Some updated information on the geographic spread of projects is available and is presented in Figures 8.1 and 8.2. In Figure 8.1, data on all projects (1,243) are presented but the figures are based on a simple count of projects, with no accounting for scale. The data presented in Figure 8.2 are restricted to projects with a value in excess of €20 million (302) but clearly this is also limited if we are interested in assessing levels of public investment across the regions.

With that caveat in mind, we can still do as the NIO (2021) did, and look at the proportion of projects in each region alongside the benchmark of the population growth targets out to 2040. As can be seen, while there is not perfect alignment, the match between actual shares of projects and projected shares of population seems reasonable, especially in Figure 8.2.

As regards the policy plans of different tiers of government, NIO (2021) anticipated that the National Planning Framework and the Regional Spatial and Economic Strategies would be complemented by the publication of County Development Plans in 2022. We understand that this has been achieved by almost all local authorities, so the set of national, regional and local plans is now in place.

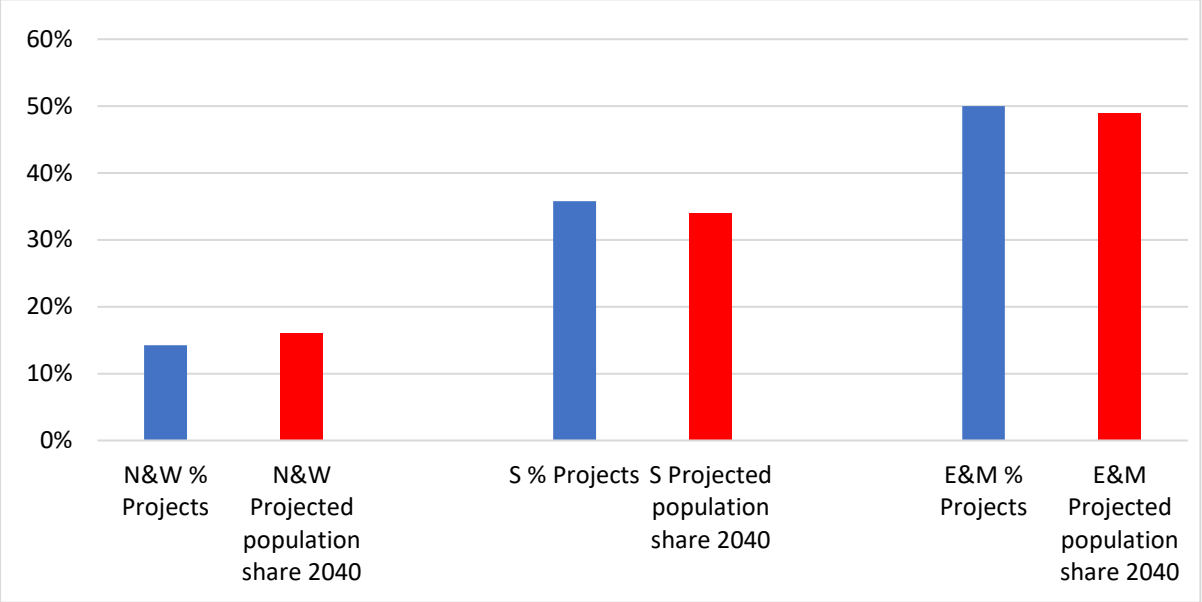
FIGURE 8.1 COMPARISON OF PLANNED POPULATION GROWTH AND PLANNED INVESTMENT, ALL PROJECTS[34]



Source: myProjectIreland, N&W: Northern and Western; S: Southern; E&M: Eastern and Midland.

[34] The MyProjectIreland database was accessed in mid-June 2023 so the data are correct as of that date.

FIGURE 8.2 COMPARISON OF PLANNED POPULATION GROWTH AND PLANNED INVESTMENT, PROJECTS €20 MILLION +

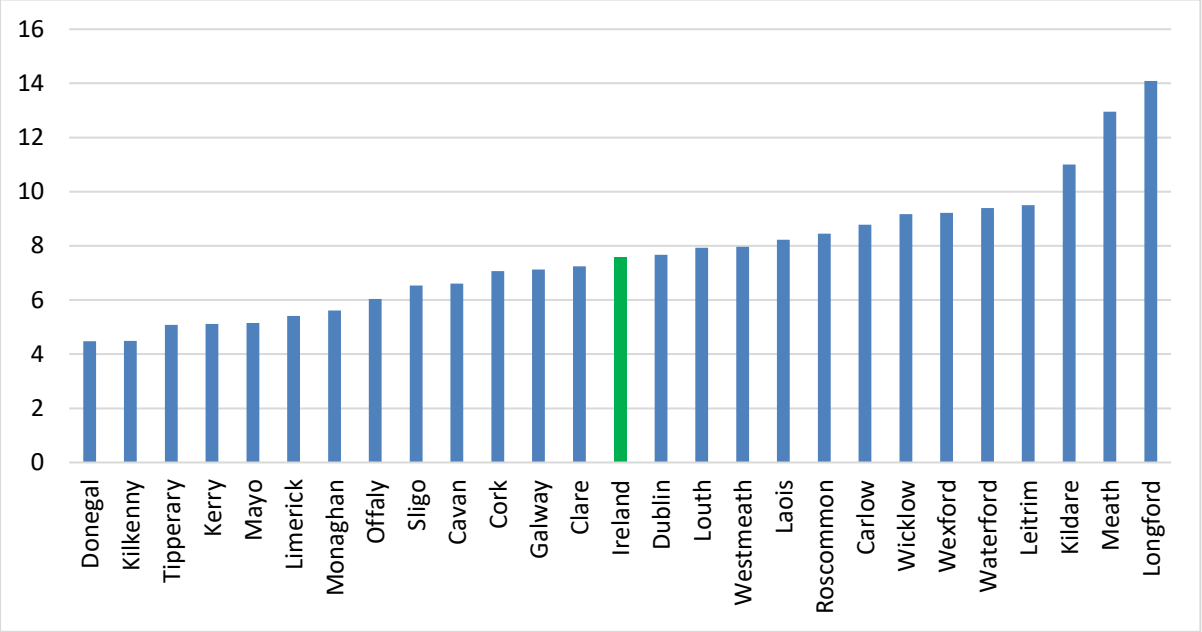


Source: myProjectIreland, N&W: Northern and Western; S: Southern; E&M: Eastern and Midland.

The data on the spread of projects provide some insight. However, it has to be remembered that the goal is to ensure balanced regional development with a corresponding distribution of population growth across the country, including a proportionate re-distribution away from Dublin and towards the country's other cities. With this in mind, a broader view of key developments under balanced regional development can be taken from data on population growth across Ireland's cities, counties and regions.

In Figure 8.3, we present the CSO's estimates of population growth by county between 2016 and 2022, based on preliminary Census estimates.

FIGURE 8.3 PERCENTAGE GROWTH IN POPULATION BY COUNTY, 2016 – 2022



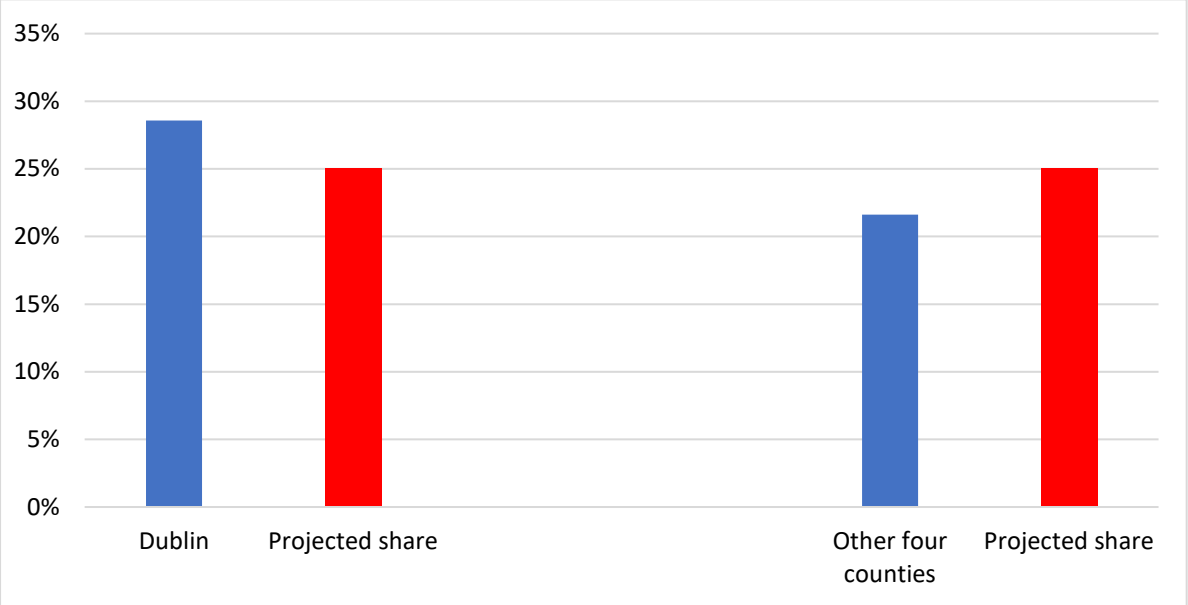
Source: Central Statistics Office preliminary Census results.

The first point to be taken from the graph is that all counties registered significant population growth between 2016 and 2022. The national population grew by 7.6 per cent and the range was from 4.5 per cent in Donegal to 14.1 per cent in Longford.

Looking more closely at the specific goals in the NPF, we can look at how population has grown in Dublin and in the four counties which contain the four cities of Cork, Limerick, Galway and Waterford in order to get some approximation of the spread of population growth. As shown in Figure 8.4, of the total national population increase of 362,000, 29 per cent occurred in Dublin (103,000). The corresponding figures for the four counties of Cork, Limerick, Galway and Waterford were 22 per cent (78,000). These compare to target growth shares out to 2040 of 25 per cent in the case of each.

Clearly, we cannot rigorously assess outcomes for the period 2018 to 2022 by comparing to 2040 goals. However, these projected shares for 2040 provide a very rough benchmark against which we can at least discuss if the early years of the current NDP cycle are showing significant divergence from NPF goals.

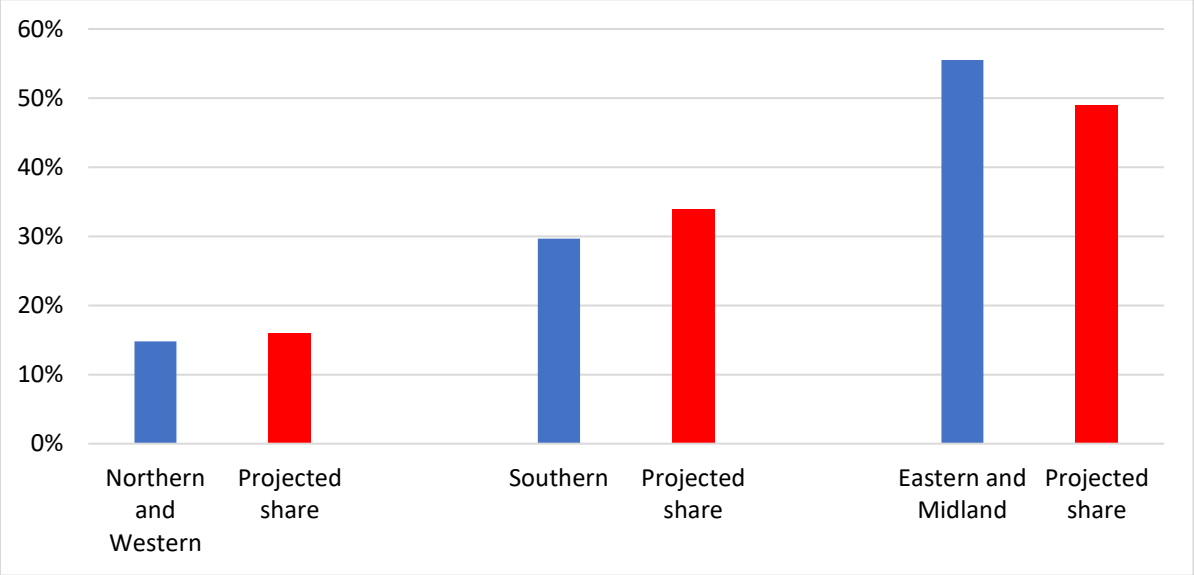
FIGURE 8.4 SHARE OF POPULATION GROWTH 2016 TO 2022 BY COUNTY/CITY AND PROJECTED SHARE UNDER NPF



Source: Central Statistics Office preliminary Census results.

A third way to consider the spread of population growth across the country is to look at the three planning regions – Northern and Western, Southern, and Eastern and Midland. As shown in Figure 8.5, between 2016 and 2022, the E&M region accounted for 56 per cent of national population growth, somewhat ahead of 2040 NPF projected share of 49 per cent. The Northern and Western Region accounted for 15 per cent of the total increase between 2018 and 2022, just below the 2040 projected share of 16 per cent. The overshoot in the Eastern and Midland region is substantially accounted for by the undershoot in the Southern region where the 2018-2022 share of population growth was 30 per cent as against the 2040 projection of 34 per cent.

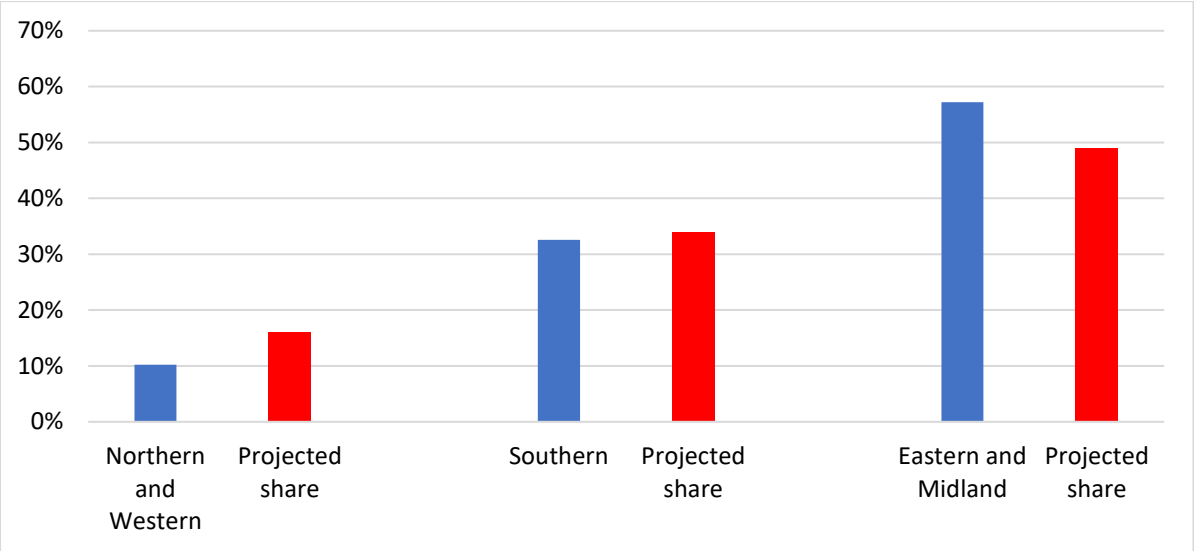
FIGURE 8.5 SHARE OF POPULATION GROWTH 2016 TO 2022 BY REGION AND PROJECTED SHARE UNDER NPF



Source: Central Statistics Office preliminary Census results.

As a final lens through which to view the issue of balanced regional development, we again consider something that was looked at in NIO (2021), namely planning permissions granted as this provides some insight into possible near-term trends in regional population trends.

FIGURE 8.6 SHARE OF HOUSING UNIT PLANNING PERMISSIONS BY REGION 2022 AND PROJECTED SHARE 2040 UNDER NPF



Source: Author's calculation based on Central Statistics Office.

In Figure 8.6, we show the proportion by region of housing units granted planning permission in 2022, again set against the 2040 population share benchmark. In 2022, planning permission was granted for 34,177 housing units nationally, 17,454 houses and 16,723 flats/apartments. Of these, 57 per cent (19,551) were granted in the Eastern and Midland region which compares to a projected share in 2040 of 49 per cent.

8.3.3 Conclusions

The achievement of balanced regional development is a key component of Project Ireland 2024. In support of that goal, investment under the NDP should ideally be spread in an integrated and systematic manner whereby this public investment can contribute to a foundation which yields positive economic, social and environmental outcomes across the country.

In the paragraphs above, we have not attempted to assess with any degree of rigour how investment is being spread and whether this is resulting in a pattern of population growth in line with stated goals. However, it is possible to draw some impressions and to raise questions.

While the spread of projects shown in Figure 8.2 appears to reflect a reasonable degree of alignment between investment and population targets, the data presented are too limited to assist in assessment. CSO data on population growth across counties and regions are more useful and allow for the following observations. All counties experienced population growth between 2016 and 2022 and this is to be welcomed. However, the fact that the Eastern and Midland region is experiencing a share of population growth beyond that envisaged in the 2040 target is a concern. The data on planning permissions granted add to this concern because they point to ongoing population growth in the Eastern and Midland region, with corresponding implications for the share of population growth elsewhere.

The NDP is still in its early stages and judging outcomes with reference to 2040 targets might seem unfair. In addition, the observed pattern of population growth begins in 2016 which pre-dates this NDP. However, changes in work patterns due to remote working which were generated by the COVID crisis might have led to movement way from Dublin and so might have assisted in the achievement of balanced regional development. For this reason, an observation of stronger movement away from the Eastern and Midland region might have been expected.

As a final point, we should note that ‘compact growth’ is another goal within the NPF and is articulated in part through targets such as the following:

deliver at least half (50 per cent) of all new homes that are targeted in the five Cities and suburbs of Dublin, Cork, Limerick, Galway and Waterford, within their existing built-up footprints.

There is an absence of relevant and reliable data in relation to drawing conclusions in respect of 'compact growth' including meaningful compact growth boundaries to reflect the existing built-up footprint of urban areas. Progress in relation to the reuse of previously developed 'brownfield' land and urban infill sites is likewise difficult to determine and is key to securing compact and sustainable growth. The review of the NPF and the forthcoming Sustainable Compact Settlement Guidelines provide an opportunity to address these issues.[35]

[35] We are grateful for discussions with colleagues in the Office of the Planning Regulator for advice on these issues.

REFERENCES

National Investment Office, Department of Public Expenditure and Reform (2021). *Assessing the alignment of the National Planning Framework and National Development Plan*, Dublin: DPER.

CHAPTER 9 DRAWING CONCLUSIONS AND PROVIDING PRIORITISATION PRINCIPLES

Alan Barrett, Sheelah Connolly, John Curtis, Kelly de Bruin, Niall Farrell, Eoin Kenny, Muireann Lynch, Kieran McQuinn and Emer Smyth

9.1 INTRODUCTION

The tasks which the ESRI was asked to undertake in preparing this report can be summarised in the following way. First, the Institute was asked to consider how relevant factors have evolved since the last version of the NDP was launched in 2021 which will impact on both investment needs and on the capacity of the economy to deliver on that need. Second, the ESRI was also asked to provide guidelines on how projects within the NDP could be prioritised so that the twin challenges of need and capacity could be met in a way that helps to see optimal outcomes achieved.

Given the limited timeframe that was available for the production of the report, the analysis and discussion have been conducted at a somewhat high level, with a focus on the broad challenges which the NDP must address. No attempt has been made to look at specific projects or at how broad policy objectives – such as housing, climate, health etc – might be re-prioritised relative to each other. Below, we elaborate on the point and specify where we see the role of analysts as opposed to decision-makers. In essence, analysts can provide metrics to assist in determining priorities, but it is up to decision-makers to decide on the relative merits of policy objectives.

Before moving onto our discussion of prioritisation principles, we will bring together the key points which have emerged from the discussion so far.

9.2 CAPACITY CONSTRAINTS

The economy is performing exceptionally strongly at the moment, and this is reflected in the current rate of unemployment – 3.8 per cent – which is historically low in modern times. Noting limits to increased labour supply from sources such as increased participation and increased immigration, it is clear that the economy – and hence the NDP – faces severe capacity constraints.

Some studies are reviewed which sought to quantify the amount of labour needed to deliver on some of Ireland's investment needs. For example, the Expert Group on Future Skills Needs (2021) asked how many additional construction workers

would be needed to raise housing output from a level of 20,000 units in 2020 to 33,000 in 2025. Looking at 'direct' employees and 'indirect' (which is supply-chain related), they estimate that approximately 40,000 full-time equivalent employees were required to build 20,000 housing units and so an extra 26,000 would be needed to reach an output of 33,000 units. Based on this and other studies, including the analysis in the Energy chapter of this report, it is clear that an accelerated NDP will create levels of labour demand in the construction sector where supply is simply unavailable.

We go on to ask what the effect might be of injecting additional demand into such a constrained setting. Referring back to earlier ESRI work from 2006 and from more recent simulations using macroeconomic models, it seems likely that such additional demand would lead to construction wage inflation and the drawing of labour away from other sectors. However, the models could well be underestimating the inflationary impact. With the unemployment rate at a historically low level, previous trends suggest that the relationship between the unemployment rate and the inflation rate might not be linear. Instead, inflation might accelerate as unemployment is lowered. The effect of this would be to raise the cost of delivering capital expenditure, and spillover inflationary effects are also possible. However, we should also note that in the medium term, the successful delivery of NDP projects including housing should lead to a reduction in inflationary pressures.

9.3 SECTORAL ANALYSIS

It is almost certain that existing targets for **housing** supply understate need given the stronger than expected increase in the population shown by early results from the 2022 Census. Hence, higher output will be needed. However, capacity constraints confront efforts to increase output. However, it is noted that increased housing output should dampen the price of existing houses and rents, thereby contributing to the policy objective of improved housing affordability.

Ireland has well-established targets with respect to **energy** infrastructure and these are set out in the corresponding chapter. The focus on the chapter is on translating these targets into levels of investment in terms of euros but also in terms of labour inputs. Combining likely labour needs for onshore wind, offshore wind, solar PV, conventional generation and energy efficiency, it is estimated that the annual employment requirement would be approximately 24,000.

Ireland's **transport** system – being heavily reliant on roads and motor vehicles – is a significant contributor to greenhouse gas emissions. Echoing advice from the OECD, this chapter discusses the need for truly transformational policy with a focus on sustainable mobility at a system level. In that context, even if the 2:1

Whitaker Square,
Sir John Rogerson's Quay,
Dublin 2
Telephone **+353 1 863 2000**
Email **admin@esri.ie**
Web **www.esri.ie**
Twitter **@ESRIDublin**

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expenditure ratio favouring public transport over new roads is maintained, the roads element of expenditure should be based on design which includes active travel modes.

Healthcare policy has an over-arching framework – namely Sláintecare – and the discussion of investment needs in the Health chapter is grounded in Sláintecare. However, as with other chapters, the faster pace of population growth has implications for capital needs in healthcare. In addition, the pace of population ageing presents particular issues for healthcare, especially with regard to long-term care.

Population growth and increasing participation will lead to an increased need for **education** facilities from early childhood through to higher education. This is well understood but an additional issue in education is the standard of facilities and the need for upgrades. Investment in digital infrastructure is also needed in education if stated policy ambitions are to be realised.

9.4 CROSS-CUTTING THEMES

On **climate**, Ireland has committed to an ambitious GHG emission reduction target of 51 per cent by 2030. However, based on achieved emission reductions to date and planned actions under the Climate Action Plan 2023, success in meeting targets is far from guaranteed. Hence, our climate policy efforts need to increase rapidly to ensure that our targets are met.

The section on **planning** reflects on a number of issues including the delays that seem to arise in a system which is under-resourced. Another point which is addressed is the situation where nationally important projects that are designed to facilitate decarbonisation and to address the potential impacts of climate change are substantially delayed, reduced in scale or abandoned because of the planning system. Examples arise in the cases of energy networks and sustainable mobility.

The achievement of **balanced regional development** is a key component of Project Ireland 2024. In support of that goal, investment under the NDP should ideally be spread in an integrated and systematic manner across the country. The fact that all counties experienced population growth between 2016 and 2022 is to be welcomed. However, the fact that the Eastern and Midland region is experiencing a share of population growth beyond that envisaged in the 2040 target is a concern.

9.5 PRIORITISATION PRINCIPLES

The key challenge for NDP delivery is that the injection of extra demand into a capacity constrained economy will increase construction inflation. Wage inflation will be part of this, but the costs of other inputs could rise too. All combined, the extra demand raises the cost of the public infrastructure which the NDP seeks to build, and it also raises the costs of private sector investment, including house building. Hence, less public infrastructure can be delivered for a given amount of investment and private investment will be curtailed too, all else equal. A secondary concern is the addition of cases to the planning system whereby extra delays are created with knock-on effects for public and private development.

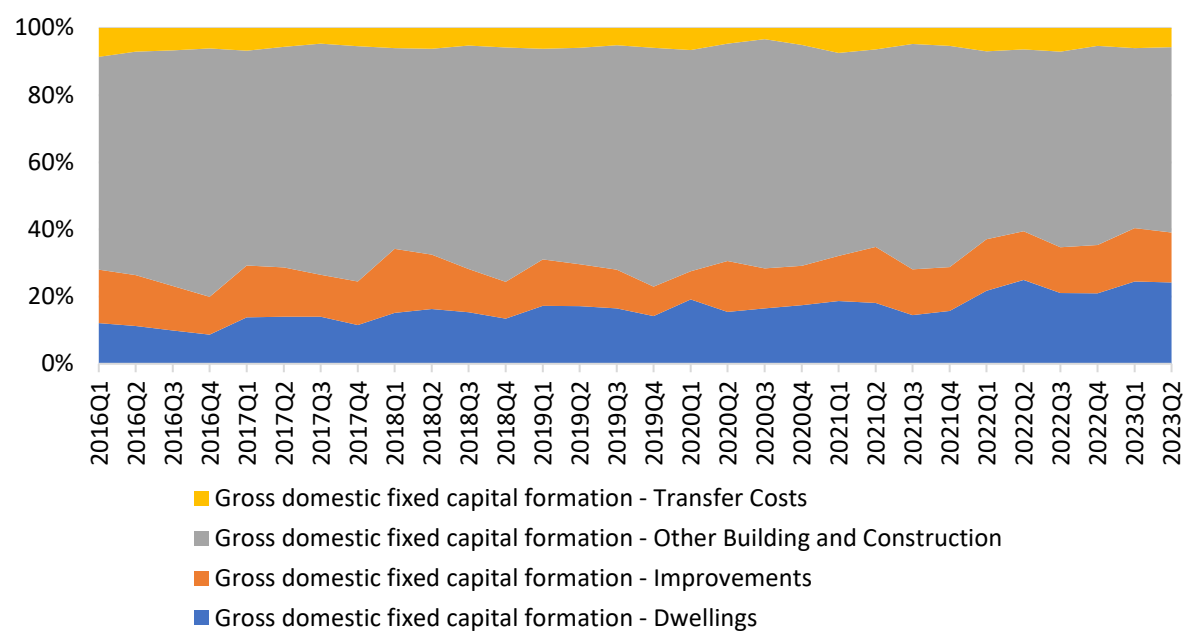
But against this, we know that in the long-term increased public infrastructure should enhance the productive capacity of the economy and ease bottlenecks which are dampening competitiveness currently, notably housing. The macroeconomic simulations which we presented show how increased housing supply leads to lower house prices relative to the baseline, in spite of the increased costs of building the new stock. To the extent that lower house prices would also translate into lower rents, increased housing supply can lower housing costs generally. Similarly, while investment in the transition to renewable sources of energy might be inflationary in the short-run, this must be balanced against the potential for reduced energy costs and reduced reliance on energy imports in the longer run.

So how then is the NDP to be delivered in a way that balances the short-run inflationary concerns and the medium- to long-run benefits of an enhanced public infrastructure? It is not possible for the ESRI to give definitive recommendations on the scheduling of projects under the NDP – we cannot say whether, for example, housing objectives should be prioritised over climate objectives because these are choices which must be made through the political system. However, we can provide some guiding principles which should be applied by policymakers when deciding on the speed and sequencing of delivery.

In many ways, this challenge of the potential inflationary impacts of increased public investment is a specific case of how to manage aggregate demand when the economy is operating above potential output. As is well-known, the standard demand-management principle is to operate counter-cyclical fiscal policy and to dampen demand through reduced spending or tax increases. In the case of increased public infrastructural spending, the equivalent solution is to raise taxes to counterbalance the increase in spending or to reduce current expenditure.

Tax increases can be used to dampen demand throughout the economy, but taxes can also be used to a re-direct economic activity. In the context of the construction industry, a tax could be used to re-direct activity towards output which is deemed most important by the government.[36] As shown in Figure 9.1, the construction of new dwellings makes up about 30 per cent of output within the sector. A much larger percentage is made up of non-housing construction and a question arises over whether this is economically or socially optimal. In many circumstances, the market is well-placed to allocate resources to their optimal use, but we know that the housing market has many features which mitigate against optimal market outcomes. For this reason, a tax on non-housing construction activity could be used to re-direct resources, or a regulation which achieved the same outcome. Of course, resources employed in the construction of hotels and office blocks might not be perfectly substitutable for housing, but the amount of non-housing construction activity suggests that some degree of reallocation could be possible.[37] We should also note that the social value of schools and hospitals should be considered in any reallocation.

FIGURE 9.1 CONSTRUCTION ACTIVITY BROKEN DOWN BY OUTPUT, 2016 – 2023



Source: CSO.

36 A subsidy could be used too but this would have the disadvantage of adding to aggregate demand in the economy whereas a tax would reduce aggregate demand.

37 From a competitiveness perspective, increases in taxation may be better deployed on unproductive forms of economic activity, such as land, and not on labour or capital. Furthermore, in the context of broadening the tax base, the proposal by the Commission for Taxation for a site value tax (SVT) is of particular note. The general case for such a tax has been made in Kumhof et al. (2021). They argue that tax reform in general should shift taxes away from productive labour and capital, where they reduce incentives to work and save, and onto land, where they do not distort any such incentives. In an international context such a policy, Kumhof et al. (2021) and Wolf (2023) argue, would provide sustainable government revenue over the medium term while not adversely impacting overall economic activity.

An alternative simple approach is a slower roll-out of the NDP, with no alteration in the sequencing of projects. This was suggested in 2006 by Morgenroth and FitzGerald when they wrote about an almost identical challenge. They conceded that the economy would miss out on an enhanced capital stock in the short term but ultimately would get the same capital stock at a lower cost. A secondary benefit of a delayed NDP would be a fiscal boost as the economy slowed.

Clearly, approaches based on tax increases, spending reductions and deliberate delays are likely to present political challenges so we sought to think creatively about the speed and sequencing of NDP delivery so that other approaches might be possible. Approaches based on macroeconomic demand management might be effective in easing inflationary pressures but there might be scope for re-prioritising projects so that a better balance is achieved between short-run inflationary impacts and the longer-run benefits of enhanced public infrastructure.

Decisions on public spending will almost always have a judgment component and such judgement is particularly important in giving weight, for example, to socially valuable outcomes in health and education. However, it is important that some form of metrics inform decisions too and in the case of any NDP reallocations, it is preferable that the metrics should extend and supplement earlier analyses of projects (or be applied to project assessments if they have not yet been undertaken).

Under the *Public Spending Code: A Guide to Evaluating, Planning and Managing Public Investment* (DPER, 2019), projects go through a multi-stage process of assessment and appraisal. This is a valuable process, but the key strand of our recommendations is that the parameters used in the 'strategic assessment' and 'preliminary business case' stages be updated and supplemented to ensure that issues such as short-term capacity constraints and medium-term impacts on inflation are factored into the quantitative analysis of projects.

It is suggested that Cost-Benefit Analyses (CBAs) and Multi-Criteria Analyses (MCE) which were undertaken for projects (or will be undertaken) be re-assessed with altered parameters used which capture the more severe capacity constraints and the more demanding climate targets which have arisen since the original NDP was drafted. For capacity constraints, the labour intensity of projects should be considered, with the climate impacts of projects (whether positive or negative) also featuring more prominently in the CBAs.

It is possible to provide some examples of this potential approach but before doing so, we need to be clear that we are not making recommendations for specific projects. Much greater analysis would be required to arrive at definitive conclusions, but the following can illustrate the thought processes that might be applied. Greenhouse gases can be reduced through housing retrofits which improve energy efficiency, through the greater uptake of electric vehicles and through investment in renewable energy. In an unconstrained setting, it would be ideal to achieve progress across all three options but in a capacity constrained context, it is useful to assess how the ratios of GHG reduction to (for example) labour input compare. While such comparisons might be implicit in any CBAs which were undertaken, the current acute nature of the labour constraint might not have been factored in.

In looking across two major areas of policy – increasing new housing supply and the retrofitting of existing houses – it is not possible for the ESRI to say which is the more important objective. As discussed before, it is the role of government to set priorities in a democratic society. However, the labour intensity of both should be considered relative to the benefits of the outcomes achieved. Should some level of prioritisation be required across these two areas, the enhanced metrics should inform decisions.

Similar considerations arise in terms of whether the demands created by investments are largely met from domestic resources or through imports. In the chapter on energy, a distinction is drawn between investment which will increase demand within Ireland and investment which will increase imports. An increased demand for imports will have no impact on inflation given that Ireland is a price-taker in the relevant markets. Hence, the inflationary impacts of investments in EVs as opposed to retrofits will differ and the current context might tip the balance in favour of increased EV subsidies, at least from the perspective of reducing GHG emissions while minimising inflationary impacts. There will also be important distributional issues, but these can be dealt with through additional re-distributive policy measures. In the case of wind energy, both offshore and onshore, a substantial component on the investment would be in the form of imports so similar points apply.

In order to be of operational value, metrics should be relatively straightforward especially it they are building on existing analyses, such as CBAs. While focusing on labour and climate impacts has the benefit of simplicity, it strikes us that the inflation-reducing impacts of projects should also be considered. As discussed above, increased building of housing units will lower the price of the existing stock, all else being equal. As housing affordability is a key policy objective in addition to increased supply (although the two are linked), this effect cannot be overlooked.

With regard to energy, a faster transition to renewable sources could reduce energy costs and, again, this would be a very desirable outcome.

Yet another factor which could be incorporated into any metrics underpinning project selection is the favouring of projects where innovative methods and materials are used which place lower demands on labour and other inputs.

Referring back to FitzGerald and Morgenroth, they also argued that investment in human capital under the then NDP might create lower inflationary impulses. This argument might be even more compelling now in that investment in building-related skills is needed for housing, retrofitting and much of the green agenda. Spending on human capital might be viewed as current and not capital expenditure but this is something of a false dichotomy. While investment in human capital through, for example, construction-related apprenticeships might move labour from one use to another as opposed to adding to the labour force, it is possible that the reallocation will be economically, socially and environmentally optimal if market failures are currently operating.

Regardless of the degree to which projects can be rationally re-ordered in terms of the sequence of delivery, a challenge will remain around the scale of investment at any point in time. Just as decisions on priority should be informed by metrics, it would be important to base any acceleration of the NDP on evidence of a loosening of capacity constraints. Real-time data on construction wages and input costs could be used for this purpose, in addition to broader economy-wide indicator such as employment, unemployment and modified domestic demand.

REFERENCES

DPER (2019). *Public Spending Code: A Guide to Evaluating, Planning and Managing Public Investment.* Dublin: DPER.

Expert Group on Future Skills Needs (2021). *Labour Demand Estimates for Ireland's National Housing Targets, 2021-2030.* Prepared for: Department of Enterprise, Trade & Employment.

Kumhof, M., T.N. Tideman, M. Hudson and C. Goodhart (2021). *Post-Corona Balanced-Budget Super-Stimulus: The Case for Shifting Taxes onto Land.* https://doi.org/10.2139/ssrn.3954888.

Wolf, M. (2023). 'The case for a land value tax is overwhelming', *Financial Times*.

APPENDIX

Additional detail on energy resource demand calculations

This appendix will outline our calculations in estimating the additional economic activity required between now and 2030 to achieve NDP and CAP targets. For each item, we will first investigate the capital investment required, followed by the labour requirement.

A.1 ONSHORE WIND

A.1.1 Capital investment requirement

IRENA (2022) surveyed international investment costs for renewable energy projects, finding that the 2021 global weighted average total installed cost of newly commissioned onshore wind projects range from €1,048.11/kW to €2,029.26/kW, with an expected value of €1,509/kW. Location-specific estimates are also included, with Irish estimates in the region of €2,092.5/kW.[38]

While this reviews the total likely cost to achieve onshore wind targets, only a fraction of this total economic activity will take place in Ireland. Much of the manufacturing activity, for instance, will be imported. Wind Energy Ireland (2021) estimates that the total direct capital investment for a representative 400MW project comes to €230 million, translating into a value of around €575/kW.

Table A.1 summarises these findings, assuming that present-day costs prevail between now and 2030.[39] Taking the IRENA estimate for Irish costs, total investment is expected to be in the region of €9.33 billion, with €2.65 billion retained in the Irish economy. The majority of this is likely to be spent in the construction sector.

[38] Many sources used in this chapter give cost estimates in dollar values. These are converted to euro using an exchange rate of USD 1 = €0.93, in accordance with the exchange rate observed on 27 May 2023.

[39] While there may be cost reductions due to efficiency and learning by doing, there may also be short-term inflationary pressures due to supply constraints. We therefore assume constant costs as a central estimate, with lower bound values providing insight should cost reductions be expected.

TABLE A.1 TOTAL INVESTMENT REQUIRED TO MEET AN ADDITIONAL 4.6 GW ONSHORE WIND TARGET, 2023 – 2030

	Total Investment	
Scenario	**Cost €/kW**	**€ (billion)**
Weighted average	1,509.39	6.943
5th percentile (Low)	1,048.11	4.82
95th percentile (High)	2,029.26	9.33
Ireland (IRENA estimate)	2,092.50	9.63
Expenditure retained in Ireland	575	2.65

Source: IRENA (2022), WEI (2021).
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

A.1.2 Labour requirement

While it is useful to understand the expenditure that will take place in the construction sector, it is also useful to quantify the employment required to meet these targets. We draw on studies in both the Irish and international literature which estimate the number of jobs per unit of renewable energy capacity installed. This provides a benchmark 'FTE/MW' (full-time equivalent jobs per MW installed). A review conducted by Rutovitz et al. (2015) finds that between c.1.12-6.1 FTE jobs are created in the construction sector per MW of capacity installed, with an average of 3.2 FTE/MW. Taking these estimates, Table A.2 shows that, to meet the Irish target of 9 GW, at least 5,152 FTE jobs will be required directly between 2023-2030. An expected mean value of 14,720 is observed. It should be noted that this is direct employment only; indirect or induced employment created by this stimulus is not considered in these estimates.

TABLE A.2 FTE EMPLOYMENT CREATED IN IRELAND TO MEET ONSHORE WIND TARGET, 2023 – 2030

Scenario	FTE/MW	Total Irish employment (9GW)
Mean	3.2	14,720
Low	1.12	5,152
High	6.1	28,060

Source: Rutovitz et al. (2015); authors' calculations.
Note: The Total Irish Employment has been estimated by multiplying FTE/MW (full-time equivalent per Megawatt) with Onshore wind target of 9GW.

A.2 OFFSHORE WIND

A.2.1 Capital investment requirement

CAP23 states a target for at least 5GW of additional offshore wind capacity to be installed by 2030. Calculating the economic impact of offshore wind development first requires an estimate of the cost/MW installed, with a particular emphasis on the expenditure required in the Irish economy. We approximate the proportion retained in the Irish economy by considering the portion of total expenditure going towards the construction sector.

When considering total offshore wind cost, several estimates exist. IRENA (2022) reviews offshore wind costs, finding that global average installed costs fell from €3,027.15/kW in 2020 to €2,657.94 in 2021. IRENA (2022) also gives estimates for the range of capital costs of installing offshore wind projects applicable to Europe, finding that costs range from €1,728.87/kW to €6,432.81/kW with a weighted average of €2,580.75/kW. In the United Kingdom, installed costs range from €2,197.59 to €6,040.35, with a weighted average of €2,843/kW.[40] This figure is likely to be most reflective of costs in Ireland.

Table A.3 reports the expected range of costs stemming from each of these calculations. Considering that Ireland requires 5 GW of installed capacity to meet its CAP23 targets, and similarly assuming that costs do not fall during the 2023-2030 period, the total investment required to meet the offshore wind targets would range from €8.64 billion to €14.21 billion. Assuming similar costs to those experienced in the UK context, total investment comes to approximately €14 billion.

[40] Conversion rate USD to euro is 0.93 as on 27 May 2023 applied to all these calculations.

TABLE A.3 CAPITAL INVESTMENT REQUIRED TO MEET 5GW OFFSHORE WIND TARGET, 2023 – 2030

	Total Investment	
Scenario	**Cost €/kW**	**Total cost (€ billion)**
Global Mean	2,657.94	13.28
Europe		
Low	1,728.87	8.64
Mean	2,580.75	12.90
High	6,432.81	32.14
UK	2,843.01	14.21

Sources: IRENA (2022); IRENA Renewable Cost Database.
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

Installed costs reported in Table A.3 reflect total installation costs, comprised of development, interconnection, foundations, installation, turbine manufacture and contingency and other expenditure items. Turbine and indeed foundation manufacture requires inputs such as steel (IRENA, 2022), which is unlikely to take place in Ireland. Similarly, installation requires the hiring of specialised vessels, many of which are likely to be hired from international suppliers (IRENA, 2022).

To approximate the investment retained in the Irish economy, we exclude foundation/turbine manufacture and installation costs. Approximately 26 per cent of total capital costs remain. If one excludes contingency costs from this total, then c.17 per cent of costs are attributable to the development and interconnection activities. This cost breakdown is similar to that found by Lorenczik (2020). It may be the case that some sundry activities take place locally, such as the employment of local tugboats and other construction and/or service activities. To account for this, we assume that costs excluding contingency represent a potential lower bound on investment retained in the Irish economy, with costs including contingency representing a likely upper bound. Taking a sample of total cost estimates from Table A.4 estimates the range of expenditure that is likely to be retained in the Irish economy. These costs are likely to fall between €1.47 – €8.36 billion. Our preferred range is €2.42 billion to €3.69 billion, corresponding to UK cost data.[41]

[41] Authors' calculations using IRENA (2021) and Lorenczik (2020) data. See Appendix for further details.

TABLE A.4 ESTIMATED INVESTMENT RETAINED IN IRISH ECONOMY REQUIRED TO MEET 5GW OFFSHORE WIND TARGET

Irish share of total expenditure	Total cost scenario	Total cost (€ billion)
Low	Average UK cost	2.42
High	Average UK cost	3.69
Low	Low EU cost	1.47
High	Low EU cost	2.25
Low	High EU cost	5.46
High	High EU cost	8.36

Source: Authors' calculations.
Note: Low share calculated as cost share attributable to development and electrical interconnection activity, which comprises c.17 per cent of total installed costs. High share includes 'contingency and other' expenditures to comprise c.26 per cent of total costs. Total cost scenario corresponds to costs presented in Table A.3. These data points are derived from IRENA (2022) and Lorenczik (2020).

A2.2 Labour requirement

The next step in this analysis is to consider the employment required to achieve this target. As before, many studies exist in an Irish and international context to estimate the number of jobs per unit of capacity installed. Leahy et al. (2020) provide an estimate of employment inputs required to serve 3.5GW of offshore wind capacity in Ireland, with the activities taking place in the installation stage highlighted in italics in Table A.5.

Excluding manufacturing, transport, and logistics (much of which is likely to be served by international vessels) and operational/decommissioning expenditures, this suggests that approximately 2.056 FTE/MW are created in the offshore wind sector in Ireland. Scaling this to a 5GW installation requirement, approximately 10,280 FTE may be required for deployment activities between 2023-2030.

TABLE A.5 WORKFORCE REQUIRED TO OFFSHORE ENERGY

Activity	Total person-days for 3.5 GW installation (Leahy et al., 2020)	Total Person years (Assuming 260 working days)	FTE/MW
Planning and Development	*166,796*	*642*	*0.18*
Procurement	*51,093*	*197*	*0.056*
Installation and Connection	*1,660,743*	*6,387*	*1.82*
Manufacturing	8,767,598	33,722	9.63
Transport and Logistics	15,113	58	0.017
Operation and Maintenance	4,387,775	16,876	4.82
Decommissioning	682,171	2,623	0.75
Total	**15,731,289**	60,504	17.29

Source: Leahy et al., 2020.
Note: Activities highlighted in italics are those assumed most likely to take place in Ireland.

A.3 SOLAR PV GENERATION

A.3.1 Capital investment requirement

CAP23 states a target of achieving 8GW of electricity generation by solar PV by 2030. The Irish Solar Energy Association reports that approximately 680MW of solar has been installed by 20 June 2023.[42] We therefore consider the installation of an additional 7.32 GW in this scenario. IRENA (2022) estimate global installation costs for utility-scale solar PV is in the region of €531- €1,843/kW, with an average of €797.01/kW. IRENA (2022) reports country-specific estimates, with Ireland having one of the highest measured 2021 installation costs at €992.31/kW.

Table A.6 estimates the likely installation costs according to these estimates. Taking the Irish capital cost estimate as our preferred value, the total installed cost of achieving our solar PV targets is expected to be in the region of €7.26 billion.

42 https://www.irishsolarenergy.org/_files/ugd/dcb342_ff637a6960104140a73e6dd2b850ad88.pdf.

TABLE A.6 CAPITAL INVESTMENT REQUIRED TO MEET 7.32GW UTILITY-SCALE SOLAR PV, 2023 – 2030

	Total Investment		
Scenario	**Cost €/kW**	**Total cost (€ billion)**	**Retained in Ireland (€)**
Ireland	992.31	7.26	2.032
Global			
Low	531	3.886	1.088
Mean	797	5.834	1.634
High	1,843.26	13.492	3.777

Sources: IRENA (2022); IRENA Renewable Cost Database.
Note: IRENA (2022) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

As with other renewable energy technologies, much of the manufacturing activity will take place outside of Ireland. Analyses by IRENA (2022) show that construction and installation comprise c.28 per cent of the total installation cost in Ireland. The final column of Table A.6 shows the proportion of the total investment that is likely to be retained in Ireland, given this breakdown. It is estimated that c.€2.032 billion will be retained in the Irish economy over the 2023-2030 period to facilitate the construction and installation of solar PV.

A.3.2 Labour requirement

Buyens et al. (2021) survey employment in the deployment stage, finding that the average direct labour intensity for deployment is also calculated and is 4.2 FTE/MW installed for Western Europe, resulting in a total employment requirement of c.30,744 FTE required during the period 2023-2030. Buyens et al. (2021) consider deployment to fall under 'construction': general construction and specialised construction activities for buildings and civil engineering works. It includes among others the installation of electrical systems in all kinds of buildings and civil engineering structures of electrical systems.

A.4 CONVENTIONAL GENERATION CAPACITY

A.4.1 Capital investment requirement

Ireland has constrained capacity in conventional gas generation (CCGT or OCGT),[43] with 2 GW of additional capacity required between 2023 and 2030 (CAP23; Government of Ireland). This is likely to be gas generation, with either CCGT or OCGT installed in varying amounts. Lorenczik et al. (2020) provides an estimate of the potential installation cost of a new gas generation plant in Italy and Belgium. Using these estimates, the cost of installation to meet the 2GW scenario is outlined

[43] CCGT (Combined Cycle Gas Turbine) and OCGT (Open Cycle Gas Turbine) are the conventional gas generation power plants. CCGTs are typically larger and less flexible than OCGTs.

in Table A.7. The total investment cost for the 2GW of new gas plant is likely to be somewhere in the region of €0.93- €1.43 billion. This assumes all expenditure takes place in Ireland, which is a likely upper bound; a portion of this is likely to be imported.

TABLE A.7 EUROPE AND COUNTRY AVERAGE TOTAL INSTALLED COSTS FOR CCGT AND OCGT TECHNOLOGY

	(€/kW)	Total cost (€ billion)
CCGT		
Italy	548.35	1.10
Belgium	712.85	1.43
Average	631.06	1.26
OCGT		
Italy	302.06	0.60
Belgium	622.7	1.25
Average	462.84	0.93

Source: Lorenczik et al., 2020.
Note: Costs mentioned include pre-construction, construction (engineering, procurement, and construction), and contingency costs. Lorenczik et al. (2020) cost estimates published in dollars. Converted to euro using a euro to USD exchange rate (conversion rate: USD to euro at 0.93 as on 27 May 2023).

A.4.2 Labour requirement

Table A.8 breaks down the employment requirement per unit of generation installed. For both, OCGT and CCGT, the required FTE/MW for both construction and installation activities is 1.3/MW. This suggests that installing 2GW would be an additional employment requirement of 2,600 between 2023 and 2030.

TABLE A.8 WORKFORCE REQUIRED TO DELIVER ADDITIONAL CONVENTIONAL GENERATION CAPACITY

Technology	Manufacturing (FTE/MW)	Construction & Installation (FTE/MW)	Operation & Maintenance (FTE/MW)	Fuel (FTE/PJ)	Decommissioning (FTE/MW)
OCGT	0.93	1.30	0.14	15.10	0.21
CCGT	0.93	1.30	0.14	15.10	0.21

Source: Rutovitz et al., 2015.
Note: FTE/PJ refers to full-time equivalent per PetaJoule.

A.5 ENERGY EFFICIENCY

A.5.1 Capital investment requirement

CAP23 highlights a desire to upgrade 500,000 dwellings to B2 BER status by 2030. The 2023 Climate Action Plan also states a target to achieve 400,000 heat pump installations by 2030. Many estimates exist concerning the cost of such investment.

The 2021 Climate Action Plan provides insight into the retrofit cost inclusive of heat pump installation. The Climate Action Plan 2021 (Government of Ireland, 2021b) states that the cost to retrofit the fabric of a house to BER B2 standard and to install a heat pump can range from €14,000 to €66,000. Taking a central value from this range, CAP21 assumes that the gross investment required to meet 2030 targets will be in the region of €28 billion. Assuming that efforts are spread evenly over the ten-year duration of 2020-2030, this schedule implies an annual target of 50,000 retrofit installations with a heat pump at an annual cost of €2.8 billion. It should be noted that this cost will yield 500,000 heat pump installations, where the target is for 400,000 to be installed by 2030.

Alternative estimates exist. Balyk et al. (2022) estimate that the cost of a shallow retrofit (from C to B2) to be at least €9,008, whilst the cost of a deep retrofit (from G to B2 standard) costs up to €24,394. If these estimates are employed as lower and upper thresholds for energy efficiency investment alone, the gross investment required is likely to be in the range of €4.5 billion to €12.2 billion. Assuming that this begins in 2023, this translates into €0.45 billion – €1.22 billion per annum, assuming that efforts are spread evenly over the ten-year duration to 2030.

A.5.2 Labour requirement

To estimate the labour requirement, the Department of the Environment, Climate and Communications indicates that 3,870 workers were involved in retrofitting 12,900 houses to B2 standard in 2019. Assuming that the ratio of employees to retrofit completion is constant going forward, and that efforts are spread evenly over the ten-year duration to 2030 (i.e. an annual target of 50,000 retrofit installations), this would imply that 15,000 workers would be required per annum to carry out the required works. This number corresponds to an expansion of 18,180, and recruitment of 22,779, identified by Government of Ireland (2022a; 2022b) to meet this challenge. This is a considerable expansion.