Europe Economics

Cost of Capital for Poles and Ducts Access

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Europe Economics
Chancery House
53-64 Chancery Lane
London WC2A 1QU

Tel: (+44) (0) 20 7831 4717
Fax: (+44) (0) 20 7831 4515

www.europe-economics.com

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1 Executive Summary

This report was prepared for ComReg by Europe Economics. It considers the appropriate weighted average cost of capital (WACC) to determine the appropriate price for access to Eircom's civil engineering infrastructure (CEI) in the context of the Irish Government's National Broadband Plan (NBP). Specifically, we consider the WACC to be applied for pole and duct access in the Intervention Area (where it is deemed that commercial providers acting alone would not provide a service) and the WACC to be applied for pole and duct access in the Transit Area (where it is necessary for NBI to transit between the intervention area and NBI's interconnection points).

Pole and duct access is often treated as having a similar WACC to that of fixed line assets. That is not appropriate in the case of the NBP because of the very different revenue model, because of government guarantees of debt, and because the assets in the intervention area would be likely to become obsolete at an earlier date under strictly commercial use. Furthermore, some of the assets in question are those of an electricity network provider not a fixed line provider. We argue that these characteristics mean that the debt for the notional entity is likely to be subject only to risks akin to that of a state-owned enterprise, and the cost of equity is likely to be closer to that of a network utility than of a fixed line communications firm.

Accordingly, we estimate the WACC for NBP CEI on that basis, using generic parameters derived from ComReg's broader communications sector WACC Decision that has been notified to the European Commission on 10 June 2020 and from recent CRU analysis of the WACC for electricity networks.

The figures we obtain are as follows.

	NBP Intervention Area CEI	Fixed Line
Nominal Risk-free rate	0.824%	
ERP	7.21%	
Asset beta	0.34	
Gearing	55.00%	
Equity beta at notional gearing	0.76	
Nominal cost of debt	1.44%	2.60%
Nominal cost of equity	6.30%	6.67%
Tax	12.50%	
Nominal pre-tax cost of equity	7.20%	7.62%
Nominal pre-tax WACC	4.03%	5.61%

For the Transit Area we argue that the proportionate approach is to use the Intervention Area CEI WACC for NBI CEI access and the Fixed Line WACC for CEI access by other firms.

2 Relevant Comparators for the WACC for NBP CEI

2.1 Introduction

This report, commissioned by ComReg, considers the appropriate weighted average cost of capital (WACC) to determine the appropriate price for access to Eircom's civil engineering infrastructure (CEI) in the context of the Irish Government's National Broadband Plan (NBP).

2.2 The National Broadband Plan

The NBP is the Irish Government's plan to provide equal access to high speed broadband services to all businesses, farms and households in Ireland.

The NBP is being achieved through a combination of:

- Commercial investment by the telecommunications sector;
- Intervention in those areas (collectively referred to as the "State Intervention Area") where it is deemed that commercial providers acting alone would not provide a service.[1]

The company chosen to provide the NBP is National Broadband Ireland (NBI). NBI will have the task of building, operating and maintaining the broadband network within the State Intervention Area (SIA), over a 25 year period.

NBI will be a wholesale operator, selling services to retail operators, who in turn deal directly with home and business broadband customers. In providing those wholesale services, NBI will provide its own technical infrastructure (eg fibre-optic cables, signal transmission and reception equipment and so on) but the CEI in which the technical infrastructure will be housed will be the existing pole and duct networks in the SIA, with some potential extensions to that CEI if demand justifies them.[2]

[1] The Irish government indicates that the State Intervention Area covers around 537,000 premises; about 23 per cent of Ireland's population; about 69 per cent of Ireland's farms; 44,000 non-farm businesses; and 695 schools. It thus covers a material portion of total Irish potential broadband demand. See https://www.dccae.gov.ie/en-ie/communications/topics/Broadband/national-broadband-plan/state-intervention/Pages/Connecting-Communities.aspx

[2] A broadband value chain can be seen as consisting of three layers: passive infrastructure (of which CEI is one form), active equipment technology, and delivery of services. The main business roles can be identified for each layer, which we summarise in the below table.

Layer	Business role	Role description
Passive infrastructure (eg CEI)	Physical infrastructure provider (PIP)	Owns and maintains the passive infrastructure
Active equipment technology	Network provider (NP)	Operates (and typically owns) the active equipment such as incumbent operators, new independent operators, broadband companies.
Service delivery	Service provider (SP)	Delivers the digital services, such as home broadband to consumers.

Source: EC Digital Single Market, Broadband value chain, actors and business models [online].

The CEI is currently owned mainly by the fixed line operator Eircom Limited (trading as eir), though there is the potential for some use of infrastructure currently owned by the electricity network asset owner ESB Networks. For the use of that CEI, NBI will pay Eircom (and potentially ESBN) a regulated access charge. One component of that access charge will be the return on capital, a key determinant of which will be WACC.

It is relevant to note that the Irish State's commitment to the NBP through a long-term contract with "step in rights"[3] is close to in effect guaranteeing to CEI providers that, over the 25 year period of the plan (with the possibility to extend it by a further 10 years to 35 years in total), in the event that NBI should fail, either an alternative broadband provider will replace it (again paying the access charges to which NBI commits) or, failing that, the government will itself cover the CEI access charge payments. Thus, under this scenario, CEI providers would be insulated from non-payment risk (though they would still bear other risks, as we shall explore below).

In addition to access to CEI in the intervention area, NBI will also have access to CEI in the commercial area in cases where it is necessary for NBI to transit between the intervention area and NBI's interconnection points. As in the case of the intervention area, NBI will pay Eircom a regulated access charge for transit access. We shall refer to the CEI used in such a case as "Transit CEI" and the associated WACC as the "WACC for transit".

2.3 ComReg's role and objectives

ComReg has the task of setting the CEI access ex ante price control due to Eircom's designation with SMP in the wholesale local access market[4]. It conducts that task bearing in mind a number of key objectives, as specified in Section 12 of the Communications Regulation Act 2002, including the promotion of competition, contributing to the development of the internal market, and promoting the interests of users within the Community.[5] ComReg must also take into consideration the requirements of Regulation 13 of the Access Regulations[6] which enables ComReg to impose a price control obligation.[7] In the context of this review, what is especially important is that ComReg must, when considering the imposition of a price control obligation, take into account the investment made by the operator and allow the operator a reasonable rate of return on adequate capital employed.

In this context, it is potentially relevant to note is that, by definition, it is deemed that there would not have been commercial entry into the SIA to provide broadband services. That means, for example, that the access price generally, and WACC in particular, are not required to be set at a level that would facilitate new commercial entry, by either CEI providers or alternative wholesale broadband providers. Neither does there need to be supply-chain equivalence between the wholesale access prices available in the SIA via NBI, after taking account of the CEI access charge, and wholesale access prices available outside the SIA.

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[3] See the "Contract between the Minister for Communications, Climate Action and the Environment and NBI dated 19 November 2019", especially Clause 73 - https://www.gov.ie/en/publication/16717-national-broadband-plan-contract/

[4] See ComReg Decision D10/18.

[5] http://www.irishstatutebook.ie/eli/2002/act/20/section/12/enacted/en/html#sec12

[6] http://www.irishstatutebook.ie/eli/2011/si/334/made/en/print

[7] Regulation 16 of the Framework Regulations is also relevant here i.e.,

- Technological neutrality Reg 16(1) (a)
- Promotion of competition Reg 16(1) (b)
- Internal market Reg 16(1) (c)
- Interest of users Reg 16(1) (d)
- Application of objective, transparency, non-discriminatory and proportionate regulatory principles incl. (Regulation 16(2)).

2.4 How pole and duct access WACCs are set in other jurisdictions and why that approach is not appropriate here

For a number of years, European countries have been moving towards greater reliance on passive access remedies for boosting competition in national broadband markets.

In Appendix 1, we provide brief descriptions of the regulatory environment of passive access broadband networks in the European context, particularly in the UK, Spain, Portugal and France, including the WACC assigned for such services (where they are available). It can be seen there that it has been common in these other contexts to apply a WACC for passive access that is similar to the WACC for fixed line services. Similarly, in its response to the ComReg's WACC Consultation (Document 19/54), Eircom contended that "While certain CEI assets owned by eir may be used for the National Broadband Plan, eir does not consider that a revised separate WACC is appropriate."[8]

It is important to understand why the same WACC is used for passive access in other countries and why that approach would not be appropriate in the context of the NBP.

The central intuitive reasons that passive access WACCs have tended to be set at a similar level to fixed line network WACC are as follows. First, the cost-related risks of fixed line networks are low and largely non-systematic in nature. For example, an individual fixed line asset or asset component might fail. Indeed, it is plausible that, given the greater complexity of fixed line infrastructure relative to passive infrastructure (e.g. signal transmission and interpretation equipment[9]) the risks of asset failure are greater for fixed line infrastructure. But such asset failures are textbook cases of idiosyncratic, diversifiable risks that will not affect the WACC.

There will be some modest systematic component to cost risks during fixed line asset roll-out (eg there may be construction cost risks) — and the same will be true during the construction phase of passive infrastructure assets. Indeed, construction risks on the passive infrastructure may be a large portion of the total systematic cost risks of a fixed line network. There is relatively little intuitive reason to expect that the systematic component of risks associated with the non-passive-infrastructure components of fixed line asset roll-out will be materially different from the systematic component of the passive infrastructure.

So, systematic cost risks should be expected to be very low. Demand risks, on the other hand, are likely to be largely shared between fixed line and passive access assets. Demand for use of a duct is, by and large, demand for the use of the optic fibre within the duct. There could be some scope to argue for a wedge between these. For example, perhaps access to a duct to install cable creates an option value for subsequent use that does not find an exact correlate in the fixed line network.[10] But the judgement call that regulators

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[8] eir, "Response to Consultation and Draft Decision 19/54", paragraph 182.

[9] CEI will still require certain technical equipment beyond the ducts and poles themselves — eg information management regarding the location of poles and duct, pole and duct identifiers, duct lengths, lengths between poles, access to poles access to duct and available capacity. There will also need to be processes to identify when assets fail (eg a duct is ruptured). But such information management equipment is likely to be less complex than the technical infrastructure specifically required for a fixed line network.

[10] Other examples of potential wedges between fixed line risks and passive infrastructure (by-and-large netting out) include the following:

- Pole and duct access providers may be less likely than fixed line providers to be able to reduce their costs in the short or medium term to respond to lower-than-expected demand. There will be some scope in each case (eg a fixed line provider might shut down part of a network; a passive infrastructure provider might choose to replace fewer defective ducts and poles as part of its continuous asset inventory maintenance programme). But it is at least arguable that the ability of a pole and duct access provider to mitigate demand drops will be very limited.
- As noted above, asset failure risk may be lower with passive infrastructure (though the systematic element of that will be low).
- Fixed line services may be more subject to being rendered obsolete by technological developments (since alternative technologies may still require physical housing, allowing passive infrastructure to be re-used).

have tended to take is that the evidence and reasoning that might support a wedge between passive access and fixed line WACCs has not typically been sufficiently robust to justify estimating separate WACC values.

It is worth noting that fixed line networks typically have asset betas that are higher than those of network utilities (eg electricity or water networks) mainly because of differences in technology risks and demand risks. Indeed, network utilities asset betas are often used as one comparator for fixed line networks.[11] Indeed, as we have noted above, in the case of the NBP some of the CEI might potentially literally be the assets of an electricity network.[12] Similarly, water ducts have clear (albeit imperfect) similarities to communications ducts. Indeed, some duct providers sell both water and communications ducts.[13] That implies there may be supply-side substitutability between water-duct-production and communications-duct-production assets.[14] High supply-side substitutability would mean water and communications ducts belong to the same market, implying that they have the same, or very similar, cost-side risks affecting WACCs.

2.4.1 Why the NBP CEI is different

In the case of the NBP CEI there are important differences from these international passive infrastructure WACC precedents, on both the cost risk and demand risk sides.

As regards demand risk, in the case of the NBP CEI that is almost wholly eliminated. The state provides investors with high confidence that CEI providers will receive the stream of payments associated with the NBP over a 25 year period (with some possibility of extension), if not from NBI then either from another provider or, in extremis, from the state itself. Residual demand risk arises only from the upside risk that NBI may ultimately demand additional CEI, along with the remote "triple failure" risk that the Irish government might default upon its undertakings in a situation in which NBI had defaulted and the Irish government had been unable to source an alternative NBP implementer.[15] As NBI puts it in its response to ComReg Consultation 19/54: "The volume and nature of usage by NBI of Eir's CEI will be independent of end-user take-up, average throughput, peak speed (e.g. upgrades to NG-PON2 or subsequent standards), emergence of competitive broadband offerings from mobile, satellite or other technologies."[16] Indeed, NBI contends that, in these respects, "the CEI division serving NBI would face much less uncertainty or risk than even the CEI division serving Eir's own infrastructure needs".[17]

On the cost risk side, our understanding is that at least some of the CEI to be deployed in the NBP would be likely to become obsolete at an earlier date than would be true of equivalent CEI in the commercial area. That means that, in a commercial setting without state intervention, that CEI would not have received an income stream throughout the technical lifetime of the asset (or at least the economic lifetime it would have had in the commercial area) and there would be no equivalent-quality new CEI entering to compete with it. That implies that, even within (very low) cost risk, the NBP CEI should be expected to have lower-than-typical cost risk.

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[11] See, for example, https://www.ofcom.org.uk/__data/assets/pdf_file/0017/111536/Draft-statement-annex-31.pdf

[12] Indeed, Eircom itself states in its submission to ComReg Consultation 19/54: "eir is not the only supplier of network infrastructure within the NBP intervention area and the awarded company for the NBP may engage in negotiations with the ESB, eNet and other infrastructure owners in the area." *op cit.* para 190.

[13] eg see https://www.drainagepipe.co.uk/ducting/top-tips-for-using-underground-ducting/

[14] A further example of such supply-side substitutability in the telecommunications sector would be SIRO, a joint venture between ESB and Vodafone Ireland. SIRO's network uses ESB's electricity distribution network to carry fibres through ducts and on poles.

[15] We note that in its submission (*op cit*) Eircom states: "if there is a provision in the NBP contract which **guarantees** that the CEI of eir will be used (or at least paid for over the full 25 year contract) then it may suggest that the systematic risk faced by the project was significantly different from that faced by eir in its overall business." Our understanding is that there is precisely such a provision.

[16] See p4 of "NBI's response to Comreg Consultation document no. 19/54".

[17] *ibid.* p4.

It is, however, worth noting that this differential may be greater early in the period of the NBP than later. As Eircom states in its submission to ComReg Consultation 19/54: "as time elapses and the remaining length of the NBP contract (if awarded) is lower than the remaining asset lives (i.e., the recovery timeframe) the riskier new investments (or replacement of existing assets) by Eircom in CEI will become over time."[18] On the other hand, as NBI argues in its response to ComReg's WACC Consultation (Document 19/54), [✂…REDACTED…✂][19]

2.5 Implications for the relevant comparators for estimating a NBP CEI WACC

Drawing together the above reasoning, we conclude the following.

- The step-in rights for CEI implies that its risk of default will be akin to that of a state-owned utility such as ESB Networks.
- For the cost of equity, there will be limited demand risk and cost risks will be close to those of a network utility — indeed, potentially some of the NBP CEI might literally be the assets of the electricity network owner. We should therefore expect that the asset beta for NBP CEI will be akin to that of an electricity network (perhaps even towards the lower end of an electricity network's range, since the assets in question are likely to be lower-risk assets amongst electricity network assets).

In principle it might be feasible to disaggregate the assets of electricity network asset owners between their poles and other assets, or water companies between their ducts and other assets. Furthermore, it is plausible that such assets might have even lower risk profiles than the average for the electricity or water network as a whole. These points notwithstanding, we believe that the requirement (in line with Regulation 8(6) of the Access Regulations[20]) that ComReg's WACC methods should be based on the nature of the problem identified and proportionate and justified suggests that, for this purpose, it should be sufficient to consider the overall asset betas for Irish electricity and water networks. We also believe that, in this context, it is proportionate to appeal to the regulatory decisions or regulatory consultation values Irish regulators have determined or proposed for electricity and water network asset betas, rather than ComReg conducting its own separate review of electricity and water network betas.

[18] eir *op cit.* para 188.

[19] "This is because with the shift to fibre and the consequent reduction in most OAO usage of services such as local loop unbundling ('LLU') and line-share in favour of VUA and Bitstream, the vast bulk of CEI usage by Access Seekers will be NBI's use of Eircom's ducts and poles for its NBP network." NBI *op cit.* p4.

[20] Regulation 8(6) of the Access Regulations provides that:

Any obligations imposed in accordance with this regulation shall –

(a) Be based on the nature of the problem identified,

(b) Be proportionate and justified in light of the objectives laid down in section 12 of the 2002 Act and Regulation 16 of the Framework Regulations, and

(c) Only be imposed following consultation in accordance with Regulation 12 and 13 of the Framework Regulations

3 The NBP CEI WACC

3.1 Generic Parameters in the CEI WACC-CAPM Model

First we consider the WACC parameters that are common across price control calculations. The key generic parameters are the risk-free rate, which is the return investors require to invest in an asset that bears no risk, and the equity risk premium, which is the additional return investors require to take on the risk of investing in equities. Together the risk-free rate and the equity risk premium constitute the total market return.

The other key generic parameter is taxation. In theory the tax rate could be specific, since companies may differ in the effective tax rate that they pay. As part of its current Consultation Document 19/54 on the fixed line telecoms WACC ComReg has taken feedback on the use of statutory versus effective rates. For our purposes here we set out our results in terms of the statutory rate, hence taxation is a generic parameter.

Given that generic parameters are common across price controls, we have used the same generic parameters used in our recent report for ComReg on "The Cost of Capital for the Irish Communications Sector — Final Report", May 2020. The derivation of these parameters and their justification may be found in that report.[21] Below we summarise the point estimates for these generic parameters motivated by a combination of calculation and theory as discussed in the previous report.

Figure 3.1: Generic WACC parameters

	Point
Inflation	1.70%
Real risk-free rate	-0.86%
Nominal risk-free rate	0.824%
ERP	7.21%
Tax Rate	12.5%

3.2 Gearing

As we have explained in Section 2, the NBP involves the government of Ireland indirectly leasing the necessary CEI from Eircom for the contract period of 25 years (possibly extended to 35 years). This means that, during this period, a proportion of Eircom's demand will be relatively stable by flowing from a government sponsored contract. This may have the effect of reducing the variability of Eircom's total demand.

It is common for assets with reasonably predictable streams of future revenue flows to be securitised.[22] One hypothesis is that the government contract to lease passive infrastructure from Eircom would allow the CEI provider to treat the flow of revenue from this passive infrastructure as a 'quasi-securitised asset'. With very

[21] We use the (modified) "European Commission Approach" generic parameters for our purposes here. As noted in our broader report on the Cost of Capital for the Irish Communications Sector, the (modified) European Commission Approach and 2014 Approach give very similar results for the cost of equity and therefore the choice of which approach is adopted is fairly arbitrary. We use the (modified) European Commission Approach parameters here to maximise consistency with the approach we adopt to the cost of debt in later sections.

[22] Pisauro, G. (2004), 'The Consolidation of the General Budget in Italy', Prometeia Group [online].

stable revenue, the CEI provider is likely to be able to sustain a higher optimal gearing — i.e. its proportion of debt may be higher than would be the case for a fixed-line business.

[✂…REDACTED…✂][23]

Another reason (not mentioned by NBI) that the CEI provider's natural gearing might be higher than that of a fixed line services provider is that, in the event the CEI provider became bankrupt, it is likely that the CEI would be able to be sold, since it is rather unlikely that bankruptcy would be associated with the absence of a need for CEI in the future.[24] By contrast, bankruptcy of a fixed line provider might be associated with technological change or business model change that would render a larger portion of the fibre or other technical components in the fixed line network obsolete and unrecoverable.[25] One of the standard theories of optimal gearing is that it will be higher when the costs of bankruptcy are lower, implying that we should expect higher gearing for a CEI provider than a fixed line wholesale access provider.

Reflecting the arguments above and those in Section 2, gearing for CEI should more closely resemble the gearing of a utility firm such as a water or electricity network company than a fixed line provider — indeed, in the case of some CEI it might literally be electricity network assets, whilst there are clear (albeit imperfect) similarities between water ducts and communications ducts — indeed, some duct providers sell both water and communications ducts.[26] Typical determined gearing levels for utility networks are of the order of 50-60 per cent. For example:

- The PR4 electricity sector gearing was 55 per cent[27];
- The CRU RC3 consultation is on a gearing of 50 per cent[28];
- the Ofwat provisional view for PR19 was 60 per cent[29];
- the Ofgem December 2018 RIIO-2 Sector Specific Methodology was 60 per cent[30]; and
- the NERL 2018 WACC consultation gearing assumption for NERL was 60 per cent.

Reflecting our analysis that CEI within the intervention area should be considered most similar to the infrastructure of an Irish utility (indeed, in some cases is literally the infrastructure of an Irish utility), we place most weight upon the PR4 electricity sector comparator and adopt an estimated gearing for CEI of **55 per cent**.

3.3 Asset beta

As we have explained in Section 2, the most relevant risk comparator for NBP CEI is an electricity network, albeit perhaps at the lower end of risk for electricity network assets. Some NBP CEI may literally be ESBN assets. Some duct providers sell both water and communications ducts (potentially meaning there is high

[23] [✂…REDACTED…✂]

[24] It is not fanciful that a future communications network might use no CEI. For example, Google and Elon Musk have both proposed schemes for providing broadband access in various less developed countries on the basis of drones. eir itself states in its submission that "the awarded company could change the technology from a fibre solution to a future wireless solution provided that it achieves the same level of service as fibre". (*op cit.* para 191) However, we do believe it is reasonable to assume that for Ireland a technological change that rendered CEI obsolete is unlikely.

[25] In this sense, CEI is more akin to a utility network such as water utility or a highly fixed asset such as an airport runway.

[26] eg see https://www.drainagepipe.co.uk/ducting/top-tips-for-using-underground-ducting/

[27] https://www.cru.ie/wp-content/uploads/2015/07/CER15296-Decision-on-TSO-and-TAO-Transmission-Revenue-for-2016-to-2020-1.pdf

[28] https://www.cru.ie/wp-content/uploads/2019/07/CRU19091e-Europe-Economics-RC3-WACC-Report.pdf

[29] See Ofwat (Dec 2017): "Delivering Water 2020: Our final methodology for the 2019 price review", and the accompanying "Appendix 12: Aligning risk and return".

[30] See Ofgem (Dec 2018): "RIIO-2 Sector Specific Methodology", and the accompanying RIIO-2 Finance Annex.

supply-side substitutability between asset providers, in principle meaning they may belong to the same market and for that reason have the same, or very similar, cost-side risks).

As regards electricity networks, at PR4 CER determined that the asset beta was 0.4 in 2015.[31] For RC3, CRU is consulting on a proposed asset beta range of 0.28-0.36, with a mid-point of 0.32 (down from 0.45 in 2016, reflecting a large movement in market betas that should also be expected to be reflected to some extent in electricity sector betas).[32]

If we use the full range here of **0.28 to 0.4** as our NBP CEI range, that has a mid-point of **0.34**.

3.4 Cost of debt

In Section 2 we have argued that the cost of debt for a CEI asset should be very close to that of a state-owned utility asset such as ESB Networks, or perhaps a risk-free asset with some allowance for issuance costs.

As per our generic parameters, a risk-free asset would have a nominal return of 0.824 per cent. Allowing 10 bps above that for issuance costs[33] would imply a nominal cost of debt of 0.924 per cent. In its current consultation[34], CRU estimates a real cost of debt of 1.0 to 2.6 per cent, with a point estimate of 2.0 per cent. However, as noted in our latest ComReg report[35] the cost of debt has fallen markedly since the data window used in that CRU report. The cost of debt we recommended in our latest ComReg report is 2.6 per cent in nominal terms, equating roughly to the very top of the CRU range. However, that figure includes what we refer to as an "Eircom premium" relative to the European Commission Notice approach value of 1.44 per cent. Reflecting our argument above that the cost of debt for a CEI asset should be close to risk-free, we adopt a value at the very bottom end of the range we recommended for Fixed Line debt, namely 1.44 per cent (nominal) (in line with the European Commission Notice Approach) as our estimate of the CEI cost of debt.

3.5 Overall WACC

The following table uses the parameters set out above to estimate an overall WACC for NBP CEI. For context and comparison, we also report the fixed line WACC figures for cost of equity and cost of debt from ComReg's WACC Decision, notified to the European Commission on 10 June 2020. We see that both the cost of equity and the cost of debt proposed for CEI are below those for Fixed Line.

Table 3.1: CEI Overall WACC

	NBP CEI	Fixed line
Nominal Risk-free rate	0.824%	
ERP	7.21%	
Asset beta	0.34	
Gearing	55.00%	

[31] See Table 7.1 of https://www.cru.ie/wp-content/uploads/2015/07/CER15296-Decision-on-TSO-and-TAO-Transmission-Revenue-for-2016-to-2020-1.pdf

[32] https://www.cru.ie/wp-content/uploads/2019/07/CRU19091e-Europe-Economics-RC3-WACC-Report.pdf

[33] In its current RC3 Consultation, CRU's consultants (Europe Economics) estimate issuance costs of 10 bps. See p55 of https://www.cru.ie/wp-content/uploads/2019/07/CRU19091e-Europe-Economics-RC3-WACC-Report.pdf

[34] https://www.cru.ie/document_group/irish-water-revenue-control-2020-2024/

[35] Europe Economics, "The Cost of Capital for the Irish Communications Sector — Final Report", May 2020.

Equity beta at notional gearing	0.76	
Nominal cost of debt	1.44%	2.6%
Nominal cost of equity	6.30%	6.67%
Tax	12.50%	12.50%
Nominal pre-tax cost of equity	7.20%	7.62%
Nominal pre-tax WACC	4.03%	5.61%

Eircom notes that any estimate of a CEI WACC distinct from that for fixed line assets could not be based on pure play comparators.[36] To the extent that the assets in question are literally ESBN assets that is not quite correct.[37] However, we accept that the comparisons in questions must be reasoned through and there is an intrinsic uncertainty in the estimates.

3.6 Implications for Transit WACC

We have seen that whereas passive infrastructure access is typically assigned a WACC in line with the WACC for a fixed line network in other jurisdictions, the different nature of CEI access in the NBP intervention area means that a lower WACC, more in line with that of a lower-end-risk utility, is appropriate. That leaves the question of the appropriate WACC for transit access.

In the NBP intervention area Eircom will primarily supply passive infrastructure access services to support NBI, whereas in the commercial area Eircom will continue to invest in CEI infrastructure primarily to allow it to supply telecommunications services generally (not least, in the form of self-supply, to its own end-users).

An initial question, therefore, is whether the CEI WACC that is applicable to NBI within the intervention area could be different from that applicable to commercial users.

Let us distinguish between two types of case:

A. The specific CEI (the specific ducts and poles) used by NBI is dedicated for its use;
B. The CEI used by NBI is also used by commercial suppliers (potentially including Eircom) operating outside the SIA.

If we were in case A it might seem fairly obvious that the WACC applicable for NBI access could in principle differ from that for other users, since it relates to different specific assets. That is not immediate, however. If, for example, all risk were cost risk and the poles and ducts used by NBI (even exclusively) were perfect substitutes (on the supply side) for poles and ducts used by commercial players, the WACCs would be the same since the risks would be identical.

If there is a difference it will lie on the demand side. Arguably the nature of NBP's long-term contract and the associated "step in rights"[38] (which are close in effect to being de facto government guarantees) mean that the demand-side risk associated with transit access is less than that of commercial access — indeed is arguably even less than that of demand within the intervention area (since transit access may vary less with demand within the intervention area). The implication would be a lower WACC for those assets used exclusively by NBI.

Let us express the point a different way. Suppose that a pole has a value X. That value is (by definition) the present value of the discounted net cash flows that pole will generate over its economic life. Two identical

[36] eir *op cit.* para 198
[37] Furthermore, though it does not make water a pure-play comparator, we note again the point that some water ducts may come from a market with supply-side substitutability to communications ducts implying that water networks are exposed to some of literally the same cost-side risks as CEI.
[38] See Footnote 3.

poles in the transit area must have the same value. Suppose pole j is used by NBI and pole k is used by a commercial vendor. Next, suppose that the nature of the contract with NBI meant that the revenue stream from pole j were absolutely certain and constant over time, whilst the revenue stream from pole k were volatile, subject to systematic risk. Then if the (undiscounted) expected value of the revenue stream from the two poles were the same, pole j would be worth more than pole k, since pole k is exposed to more systematic risk. (Think which revenue stream a firm would prefer to receive.)

In order for the two poles to be worth the same (which, as identical poles, they should be), the expected undiscounted value of the revenue stream from pole j must be less than that of pole k. In other words, in this case where there are poles and ducts dedicated to NBI it ought to be charged less than commercial CEI access-seekers, because the revenue stream from NBI is subject to less risk. (This is analogous to the price being lower for a bulk order when there are economies of scale.) NBI ought to be charged less for the same reasons the WACC associate with supplying to it is less.

Having established that this is the case when assets are separate, let us now consider how things change (if at all) if the same assets can be or are used by both NBI and commercial players. Consider a pole used solely by commercial players versus an identical pole used by both NBI and a commercial player. Once again these two poles must be worth the same, but given that the pole that is used by NBI has a less risky revenue stream, the only way they can be worth the same is if the NBI revenue stream has a lower expected value reflecting its lower systematic riskiness.

This may appear to give rise to the paradox that two identical assets with the same potential uses in fact have different WACCs. But that is a misconception. The correct way to understand this situation is as follows. Every duct or pole in the transit area has some probability q of being used each period by NBI and probability (1-q) of being used by commercial players or not used. So every duct or pole in the transit area has a WACC given by q x WACC of NBI use + (1-q) x WACC of commercial use.

Accordingly, we conclude that in the transit area the WACC that should entering into setting the price for NBI access can be different from (in this case lower than) that associated with commercial access.

The most straightforward approach is to adopt the same CEI access WACC for NBI as applies in the SIA, even if other CEI access-seekers pay a rate reflecting the fixed line WACC (as per international precedent and the arguments of previous sections).

3.7 Likely impacts on stakeholders

We noted at the outset of this report that the regulatory context is not one in which the aim is to create neutrality between investment and new entry. Rather, we are considering the appropriate WACC to apply in a context of a special state intervention when, by definition, there would be no commercially viable alternative — and thus no requirement that the prices would be such as to make an investment from scratch commercially viable absent government intervention.

We can think of the implications of the WACC we recommend in terms of its impacts on five classes of stakeholders:

- Eircom — the WACC implies a rate of return lower on new CEI than Eircom would be likely to be able to obtain through additional investment in new CEI outside the State Intervention Area. However, accompanying this lower rate of return is lower risk, along with an elevated return on CEI that would become obsolete at an earlier date were it not for CEI access payments under the NBP. Over time, it is plausible that the proportion of Eircom's total CEI under economic use that was that CEI within the State Intervention Area (as opposed to outside) would rise, as technological changes rendered current access technologies obsolete. That might also favour investment in the lower-return/lower-risk/longer-guaranteed-economic-asset-life CEI within the State Intervention Area even earlier in the NBP period.

- Other CEI providers — At a WACC equivalent to the WACC on an electricity network, ESBN would be neutral between providing CEI access to NBI and not doing so. If the WACC had been higher, ESBN would have had strong incentives to provide CEI infrastructure instead of using its infrastructure to support its electricity network. There is thus neutrality in this respect.
- Other communications sector wholesale access providers — By definition, no other communications sector wholesale access provider would have operated within the State Intervention Area providing broadband-related wholesale access services. Perhaps there is the possibility that, at the margins between the State Intervention Area and outside that area, there could be a limited number of households that could be served either by wholesale access-seekers using NBI or wholesale access-seekers using non-State Intervention Area wholesale access providers. To the limited extent such rivalry existed, the use of a CEI WACC based on electricity networks would tend to favour NBI, but it is far from clear that this would be sufficient to offset the disadvantages NBI would face in other dimensions of its costs, associated intrinsically with operating within the by-definition-not-commercially-viable State Intervention Area.
- Wholesale access-seekers (ie broadband services retailers) — Lower CEI access costs (via a lower WACC) than would be the case if a fixed line WACC were applied means that wholesale access-seekers are more likely to find it commercially viable to operate within the State Intervention Area, and so more likely to provide broadband services to final consumers at all and more likely to provide a full range of services where they do.
- Final consumers — Whether final consumers are likely to find that they are served with broadband services within the State Intervention Area will depend upon other elements of the price control and other elements of state intervention in the State Intervention Area that fall outside our scope to analyse here. But in respect of the WACC, they are more likely to be offered broadband services and more likely to be offered a full range of broadband services than would be the case if the WACC were set at the fixed line level.

4 Appendix 1: The Regulation of Passive Access Infrastructure WACCs in Other Countries

4.1 UK

In the UK, Openreach, a division of BT, owns an extensive network of ducts and poles. The telecommunications regulator, Ofcom, takes the view that providing BT's competitors with improved access to the poles and underground ducts on Openreach's local access network can improve competition and therefore encourage investment in new technologies such as superfast fibre.

Openreach has been required to allow BT's competitors to rent access to ducts and poles since 2010 for laying fibre optic cables for high-speed broadband services.[39] In 2016, the Communications (Access to Infrastructure) Regulations were introduced, which included the requirement for operators of telecommunications infrastructure to share physical infrastructure with competing network operators.[40] The incumbent is also required to provide prospective service providers with maps and other records of its CEI in the area of interest.

4.1.1 Recent incumbent WACC

Ofcom's most recent WACC approach disaggregates the BT Group WACC into 'Openreach Copper Access', 'Other UK Telecoms', and 'Rest of BT'. For our purposes, the WACC determined for the Openreach Copper Access is most relevant because this division of BT is responsible for implementing BT's physical infrastructure access (PIA) remedy giving Ducts and Poles Access (DPA). In 2018 Wholesale Local Access Market Review Ofcom estimated a WACC for Openreach Copper Access of **7.90 per cent** (pre-tax, nominal) for the final year of its charge control period 2020-21.[41] Although this WACC figure is for BT wholesale copper (fixed line) access, as it currently stands Ofcom uses the same figure to determine prices for DPA — i.e. Ofcom treats duct and pole access as having the same WACC as the fixed line network. The components of this calculation, as well as those for the other BT divisions, is shown below.

[39] Ofcom (2016), 'Initial Conclusions from the Strategic Review of Digital Communications', [online].
[40] The Communications (Access to Infrastructure) Regulations, 2016 [online].
[41] Ofcom (2018), 'Wholesale Local Access Market Review' [online].

Figure 4.1: 2018 WACC components for BT Group business areas

BT Group division	Openreach Copper Access (also applies to ducts and poles access)	Other UK telecoms (includes fibre access)	Rest of BT
Asset Beta	0.59	0.73	1.25
ERP	6.30%	6.30%	6.30%
Gearing	30%	30%	30%
Cost of Debt (pre-tax, nominal)	3.90%	4.00%	4.10%
Cost of Equity (pre-tax, nominal)	9.50%	11.10%	16.70%
Corporate tax rate	17%	17%	17%
Nominal WACC (pre-tax)	**7.90%**	**8.90%**	**12.90%**

Source: Ofcom (2018), 'WLA Statement (2020/21), Annexes 17-27' [online]; UKRN (2018), 'Cost of Capital – Annual Update Report' [online].

The approach adopted by Ofcom is kept under review and it receives feedback from industry bodies on a regular basis.[42] Ofcom is currently undertaking a consultation on its proposals to set maximum charges for unrestricted access to passive infrastructure. Ofcom also proposes to set maximum ancillary charges that relate to supplementary services or activities carried out by Openreach on behalf of a telecoms provider using PIA.

The detailed steps of Ofcom's method for allocating costs per unit of each PIA product is given in Annex 5 of its WLA Market Review.[43] It is based on the method originally adopted by Openreach to derive rental charges when the PIA regulations came into force in 2010. There are two main parts of the calculation:

First is the regulatory cost base is calculated for each type of PIA asset (single bore spine duct, lead-in duct, poles etc.). Each asset cost includes the return on capital, depreciation, and overheads. The return on capital component is calculated using the current cost accounting mean net replacement cost of the asset multiplied by the WACC for Openreach Copper business (8 per cent).

Second is the regulatory cost base of each type of PIA asset is allocated to each unit of the PIA rental product (e.g. the regulatory cost base of one bore spine duct is allocated to each metre of single bore spine duct rental). As an example, for poles this involves the following:

- The regulatory cost base of poles is divided by the total number of poles as of June 2015, to give a regulatory cost per pole.
- This regulatory cost per pole is split between cable attachments (90 per cent), cables up poles (3 per cent) and manifolds (7 per cent). Openreach was unable to confirm the basis for these specific proportions.
- Each of the regulatory cost bases of cable attachments, cables up poles and manifolds is then divided by the total number of poles as of June 2015.

4.2 Spain

In Spain, it was recognised early on that great savings in mass broadband deployment could be made by avoiding the replication of physical infrastructure. Infrastructure represents approximately 60-80 per cent of the costs of fibre to the home/premises (FTTH) deployment. The incumbent broadband PIP, Telefónica, owns

[42] For example, see BT's 'Response to Ofcom's consultations on the Physical Infrastructure and the Business Connectivity Market Reviews' [online].

[43] Ofcom (2017), 'WLA Market Review', Annex 5, page 67 [online].

and operates 300,000km of ducts across the country, giving it significant competitive and operative advantages over rivals.[44]

Consequently, the regulator *Comisión Nacional de los Mercados y la Competencia* (CNMC; formerly the *Comisión del Mercado de las Telecomunicaciones* (CMT)) has imposed upon Telefónica a range of obligations regarding the maintenance of passive infrastructure. This includes situations in which ducts are full or broken, the provision of alternative duct routes where available (and, as a last resort, provision of dark fibre), and the expansion of passive infrastructure capacity when ducts become full. The incumbent may be requested to remove redundant cabling, for example old copper cabling or in the instance that a service provider exits a particular geographic market.

Furthermore, so-called 'symmetrical obligations' are imposed on Telefónica and other service providers. The first network provider to bring broadband to a building must install optical equipment that enable the subsequent use of other providers by sharing the resources. Thus, the first provider bears the cost of constructing the necessary equipment to enable the installation of not only its own cabling but also the cabling of other providers. This cost is recovered by 1) payments for making a duct access request and installation; and 2) a fixed cost for installation and a variable per-metre fee. The various prices proposed by the incumbent were individually scrutinised by the regulator, with the regulator making changes to the proposed prices to ensure they properly reflected costs.[45]

4.2.1 Recent incumbent WACC

The 2018 WACC for Telefónica and its components are provided in the table below.

Figure 4.2: 2018 WACC components for Telefónica

	Telefónica 2018
Asset Beta	0.61
ERP	6.79%
ERP adjusted for QE*	6.25%
Gearing	36.04%
Cost of Debt (pre-tax, nominal)	2.09%
Cost of Equity (pre-tax, nominal)	7.11%
Corporate tax rate	25%
Nominal WACC (pre-tax)	**6.82%**

Source: CNMC (2018), 'Verificación contabilidad analítica y WACC' (WACC/DTSA/018/18/WACC 2018 OP INTEGRADOS) [online].
Note: * when the ERP is adjusted for QE it means that the risk-free rate is reduced to reflect the quantitative easing programme of the ECB which keeps Spanish bond yields low by historical standards (CNMC, 2018, page 7).

For duct access, the price per metre per month is calculated either by the cross-sectional area taken up by the infrastructure or the operator is charged for a whole sub-duct or duct.[46]

[44] Comisión Nacional de los Mercados y la Competencia (CNMC) (2014), 'Infrastructure sharing for NGA deployment' [online].
[45] Comisión Nacional de los Mercados y la Competencia (CNMC) (2009), 'Agreement which Approves the Decision Regarding the Analysis of the Offer for Access to Ducts and Junction Boxes of Telefónica de España, S.A. and their Adequacy to the Requisites of the Comisión del Mercado de las Telecomunicaciones' [online].
[46] Allen, J. and C. Tinine (2015), 'International case studies', final report for Ofcom by Analysys Mason [online]

4.3 Portugal

The Portuguese regulator ANACOM has imposed access obligations on the passive duct infrastructure of the incumbent, MEO (formerly Portugal Telecom), to allow rival providers to deploy their own networks.[47] Similarly to the symmetric obligations in Spain, ANACOM also requires the first provider to connect a building to provide sufficient vertical infrastructure to enable the entry of others.

Additional obligations are imposed on MEO, referred to as 'asymmetric obligations' and referenced in Article 73 of the EECC. For example, as the incumbent, MEO had to develop an automated mapping tool to assist other service providers to plan their network deployments in connection with duct access.[48] This was to make available an infrastructure information system showing the available ducts, their locations and associated facilities in accordance with Article 73 of the EECC.[49] By providing such information, the cost incurred by prospective service providers of acquiring information is lowered, which may in turn make them more likely to take-up duct access to reach consumers.

Along with that of Spain, Portugal's regulatory context is regularly hailed in the literature as being close to the regulatory gold standard of passive access broadband networks. A 2015 report by Analysys Mason suggested that the involvement of non-incumbent operators in building FTTH networks is directly linked to the existence of passive access.[50] Vodafone has been particularly engaged in competition with MEO deployment as a result of the high quality and comparatively low expense of regulated duct and pole access.

4.3.1 Recent incumbent WACC

The most recent WACC for MEO was determined by ANACOM in August 2019.

Figure 3.3: 2018 WACC components for MEO

	MEO 2019
Equity/Levered Beta	0.762
ERP	6.54%
Gearing	39.53%
Cost of Debt (pre-tax, nominal)	4.06%*
Cost of Equity (pre-tax, nominal)	7.43%
Corporate tax rate	22.5%
Nominal WACC (pre-tax)	**7.40%**

Source: ANACOM (2019), 'SENTIDO PROVÁVEL DE DECISÃO SOBRE a taxa de custo de capital da MEO – Serviços de Comunicações e Multimédia, S.A. (exercício de 2019)' [online]; Europe Economics calculations.
Note: * - the source did not specify the cost of debt (Kd) but provided the formula for the pre-tax WACC:
$WACC_{pre-tax} = [Ke \times (1 - G) + Kd \times G \times (1 - tax)] \times 1/(1-tax)$

ANACOM publishes its regulated recurrent prices for access to ducts and poles infrastructure. On a monthly basis, in 2018 the price to use existing ducts was set at €0.0314 per cm^2 per metre, and the price to use poles €1.25 per pole.[51]

[47] Allen, J. and C. Tinine (2015), 'International case studies', final report for Ofcom by Analysys Mason [online].
[48] CSMG (2010), 'Economics of shared infrastructure access', report for Ofcom [online]
[49] European Commission (2018), 'European Electronics Communications Code', Article 73,1, k: 'National regulatory authorities may require undertakings to provide access to associated services such as identity, location and presence service.'
[50] Allen, J. and C. Tinine (2015), 'International case studies', final report for Ofcom by Analysys Mason [online].
[51] BEREC (2018), 'Report on pricing for access to infrastructure and civil works according to the BCRD' [online].

Prices are 'cost oriented' and take into consideration:

- costs derived from the construction, maintenance, repair and improvement of the CEI;
- administrative costs incurred with the treatment of the requests, namely the requests for installation, repair or removal of cables;
- costs related to follow-up of interventions.

4.4 France

The French regulator, ARCEP, has been involved in passive remedies for duct access, vertical (within-building) access, and dark fibre.[52] The incumbent firm, Orange, is the owner of the copper infrastructure in the country, and since 2008 it has been required to provide access to its CEI to other service providers.

4.4.1 How passive infrastructure access prices are determined

ARCEP's pricing model for duct access is cost-based. However, ARCEP does not set specific prices for access, and instead it relies on 'pricing principles', namely: non-discrimination, objectivity, relevance, and efficiency.[53]

With regards to vertical access and dark fibre, ARCEP has taken an approach to pricing that stands in contrast to those of other national telecommunications regulators. Instead of setting specific wholesale access prices itself, it has constructed a 'shell' price calculation model with working calculations and fields that are populated by the service provider. To use the model and produce a price, an operator needs to specify the parameters and costs of its own broadband deployment and input them into the calculations.[54]

[52] Allen, J. and C. Tinine (2015), 'International case studies', final report for Ofcom by Analysys Mason [online].
[53] Ibid.
[54] Ibid.