PC5 Frontier Shift

Commission for Regulation of Utilities (CRU)

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FINAL REPORT

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EXECUTIVE SUMMARY

This paper sets out CEPA's analysis of macroeconomic trends that might affect the unit costs of a notionally efficient gas network company in Ireland in PC5 – the regulatory economics concept of 'frontier shift'.

Frontier shift expressed in real terms (i.e., after subtracting HICP inflation) is defined in this report as scope for expected 'ongoing efficiency' improvements net of 'real price effects' (RPEs).[1] Ongoing efficiency improvements relate to the change in the volume of inputs used because of new technology or working practices. RPEs are the changes in prices of those inputs, net of the inflation indexation already applied under the regulatory framework.

Frontier shift across opex and capex allowances

In the CRU's regulatory framework for GNI, frontier shift is in principle relevant in three key areas: (i) when setting forward-looking opex allowances; (ii) when assessing outturn capex against allowances in the look-back review; and (iii) when setting new (forecast) capex allowances for PC5.

The CRU's framework for opex includes an ex-ante allowance, against which GNI bears any difference against outturn costs. The ex-ante allowance is formed from a mixture of bottom-up and top-down analysis – while forward-looking evidence is used to inform the required cost allowance (e.g., in assessing expenditure step changes), the majority of the evidence base is backwards-looking (i.e., using outturn costs). This is a result of opex being repeatable in nature. Ongoing efficiency and RPEs may then need to be applied to increase or decrease GNI's allowance so this reflects an efficient forecast cost trend for the forthcoming price control.

In contrast, the CRU's current approach to capex includes an ex-post assessment, with an ex-ante baseline to inform this assessment, itself using information available at the start of the price control. The assessment is also typically project/ programme centric. Frontier shift is relevant to both the capex look-back assessment and the setting of capex allowances for the next price control period but raises different challenges to opex:

- First, there is greater scope for RPEs to be captured either implicitly or explicitly within CRU's capex allowances given the greater reliance of its cost assessment process on GNI's own forecast capex for setting the price control's ex-ante baseline:
    - There would be an *implicit* RPE where an expected differential to economy wide inflation was already incorporated into the capex submission from GNI, and this then flows through into the CRU's ex-ante capex allowances.
    - In contrast, an *explicit* RPE would be where an ex-ante capex requirement is scaled up by the assumed inflation differential on the expectation that this is not already captured within GNI's forecast capex for the price control period.
- Second, as capex is a more project/ programme centric assessment, it is also arguably more challenging to establish an explicit RPE assumption to apply across GNI's capex allowances. For example, the mix of labour, materials and other input cost pressures may differ substantially across the capital portfolio, making it challenging to establish an appropriate explicit ex-ante RPE adjustment, should one be required.

The CRU has not previously included explicit RPE allowances for GNI's capex, though whether any expected above-inflationary cost pressures have been included in ex-ante allowances is also unclear as it will depend on the extent to which they were already captured implicitly in GNI's reported costs (e.g. via contract prices). Applying an explicit RPE where an implicit RPE has already been included in the estimation of the project cost would risk Irish consumers funding the same cost driver twice, conversely where no explicit RPE or implicit RPEs are allowed, there is a risk of under-funding GNI if an inflation differential to HICP does in practice exist.

[1] We note that in some other regulatory contexts, frontier shift is defined as scope for ongoing efficiency improvements only. For the avoidance of doubt, in this report, frontier shift is defined as ongoing efficiency *net* of RPEs.

A move to capturing an explicit RPE within CRU's regulatory framework for the capex assessment (as GNI have requested) would, therefore, require assurance from GNI that its capex estimates do not already include implicit RPEs if the risk of Irish consumers overpaying is to be avoided. It is also important that where any additional explicit RPE allowance is considered needed, that this reflects the cost pressures GNI experienced for the projects/ programmes of capex it plans to undertake in PC5, and that the opportunities for achieving ongoing efficiency improvements from the capital programme are also considered in expected cost trends.

With these issues and challenges in mind, we have reviewed the case for applying a frontier shift adjustment to capex and opex allowances in the PC5 cost assessment. We summarise our findings for each area of the cost assessment – opex, PC4 capex look-back and PC5 capex allowance setting – below.

PC5 opex allowance setting

The level of frontier shift challenge applied to GNI's controllable opex will remain a key area for the CRU's judgement; this report suggests there is a range of what GNI might be expected to achieve in PC5 based on current macro-economic evidence and recent regulatory precedent in Ireland and the UK.

We consider an ongoing efficiency challenge of 1% for opex, as proposed by GNI and applied in PC4, to be a reasonable and achievable regulatory target in PC5. Much of the evidence to assess ongoing efficiency in this area is long-run and historic, and remains unchanged from PC4. GNI's stable regulatory framework is also likely to have protected it from more recent events (e.g., the COVID-19 pandemic) that may have affected the ongoing efficiency potential of companies operating in competitive sectors.

Evidence on expected RPEs in PC5 in contrast, is particularly volatile in the current high inflationary environment, but suggests that macroeconomic input price pressures, to the extent they impact GNI's opex, could have a positive effect on GNI's combined materials and labour costs above inflation over PC5.

Labour costs represent the vast majority of GNI's controllable opex and so are particularly important when assessing the case for opex RPEs. We have found that GNI may benefit from negative labour RPEs at the start of PC5, with HICP expected to keep growing faster than earnings, but that recent CBI forecasts[2] support a positive labour RPE later in PC5, if expected labour price pressures in the general economy are considered to impact GNI's opex. For PC5 as a whole, this could support a small positive labour RPE assumption, potentially consistent with the evidence of longer-term compensation data in the Irish economy. However, assuming a zero labour RPE might also be considered an appropriate assumption for setting PC5, if the CRU were to take a longer-term perspective that GNI is able to manage its labour price pressures between years and across price controls to HICP.

We have also assessed potential RPEs for opex materials and business services. There are factors that currently point towards GNI's material costs growing faster than HICP for periods of PC5. However, recent outturn evidence leading into the PC5 period would suggest that the positive wedge between HICP and price indices that reflect the input costs of capital goods in the Irish economy has started to reduce.[3] There is also recent market evidence of materials prices falling in the past few months.[4] Business services are a small proportion of GNI's opex base and we find there is limited evidence to suggest cost pressures should be expected to deviate from HICP.

Overall, we consider that an opex frontier shift target in the range 0-1% per annum (net of RPEs) can potentially be justified for PC5, depending in particular on the expected impacts of RPEs on GNI's opex over the price control period. We have accommodated this conclusion into the top-down efficiency challenge that we apply to arrive at our proposed opex allowances for GNI's transmission and distribution business units in PC5.

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[2] See CBI (2023): Q1 2023 Quarterly Bulletin

[3] For example, the WSI and Capital Goods (Building & Construction) price indices published by the Central Statistics Office.

[4] Metals prices have recently fallen from previous highs in 2021 and there is an indication of backwardation for some metals prices when comparing current and forward prices, suggesting that supply pressure may ease over the longer term.

PC4 capex look-back

GNI has experienced cost overruns compared to allowances on a range of capex projects and programmes during PC4. In its submissions, GNI argues that one of the contributing factors to the overruns has been positive RPEs that were outside of its control; input price inflation that GNI consider was not accounted for in the ex-ante capex allowances for PC4 and that was above the rate of HICP inflation experienced during this period.

Macroeconomic information on 'outturn' RPEs provides useful context for considering whether GNI's representations on capex price inflation are justified. Our assessment of labour and, in particular materials, indices suggest there have been macroeconomic trends that could have increased unit costs faster than HICP during the years covered by the PC4 look-back review. Very low HICP in Ireland is an important part of that story alongside global price pressures on network utilities' capex related to increases in commodity prices.

However, the applicability of certain external labour and materials/construction price indices to GNI's PC4 capex programme is unclear. The emerging input price pressures in the Irish macro-economy were at the back end (rather than all) of PC4. Under the current regulatory framework for GNI's capex, it is also important for GNI to be able to present to the CRU evidence to justify precisely why and to what extent its costs increased relative to expectations at the time of the PC4 decision and in this case how input price inflation contributed to this.

In particular, it is difficult to discern what if any RPE or ongoing efficiency assumptions were already embedded in the PC4 allowances and while evidence on outturn cost indices may be informative of the external cost pressures that GNI has faced during PC4—noting we have some concerns with the applicability of specific indices that GNI refers to—it cannot on its own provide compelling evidence to reopen PC4 allowances.

For capex overspends in PC4 to be considered economic and efficient for the purposes of their treatment in GNI's revenue controls, i.e. attributable to external input price inflation over and above any ex-ante allowance and HICP indexation provision for input price changes, we consider the following factors also need to be demonstrated to the satisfaction of the CRU, as supported by Long O'Donnell (LOD), its technical advisor:

- **Materiality:** GNI can demonstrate that changes in its project/programme unit costs[5] were materially higher than HICP inflation (which CRU's capex allowances were already indexed to).
- **Attribution:** Capex allowance overruns are not attributable to factors other than price effects and how these contributed to higher project/programme costs than expected. [6]
- **Controllability:** The increase in unit prices was outside GNI's control and consistent with the broader macroeconomic cost trends we observe in our analysis in PC4.
- **Management and mitigation:** GNI sought to appropriately mitigate and manage the input price cost escalation it faced, in line with good industry practice.[7]

In summary, we consider the impact GNI claim RPEs have had on its capital portfolio costs in PC4 is not fully inconsistent with macro-economic trend evidence, however:

- the macro-economic evidence of positive RPEs for the full period of PC4 is mixed and more compelling for the final year of the price control rather than earlier years; and
- the extent of pass-through of trends in macro-economy to GNI's cost base is not clear, and so cannot on its own justify the CRU reopening its allowances.

[5] Relative to the assumptions used to set ex-ante allowances.

[6] That is, GNI can adequately demonstrate that price effects contributed to cost overruns on specific capex programmes.

[7] This would include adequate cost monitoring processes and contractual mitigations.

PC5 capex allowance setting

GNI has requested a 1.4% to 2.2% RPE in its capex allowances for PC5.[8] Its request is based on analysis from its economic advisor, Frontier Economics, comprised of an RPE placing equal weight on an assessment of labour RPEs (0.8%) and materials RPEs (2.0% to 3.5%).

An important difference between opex and capex is the large share of capex covered by materials costs, with opex having a larger labour weighting. GNI has provided evidence that at least some of its materials costs have already grown faster than HICP. With HICP itself being driven higher by many of the same underlying factors (e.g., post-lockdown supply chain issues and energy costs), simple HICP indexation may already go much of the way for mitigating risks around input cost pressures. The direction and size of any differential between HICP and material costs is also uncertain, linked to the fact that global commodity prices remain volatile and the market price outlook for these inputs uncertain.

It is important to note that unless there is a significant change to the regulatory framework for GNI's capex, GNI should have the opportunity to argue in the PC6 look-back review why any overspend vs. unit cost allowances was in fact efficient. This is an important difference from the treatment of controllable opex, which is currently not reassessed and so must be set as accurately as possible from the outset. However, as seen from the discussion above on the PC4 capex lookback, it may be difficult for GNI to make that case using top-down (macroeconomic) evidence alone, particularly if it has not been transparent in how it built up its proposals.

As discussed above, when considering GNI's capex proposals, it is also important to note that as an area that is fully assessed based on a bottom-up basis, it is hard to control for frontier shift assumptions that may already be embedded within GNI's forecasts.[9] Therefore, we consider it most appropriate for the CRU to focus on bottom-up evidence and the case for embedded RPEs when setting allowed unit prices and ultimately PC5 capex allowances. If the CRU were to find it appropriate to apply a top-down frontier shift adjustment to some or all capex allowances, it would also be important to account for *both* expected RPEs and ongoing efficiency gains. It appears GNI has proposed RPEs in this area but no ongoing efficiency adjustment.[10]

We recognise GNI is facing a difficult period for managing its costs and will need to work hard to contain its own costs and manage market pressures as it negotiates and manages its key contracts with suppliers. We consider a zero top-down frontier shift challenge may not be an unreasonable starting point for setting GNI's capex allowances for PC5[11], with the current macroeconomic evidence suggesting that there is some justification for supposing that GNI's capex material prices may rise faster than Irish HICP in PC5, albeit this is considerably more mixed than GNI has presented in its most recent business plan submission.

We conclude that any additional provision for RPEs in the PC5 capex allowances should be premised on GNI also being able to satisfy the CRU and LOD, its technical advisor, on the following points:

- **Additionality:** Relevant trends in material prices are not already accounted for within the project capex forecasts GNI has prepared for PC5 (e.g., existing network works contracts).
- **Materiality:** The expected price effect on specific projects and programmes of capex is structurally and materially higher than forecast HICP.
- **Balance:** Any additional request is premised on 'frontier shift', not solely RPEs (i.e., the allowance accounts for both expected RPEs and ongoing efficiency).

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[8] Page 49, GNI (2022), PC5 SD001 Submission overview, September.

[9] As with opex, there is a risk of double counting RPEs particularly in relation to tendered contracts.

[10] RIIO-GD2, for example, incorporates a 0.95% ongoing efficiency adjustment for capex and repex.

[11] Particularly once consideration is given to the need for GNI to account for the scope for ongoing efficiency gains in its capex programme.

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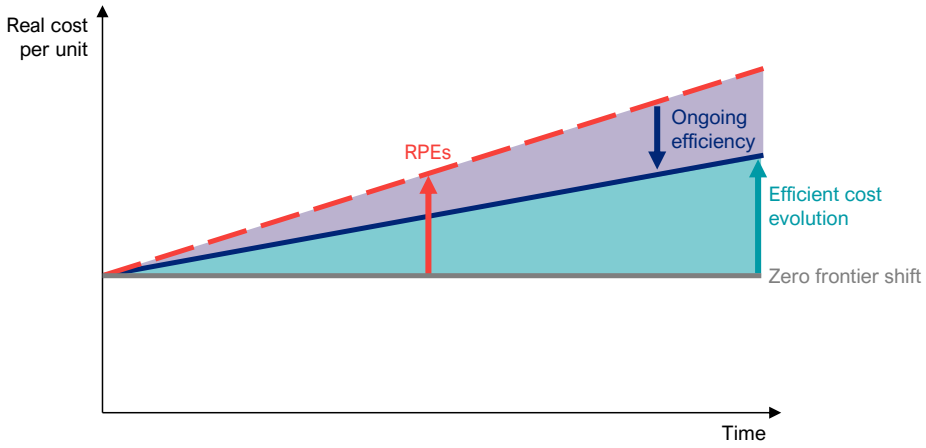
1. INTRODUCTION

CEPA has prepared this paper for the Commission for Regulation of Utilities (CRU). It is an output under the services agreement for the provision of economic, financial and related consultancy services for CRU's Price Control 5 (PC5) project. PC5 is the price control for the gas distribution and transmission licenced activities of Gas Networks Ireland (GNI) for the five years running from October 2022 to September 2027.

This paper sets out CEPA's analysis of macroeconomic trends that might affect the unit costs of a notionally efficient gas network company in Ireland—the regulatory economics concept of 'frontier shift'. Frontier shift is the rate at which the unit costs of an efficient company change over time. It captures both changes in the *volume* of inputs needed to produce a level of output and in the *price* of inputs used.

As shown in Figure 1.1, frontier shift expressed in real terms is expected 'ongoing efficiency' improvements net of 'real price effects' (RPEs). Ongoing efficiency improvements relate to the change in the volume of inputs used because of new technology or working practices. RPEs are the changes in prices of those inputs, net of the inflation indexation already applied under the regulatory framework. If an efficient company were expected to make a one percent annual efficiency gain but its input prices were also rising at one percent a year, it would be expected to keep the cost of producing its outputs approximately constant over time—frontier shift would be zero.

Figure 1.1: Frontier shift illustration



Source: CEPA

This paper provides part of the analytical basis for CEPA's recommendations on the efficient level of cost allowances for GNI's gas transmission and distribution network businesses during the PC5 period. We consider how frontier shift challenges fit into the CRU's regulatory framework for setting GNI's opex and capex allowances. We also assess the balance of evidence to support any RPEs or ongoing efficiency challenge, responding to GNI's business plan proposals and two Frontier Economics ('Frontier') reports prepared for GNI on this topic: GNI 'Exhibit 059',[12] submitted alongside GNI's December 2021 business plan submission; and a September 2022 response to an earlier draft of this paper, which the CRU shared with GNI for comment in July 2022.[13]

GNI draws on Frontier's analysis to request a 0.9% to 1.1% p.a. RPE on its controllable opex in PC5, offset by a 1% p.a. ongoing efficiency challenge. It also includes certain embedded RPEs within its bottom-up proposals, notably a 1% p.a. RPE for its internal 'People' costs. GNI similarly draws on Frontier analysis to propose a 1.4% to 2.2% p.a. RPE on its PC5 capex, but does not include a forward-looking ongoing efficiency adjustment, consistent with PC4 precedent.

[12] Frontier (2021), Real price effects and ongoing productivity in PC5, November. Confidential.

[13] Frontier (2022), Response to CEPA's draft frontier shift paper, September. Confidential.

For the capex look-back review—a review of outturn expenditure that plays an important role in the capex incentive framework for GNI—GNI argues that it experienced construction price inflation above HICP during PC4 and that it *"should not be automatically penalised for this in the incentive/penalty mechanism and any resultant cost overruns should generally be treated as financed overspends"*.[14] In its historic distribution capex submission, GNI proposes that *"20% of resultant unit cost overspend will be unfinanced overspend, with the remainder treated as financed overspend"*.[15] It notes the same issue for transmission capex, but has not made the same request to modify the capex incentive framework set out for PC4. The CRU has been supported on capex by Long O'Donnell (LOD), its technical advisor.

Following this introduction, Section 2 addresses how frontier shift challenges can fit into the CRU's regulatory framework, specifically in the context of GNI's business plan submission. Section 3 presents CEPA's findings on RPEs and Section 4 presents findings for ongoing efficiency. Section 5 presents our conclusions.

[14] Page 25, GNI (2021), SD010 PC5 Transmission Review of Historical Capital Expenditure, December; and Page 25, GNI (2021), SD011 PC5 Distribution Review of Historical Capital Expenditure, December.

[15] Page 25, GNI (2021), SD011 PC5 Distribution Review of Historical Capital Expenditure, December.

2. FRONTIER SHIFT APPLICATION

Frontier shift as a concept captures how macroeconomic trends are expected to affect the unit costs of an efficient company over time. Where a frontier shift challenge is applied, it is made as a 'top-down' adjustment, separate to any assessment of the 'bottom-up' rationale for the underlying activities and costs.

In this section, we set out how we propose the CRU apply any 'top-down' findings on frontier shift to GNI's controllable opex (Section 2.1) and capex allowances (Section 2.2), recognising how our top-down assessment must fit in with and complement CEPA's recommendations to the CRU on the bottom-up assessment of step changes in GNI's opex, and LOD's recommendations to the CRU on GNI's capex proposals.

2.1. CONTROLLABLE OPEX

In this section, we set out our recommendation for how the CRU should apply a top-down frontier shift challenge to GNI's controllable opex allowances.[16] We consider the role of frontier shift in the context of the CRU's incentive framework for controllable opex and our approach for developing cost allowance recommendations.

Incentive framework

In its PC4 decision papers, the CER set HICP-linked controllable opex allowances for GNI. Allowances were set at the total controllable opex level for distribution and transmission each year, without tying budget pots to the delivery of specific outputs. There was no provision for cost sharing if GNI over-or under-spent its allowances nor for an ex-post efficiency review of outturn expenditure opex.

This approach gave GNI flexibility to respond to changing needs and a powerful incentive to reduce costs, helping the CRU rachet down charges in the following price control. We understand the CRU intends to implement a similar incentive framework for controllable opex in PC5.

When the CER set the PC4 controllable opex allowances, consistent with CEPA advice,[17] it did not include top-down adjustments to allowances for RPEs. However, it captured some expected input price trends through bottom-up cost assessment (e.g., expected steps up in insurance costs) and included a top-down 1% ongoing efficiency challenge. Pending confirmation of its 2021/22 expenditure, GNI appears to have kept its controllable opex expenditure within the overall allowances set across the distribution and transmission businesses.[18]

PC5 allowance setting

CEPA is advising the CRU on GNI's controllable opex allowances for PC5. We have assessed GNI's proposals using a mixture of top-down and bottom-up cost assessment techniques, following a 'base-trend-step' methodology.

Our cost assessment started with assessing GNI's outturn costs for a 'base' year in PC4, recognising that much of GNI's controllable opex represents ongoing activities that will continue into PC5. We used 2019/20 as the primary base year, taking GNI's outturn costs and applying a top-down challenge based on findings from an econometric benchmarking exercise vs. gas distribution networks (GDNs) in GB. Our findings are documented in a series of separate reports.

Having established that 'efficient' base year cost, we rolled forward allowances for changes in activity levels. We then assessed the appropriateness of a series of steps up or down in GNI's costs. Applying a frontier shift challenge is the last step.

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[16] Controllable opex is distinct from 'non-controllable' opex (e.g., business/commercial rates), which is treated as a 'passthrough', without the need for an ex-ante allowance set in the price control decision.

[17] Page 36, CEPA (2017), PC4 review of transmission revenues, June; and Page 25; CEPA (2017), PC4 review of transmission revenues, June.

[18] GNI underspent its controllable opex allowances for distribution, but overspent them for transmission.

We recommend that in following a base-trend-step framework, the CRU apply any top-down frontier shift challenge from the first year of PC5, rather than from the chosen 'base year' in the middle of PC4. That approach is most appropriate as GNI's proposed step changes in allowances often relate to changes in unit costs, not just changes in the scope or volume of activities.

As an example of this, one of the major steps up in GNI's controllable opex for PC5 relates to new contractor rates in its network services and works contract ('NSWC2'). If GNI's bottom-up proposals already include changes in unit costs (i.e., an 'embedded' RPE), applying a top-down frontier shift challenge between the base year and the start of PC5 could cause double counting that makes allowances less accurate, not more. In Ireland's gas network regulatory context, where GNI can offer more detailed rationale for a change in unit costs, we consider it more appropriate to consider that evidence rather than relying on top-down evidence.

2.2. Capex

In this section, we set out our recommendation for how to consider a frontier shift challenge to GNI's capex allowances. We consider: (i) the role of frontier shift in the context of the CRU's capex incentive framework; (ii) how findings on RPEs and ongoing efficiency might be applied in the CRU's look-back assessment of GNI's capex expenditure; and (iii) how those findings might be applied when setting capex allowances for PC5.

Incentive framework

The CRU's incentive framework for GNI's capex has had some significant differences from the incentive framework applied to controllable opex, as described above:

- The capex incentive framework is based upon unit cost allowances differentiated by activity, where allowances can be scaled up/down for realised activity levels/outputs at the following price control review.
- If after adjusting for volumes of work, GNI has underspent its allowance for an activity, it gets to keep some of the benefit. It also gets to keep some of the benefit if it defers work to a later price control.
- If GNI has overspent its adjusted allowances, GNI can present a case for its expenditure to be treated as efficient spend. If the CRU does not accept those arguments, GNI is penalised at least part of the overrun.

In this framework, the capex unit costs and allowances set upfront in the price control are adjusted for HICP. For PC4, no explicit provision was made for those allowances to be updated for expected RPEs or ongoing efficiency improvements. However, those factors could have been captured in the bottom-up assessment of GNI's proposals.

The CRU has not issued specific guidance on how RPEs or expected ongoing efficiency improvements should be considered when assessing a GNI request for an update to the unit costs to justify an overrun as part of the look-back review. We note there is no clear provision for the opposite if there is an under-spend (i.e., the CRU does not look to claw back underspends in full when macroeconomic factors lead to costs rising slower than HICP).

We understand the CRU is considering potential changes to the capex incentive arrangements for PC5. However, we expect them to target specific issues, rather than representing fundamental change to the PC4 framework.

PC4 look-back

GNI has experienced cost overruns compared to allowances on a range of capex projects and programmes during PC4. In its submissions, GNI argues that one of the contributing factors to the overruns has been positive RPEs over and above HICP inflation that were outsides its control—it notes the Society of Chartered Surveyors Ireland 'Tender Price Index', which we assess in Section 3.2.2, as evidence of such an economy-wide trend.

We recommend that consistent with the capex incentive framework, the CRU and its technical advisor (LOD) consider evidence provided by GNI on how its outturn costs have been affected by changes in input cost assumptions vs. those underpinning the allowances set in the PC3 and PC4 price controls. However, we do not consider that it would be appropriate to re-open capex allowances based solely on a top-down assessment of RPEs—something GNI requested in its business plan submission:

- The CRU did not include provision for such a broad top-down reopener of cost allowances as part of the look-back review. The assessment of capex overspend may be considered on a case-by-case basis, but that should be based on justification for outturn GNI expenditure, not generic statistics.
- Different to Ofgem, the CRU did not introduce a RPE indexation approach. However, in GB companies cannot argue for why outturn expenditure was incurred efficiently in a look-back review. There is also a richer evidence base of cost indices available compared to Ireland.
- In assessing top-down evidence on input cost pressures, it may be relevant to consider the extent to which they may have been offset by scope for ongoing efficiency improvements realised vs. the capex allowances, or other relevant factors including contracting strategy and timing changes.
- Different to opex, the CRU has not applied top-down ongoing efficiency improvement assumptions when setting capex allowances. Therefore, we would also expect it could be relevant for GNI to present evidence on steps it had taken to realise efficiency gains and mitigate the impact of input cost rises.

In this context, while the later sections of this report consider historic evidence to support forward-looking recommendations for controllable opex and provide useful context for the look-back review, we have not produced a top-down estimate of RPEs or ongoing efficiency improvements to apply to capex over the look-back period.

We do, however, provide commentary in Section 3 on evidence of movements in cost indices relative to HICP over the lookback period. We also comment as part of our conclusions to this report on whether the macroeconomic evidence we consider on RPEs is consistent with GNI's request and what additional requirements the CRU and its technical advisor might seek to conclude whether capex allowances should be revisited to account for frontier shift.

PC5 allowance setting

LOD is advising the CRU on GNI's capex allowances for PC5 based on a bottom-up assessment of GNI's proposals. However, given the incentive framework and approach to assessing costs for controllable capex CRU has asked us how it should consider an RPE request on capex allowances from GNI for PC5.

The CRU has not previously included top-down adjustments to GNI's capex allowances for RPEs or ongoing efficiency. However, the CRU will have considered GNI's case for changes in unit costs as part of its initiative-by-initiative capex proposals. That approach effectively embeds frontier shift within the bottom-up cost assessment, rather than being a blanket top-down adjustment, which can be applied with greater confidence to opex given the more limited changes in the scope of those activities and the ability to compare costs internationally.

We have not sought to recommend a specific top-down estimate of RPEs or ongoing efficiency improvements to apply to capex in PC5, given the bottom-up assessment approach that LOD is following. However, similar to the PC4 lookback, we comment on whether the macroeconomic evidence in this report appears consistent with GNI's request for positive expected RPEs are accounted for in its capex allowances.

From a methodological perspective, we consider that if LOD or the CRU wished to apply a top-down frontier shift challenge to any cost category or initiative in GNI's bottom-up capex proposals, it would also be appropriate to consider the scope for an ongoing efficiency adjustment alongside RPEs. Considering one without the other would likely bias the assessment of unit costs, reducing the accuracy of forward-looking cost allowances.

We elaborate on this and further requirements for setting a top-down frontier shift challenge as part of our conclusions in Section 5.

3. REAL PRICE EFFECTS

The CRU uses the Harmonised Irish of Consumer Prices (HICP) index published by the Central Statistics Office of Ireland (CSO) to update the cost allowances set in real terms in its price control determinations of GNI's regulated gas network businesses.

HICP is a consumer price index for a basket of finished goods and services that are not necessarily applicable to running a gas network business. But as a widely used and well understood metric covering a diverse set of activities, Irish HICP is a good starting point for capturing broad macroeconomic price pressures for a gas network business. Many organisations serving Irish consumers will be engaged in similar or adjacent markets for labour, materials, equipment and other services.

As Irish HICP cannot be expected to capture all cost pressures on a gas network business, we consider if there is a case for an RPE to account for expected cost pressures above or below Irish HICP. For that assessment, we first present the context of Irish HICP inflation (Section 3.1) before assessing trends affecting major cost categories for GNI as discussed in its PC5 business plan and Frontier's reports (Section 3.2). We conclude with a summary of our findings (Section 3.3).

3.1. HICP INFLATION

HICP is the reference point for RPEs in PC5. As such, it is important to understand how it has moved in recent years, and how it might move during PC5. This is particularly relevant in the current macroeconomic context where future inflation levels are more uncertain than in recent gas network price control determinations.

Frontier, on behalf of GNI, adopts outturn HICP as the reference point for its historic RPE analysis. For its analysis of forward-looking evidence, it uses a *"consensus approach"* to inflation forecasts, taking the mean forecast from four sources. Table 3.1 below details the underlying forecasts cited by Frontier.

Table 3.1 Inflation estimates considered by Frontier over the PC5 period (%, rounded to 1d.p.)

Source	2021	2022	2023	2024	2025	Publication date
Department of Finance (DoF)	2.5	6.2	3.0	2.2	2.1	Apr 2022
OECD	2.4	6.6	5.0	n/a	n/a	Jun 2022 [19]
European Commission (EC)	2.4	7.3	3.3	n/a	n/a	Jul 2022
Central Bank of Ireland (CBI)	2.4	7.8	4.2	2.1	n/a	Jul 2022
HICP forecast (avg.)	**2.4**	**7.0**	**3.9**	**2.2**	**2.1**	

Source: CEPA based on pages 5 to 6, Frontier (2022)

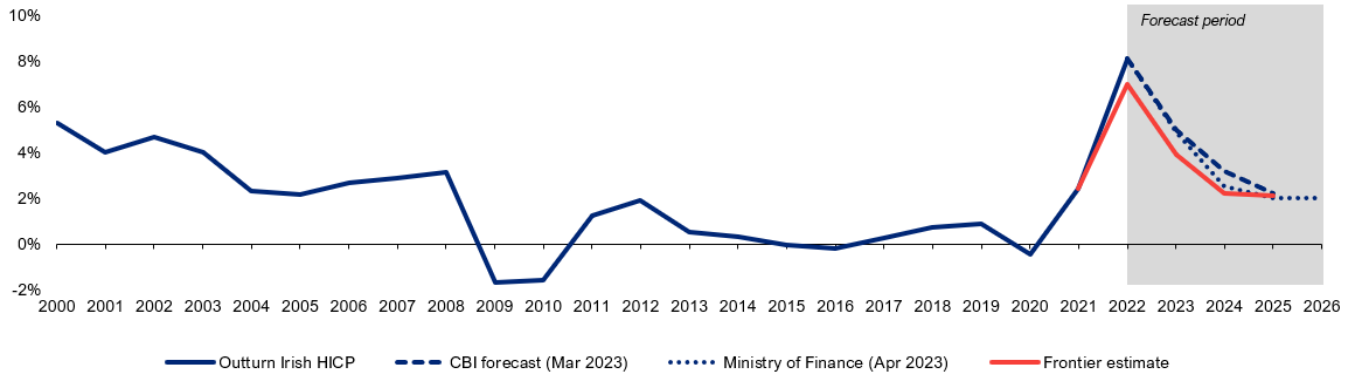
Frontier's strategy of using multiple sources to produce its HICP forecast *can* help produce a robust consensus view capturing diversity in professional opinion. But where the sources are staggered over time and the macroeconomic context moves fast, apparent differences of opinion, may just reflect changes in the evidence base.

This effect is not as marked as when CEPA assessed Frontier's 2021 analysis. However, in the limited cases where we do use HICP forecasts in this analysis to deflate a nominal cost index (see Section 3.2.1 on labour cost trends), we consider it more robust to use contemporary HICP forecasts from the same source, rather than developing a single consensus forecast.

[19] Frontier indicates July 2022 as the date for OECD forecasts. However, CEPA was not able to identify OECD forecasts from that period. As such, we assume the forecasts were from the OECD's Economic Outlook No 111, published in June 2022.

In the current fast-moving context for inflation, the CBI Q1 2023 Bulletin[20] and DoF 2023 Budget forecasts[21] are our preferred sources for near-term HICP inflation in Ireland. Both sources were published after the Frontier (2022) analysis was complete, but as shown in Figure 3.1, there has been a material uplift in forecast inflation for 2022 and 2023 compared to Frontier's findings.

Figure 3.1: Ireland HICP Inflation rates (realised and forecast) 2000 to 2026 (annual, %)



Source: CEPA analysis of multiple sources

Besides contrasting Irish HICP forecasts, Figure 3.1 shows a marked difference between the inflation context for the start of PC5 and the experience of the last decade. Since the Global Financial Crisis ('GFC'), HICP inflation has often been well below 2% and included periods of deflation (i.e., negative inflation). Ireland's inflation was also low for an EU member state, registering the lowest inflation within the bloc in multiple years.[22]

The CBI forecasts project near-term inflation to be at a level commensurate with the early 2000s, when Ireland adopted the Euro and was experiencing sustained economic growth. Key drivers of price rises are energy costs and cited post-pandemic supply chain disruption. After those drivers have fully played through to prices (or even reversed), there is an expectation that inflation will return towards 2%, but not the very low levels of the last decade, which were affected by one-off factors such as Brexit. However, there remains uncertainty on the longer-term outlook and the CBI noted in the Q1 2023 bulletin that its forecasts are subject to both 'upside' and 'downside' risks. Downside risks dominate in the short-run due to the uncertainty regarding the speed at which reductions in wholesale energy prices will pass through to consumers. Potential upside risks cited include environmental disasters, escalation of geo-political tension or a re-emergence of the pandemic. Energy price developments continue to be a major driver of its forecasts, as shown in Table 3.2 below.[23]

[20] Page 14, CBI (2023) Quarterly Bulletin QB1, March.

[21] Page 5, DoF (2023), Stability Programme Update, April.

[22] Ireland had the lowest inflation in the EU during 2010, 2011, 2017 and 2018 (Eurostat TEC00118).

[23] Page 61, CBI (2023) Quarterly Bulletin QB1, March.

Table 3.2: Breakdown of CBI Q1 2023 HICP inflation estimates (annual, %)

	2021	2022	2023	2024	2025
HICP	**2.4**	**8.1**	**5.0**	**3.2**	**2.2**
Goods	2.0	11.4	6.4	3.0	0.8
- Energy	12.3	41.2	11.0	5.3	-1.2
- Food	0.5	7.3	7.8	3.3	1.0
- Non-Energy Industrial Goods	0.0	4.2	3.2	1.6	1.5
Services	2.4	4.7	3.6	3.4	3.5
HICP ex Energy	**1.5**	**5.0**	**4.3**	**2.9**	**2.6**
HICP ex Food and Energy (Core)	**1.7**	**4.6**	**3.5**	**2.8**	**2.9**

Source: CBI (2023)

As shown by comparing headline 'HICP' and 'HICP ex Energy' in Table 3.2, energy was a major contributor to HICP inflation in 2021 (0.9%) and 2022 (3.1%). Energy is forecast by the CBI to continue to have an impact on inflation in 2023 (0.7%) and 2024 (0.3%) before having a deflationary impact (i.e., negative inflation) in 2025 (-0.4%). This sensitivity to energy prices is notable as while GNI's costs will have some exposure to energy costs, it is not clear their impact is as direct as on the consumer basket of goods.

3.2. COST TRENDS EVIDENCE

GNI has asked the CRU to apply RPEs to parts of its PC5 cost allowances based on Frontier's advice on the *"three main input cost categories"* for GNI (page 4, Frontier (2022)): (i) labour; (ii) materials; and (iii) business services.[24] It also uses information in these areas to argue it faced real price pressures during PC4 that should be taken into account in the CRU's capex look-back review.

In this section we comment on the analysis presented to support the RPEs requested in each area.

3.2.1. Labour

GNI proposal and Frontier analysis

GNI proposes two types of labour RPE for PC5:[25]

- an 'embedded' 1.0% RPE it has built into its 'People' cost request for opex; and
- an *ex-ante* 0.8% RPE on top of the HICP indexation provided in the price control framework.

GNI has maintained its proposed 1.0% embedded RPE for its internal 'People' costs since its original business plan submission. When GNI originally put forward that proposal, it was below the 2.6% labour RPE estimate presented in supporting Frontier analysis.[26] GNI left its proposal unchanged in September 2022 despite its updated supporting analysis from Frontier cutting its estimated labour RPE significantly to 0.8%, now 0.2% lower than GNI's proposal.

The 0.8% *ex-ante* labour RPE request is consistent with Frontier's September 2022 estimate. Frontier's estimate is based on the CBI's Q3 Bulletin forecasts of average nominal growth in compensation per employee for calendar years 2022 to 2024, deflated using Frontier's consensus HICP forecast (see Section 3.1). GNI does not appear to

[24] When producing overall recommendations for opex, Frontier assumes that opex is 83% labour, 12% materials and 5% business services. Frontier assumes capex is equally split between labour and materials.

[25] Pages 59 to 61, SD008; and pages 59 to 60, SC009.

[26] Page 4, Frontier (2021).

have amended its ex-ante RPE proposal to account for potential to double count real labour cost inflation that would already be covered through the embedded People cost RPE it proposes.

CEPA comments and analysis

Forward-looking evidence

As noted in Section 3.1, we had concerns that Frontier's forward-looking labour RPE estimate might be biased because of using its consensus HICP forecast to deflate the CBI's compensation forecasts, rather than using the CBI's own forecast available in that same report. As such, we re-ran its calculations using the HICP inflation estimates available within the CBI source.[27]

Table 3.3 below shows our calculations using the CBI Q3 2022 Bulletin that Frontier referenced and with updated forecasts now available from the subsequent Bulletins (Q4 2022 and Q1 2023).

Table 3.3: Real compensation per employee forecasts (%, rounded to 1dp)

	2021	2022	2023	2024	2025	Average (2022-24)	Average (all years*)
CBI (Q3 2022)							
Compensation per employee	1.2%	3.3%	6.6%	5.5%	n/a	5.1%	4.2%
HICP	2.4%	7.8%	4.2%	2.1%	n/a	4.7%	4.1%
Real compensation per employee	**-1.2%**	**-4.5%**	**2.4%**	**3.4%**	**n/a**	**0.4%**	**0.0%**
CBI (Q4 2022)							
Compensation per employee	2.7%	3.8%	5.8%	4.9%	n/a	4.8%	4.3%
HICP	2.4%	8.0%	6.3%	2.8%	n/a	5.7%	4.9%
Real compensation per employee	**0.3%**	**-4.2%**	**-0.5%**	**2.1%**	**n/a**	**-0.9%**	**-0.6%**
CBI (Q1 2023)							
Compensation per employee	n/a	4.2%	6.4%	5.2%	3.3%	5.3%	4.8%
HICP	n/a	8.1%	5.0%	3.2%	2.2%	5.4%	4.6%
Real compensation per employee	**n/a**	**-3.9%**	**1.4%**	**2.0%**	**1.1%**	**-0.2%**	**0.2%**
Change in real compensation estimate (CBI Q3 2022 – CBI Q1 2023)	*n/a*	*+0.6%*	*-1.0%*	*-1.4%*	*n/a*	*-0.6%*	*-0.6%*

*Source: CEPA analysis of CBI (2022) and CBI (2023). *All year average presented covers 2021-2024 for CBI Q3 2022 and CBI Q4 2022 and 2022-2025 for CBI Q1 2023.*

As shown in Table 3.3, re-running calculations using the CBI forecast HICP to deflate nominal compensation growth per employee, indicates an expected labour RPE estimate of 0.4% based on information in the Q3 2022 Bulletin—half the level of Frontier's estimate. We have updated the analysis for the Q4 2022 Bulletin which was published at the start of the PC5 period[28] and found that there had been a significant downwards adjustment due to higher inflation expectations and lower expected nominal growth in compensation per employee. In fact, the forecast average real compensation growth per employee for 2022 to 2024 fell by 1.3% to -0.9%. If the analysis is further updated for the latest CBI Bulletin, Q1 2023, we find an average real compensation growth per employee of -0.2% over the period 2022 to 2024. This publication also includes a forecast for 2025 which, if included in the forecast average, increases the average real compensation growth per employee to 0.2%.

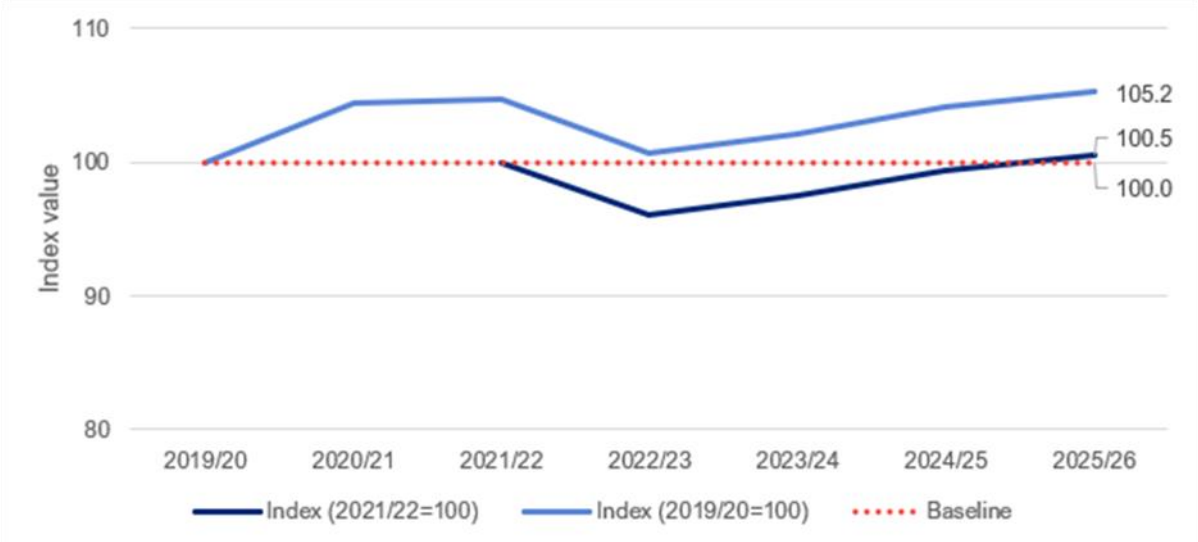
[27] CBI (2021) Quarterly Bulletin QB4, October.

[28] CBI Quarterly Bulletin Q4 2022 was published on 5 October 2022, four days after the start of PC5.

In the current high and volatile inflationary environment there is considerable uncertainty of the expected labour RPE for the PC5 period. This is highlighted by the volatility in the estimates between CBI publications as shown in the bottom row of Table 3.3. We would guard against solely using the figures spanning 2022-2025 from Q1 2023 in isolation given the potential for the most speculative estimate (2025) to have a disproportionate impact on the average and the retrospective nature of these CBI forecasts relative to the start date of PC5.

A simple index also helps to demonstrate the importance of the base year from which evidence of RPE pressures are considered to apply in setting costs allowances. As demonstrated in Figure 3.2 below, the Q1 2023 real compensation per employee CBI forecasts results in an approximately zero expected RPE impact on forecast GNI costs from the start of the PC5 period to 2025 if indexed from 2021/22. In contrast if the index starts from 2019/20 as the base, the CBI's forecasts would imply an expected positive labour RPE for PC5.

Figure 3.2: Indexed CBI Q1 2023 real compensation per employee estimates



Source: CEPA analysis of CBI (2023).

In practice, even if the wage pressures discussed above exist for Irish companies in general, GNI may also be insulated from those trends to some degree because of its specific approaches for contracting specialist external labour and setting pay deals with its staff.

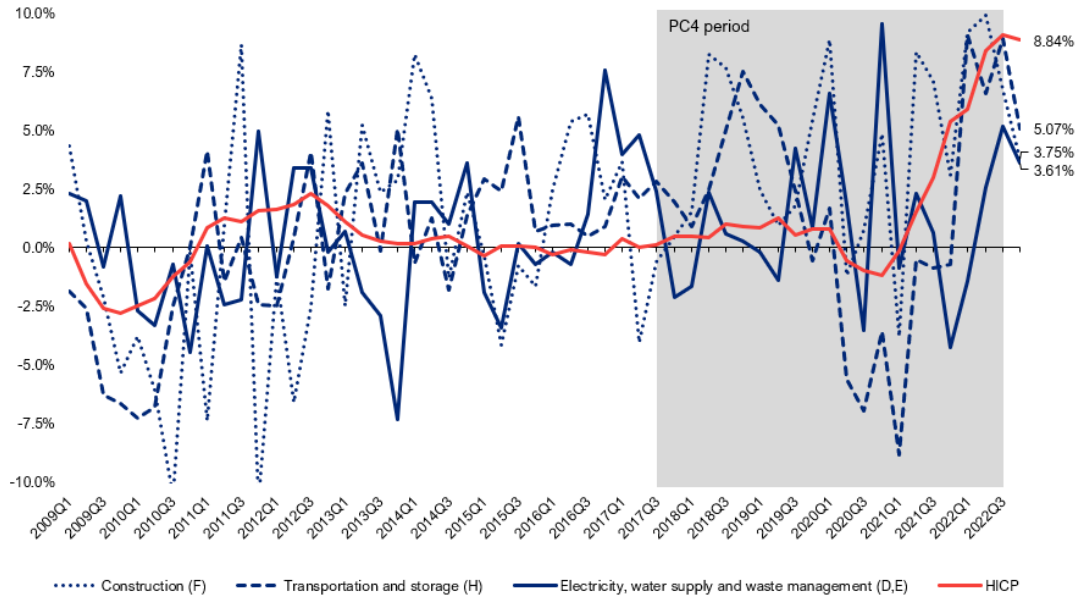
Historic evidence

Frontier's labour RPE recommendation was based on forward-looking analysis, but it also considered CSO data on average hourly earnings (AHE) excluding irregular earnings as an estimate of outturn labour RPEs during PC4.

Figure 3.3 below presents year-on-year growth in AHE excluding irregular earnings for the three market segments that Frontier assessed: (i) construction; (ii) transport and storage; and (iii) electricity, water supply and waste management. It shows these series for the full period that all three series are available (Q1 2009 to Q4 2022), set against HICP inflation.[29]

[29] A further nine quarters are available for electricity, water supply and waste management. During that period, AHE excluding irregular earnings increased 2.2% faster than inflation on average.

Figure 3.3: Average hourly earnings excluding irregular earnings and HICP Q1 2009 to Q4 2022 (annual, %)



Source: CEPA analysis of CSO data

As shown in Figure 3.3, AHE excluding irregular earnings has been volatile over time, with all three sectors experiencing periods of negative growth. It also shows that in the most recent quarters, it has not kept up with HICP, indicating a negative labour RPE.

The volatility of the underlying earnings series suggests we should not expect recent trends to give reliable predictions for the price control period, particularly over a period as long as PC5. As such, when analysing this data, we focus on average growth over the longest period where data is available for all three sectors. Table 3.4 below shows the average growth in those series net of HICP inflation. It also shows the results for the shorter 2017 to 2021 period assessed by Frontier, as evidence for a 1.1% labour RPE during PC4.

Table 3.4 Average hourly earnings excluding irregular earnings net of HICP (rounded to 1dp)

Category	CEPA average (Q1 2009– Q4 2022)	Frontier average (2017–2021) [30]
Construction	0.6%	2.4%
Transportation and storage	-0.2%	0.4%
Electricity, water supply and waste management	-0.3%	0.7%
Average (unweighted)	**0.3%**	**1.1%**

Source: CEPA and Frontier analysis of CSO data

As shown in Table 3.4, if we consider the average over the longest time series available (14 years), real earnings growth in the sectors highlighted as being most relevant for GNI was much lower than the five-year range that Frontier chose to focus on. As such, while this information may suggest evidence of labour cost pressure above HICP during parts of PC4, AHE evidence does not provide a compelling case that GNI should now necessarily expect its labour costs to grow a given margin faster (or slower) than HICP.

[30] Please note that in preparing this report we have not been able to fully reconcile Frontier's calculations with the calculations that we have applied to calculate our averages for the 2008-2021 period. There may as a result be differences in the methodology applied between the two columns. For simplicity, our calculations subtract HICP growth over the relevant period rather than applying the Fisher equation.

The historic AHE evidence presented above also needs careful interpretation in the context of the capex look-back review. The analysis of this measure indicates that to the extent GNI's capex prices were exposed to wider market trends, there is some indication that labour costs grew faster than HICP. However, to what extent (if at all) this was greater than what was already accounted for in the original allowances is not possible to identify from the information that GNI has provided.

Recommended range

Based on the analysis presented above, we can see there is significant uncertainty of the size and direction of any labour RPE that a notionally efficient company might expect to experience during PC5. Noting this uncertainty, we consider a range of -0.2% to 0.3% can be justified based on current evidence:

- The top end of our range is consistent with long-term averages of historic compensation data. It also acknowledges that while forward-looking estimates showing higher levels of wage inflation in later years of the price control are currently very uncertain, they may impact GNI's future cost base.
- The bottom end of our range recognises the expectation that GNI is highly likely to realise a negative labour RPE during at least the first year of PC5 and is consistent with placing greater weight on the latest near term CBI forecasts of growth in real labour prices in the Irish economy (2022-2024).[31]

We have been cautious in our conclusions, and note there is evidence, including recent CBI forecasts, that can support an assumption of a negative labour RPE in PC5. Assuming a zero labour RPE might also be considered an appropriate assumption, if the CRU were to take a longer-term perspective that GNI is able to manage its labour price pressures between years and across price controls to HICP. Our current proposed range recognises uncertainty in the macroeconomic evidence and the circumstances of GNI, which may to some extent moderate its exposure to the forecast labour price trends discussed above.

3.2.2. Materials

GNI proposal and Frontier analysis

GNI proposes a materials RPE in the range of 2.0% to 3.5%. Its range is consistent with the recommendation in Frontier's September 2022 update,[32] up from the 1.0% materials RPE it estimated in November 2021.[33]

Frontier based its recommended materials RPE range on analysis of how the CSO's Wholesale Price Index (WPI) for building and construction materials has moved relative to HICP in recent years. The bottom end of its range is linked to the average percentage increase over HICP between 2017 and 2021. The top end of its range includes data to the end of July 2022. Frontier uses information from the same date range to justify evidence of an outturn materials RPE in PC4 and its forecast for PC5.

Frontier also presented evidence on annual changes in the Society of Chartered Surveyors Ireland (SCSI) Tender Price Index (TPI), which GNI also cites as evidence of real construction price inflation during PC4,[34] and information that GNI was experiencing materials price inflation significantly ahead of HICP on some contracts.

CEPA comments and analysis

We have reviewed Frontier's September 2022 update and considered additional evidence from the CSO's Industrial Price Index (IPI) and Capital Goods series, which Frontier did not comment on in its submissions. We set out our findings for each source below, before presenting our recommended materials range.

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[31] A conclusion closer to a zero RPE would be justified if assuming the CBI Q1 2023 forecasts are indexed to a 2021/22 base for the purposes of applying a frontier shift target to set cost allowances in PC5.

[32] Page 16, Frontier (2022)

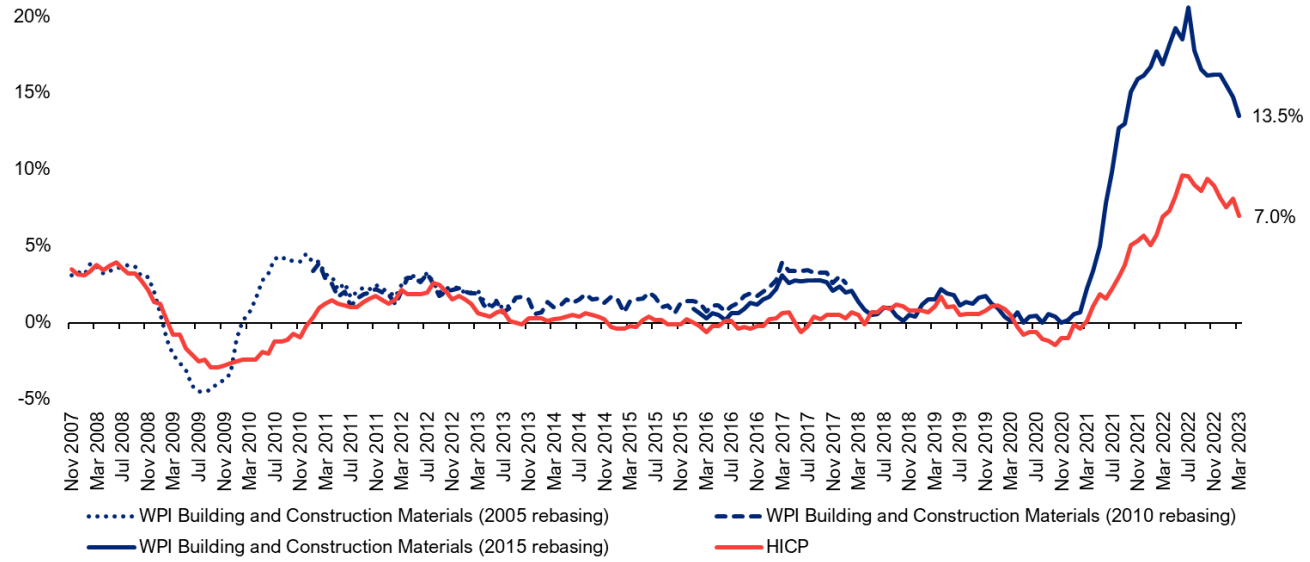
[33] Page 4, Frontier (2021)

[34] The Tender Price Index is based on surveys of SCSI members on the cost of commercial construction projects over €0.5m.

WPI building and construction materials

Figure 3.4 below shows the 12-month percentage change in the CSO's WPI building and construction materials series from November 2007 to March 2023. It also shows HICP inflation over the same period.

Figure 3.4: 12-month growth in CSO WPI building and construction materials and HICP (Nov 2007 to Mar 2023)



Source: CEPA analysis of CSO data

As shown in Figure 3.3, the CSO's indices of building and construction materials have tended to increase faster than HICP. However, since Q2 2021 there have been large increases in the building and construction materials series, outpacing HICP by a large margin.

Examining the CSO's subindices, it is possible to see that during 2021, much of the increase came from timber prices—a material that we would not expect to represent a significant portion of GNI's costs. However, during 2021 and 2022 the price increases have continued, with a wider range of materials contributing to that, including some categories that may be more relevant for GNI (e.g., 'pipes and fittings').

The WPI building and construction index include some materials relevant to GNI's business, or that might face comparable price pressures to the materials that GNI procures. However, care must be taken when interpreting the aggregate index, which weights together subindices based on a 1998 CSO survey that requested the breakdown of materials used by building, civil engineering and other trade firms.[35] We have not been able to find the underlying weights that the CSO applies. However, we note that 'pipes and fittings'—one of the categories appearing more relevant for a gas networks business—falls in the 'other' category, suggesting the WPI building and construction materials index may not be well tailored for a gas network business in PC5.

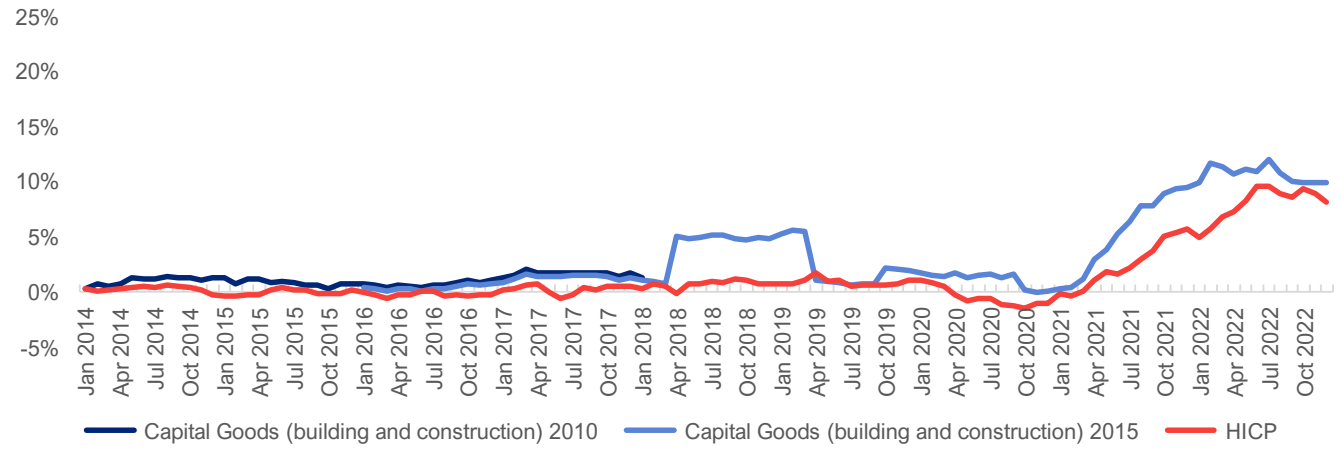
CSO Capital Goods (buildings and construction index)

As an alternative to the WPI that was cited by Frontier in its analysis, we have also explored the "Capital Goods Price Index for Building and Construction" (CGPI) – given its potential relevance in capturing labour costs as well as material cost inflation. This combines the WPI B&C with a measure of the change in wages in the construction sector to provide an overall index for input construction costs.

Figure 3.5 shows the 12-month percentage change in the index. In the last two years the index has mostly outpaced HICP, although the gap appears to have reduced in recent months.

[35] Page 11, CSO (2020), Wholesale Price Index - Introduction of Updated Series, Base year 2015 = 100, December.

Figure 3.5: 12-month growth in CSO Capital Goods (building and construction) and HICP (Jan 2014 to Feb 2023)



Source: CEPA analysis of CSO data

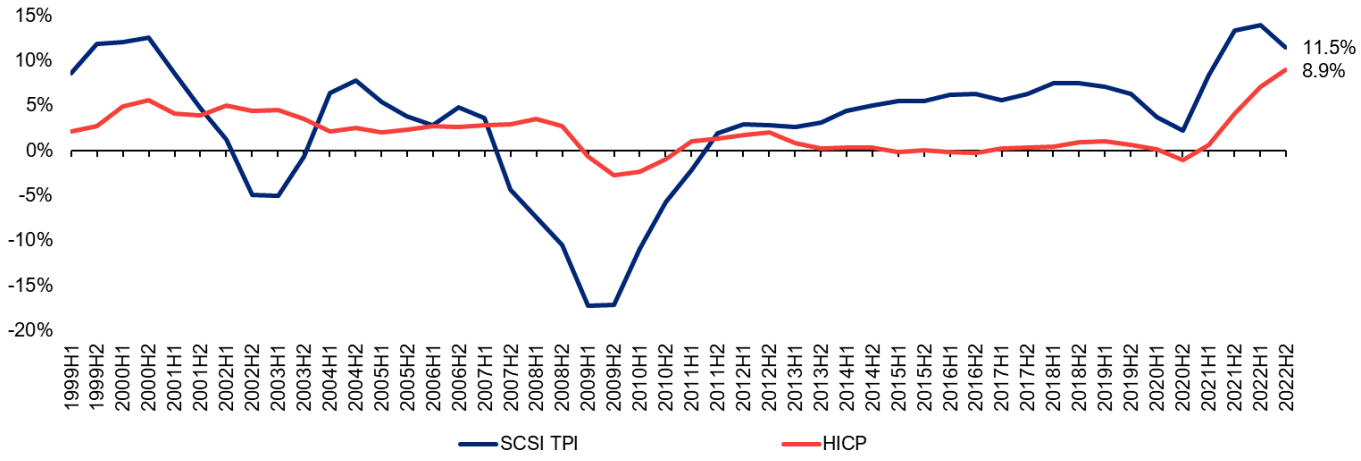
The CSO Capital Index might be considered a better measure of overall RPE pressures, particularly for GNI's capital portfolio, than specifically for materials, and has shown a consistent positive wedge relative to HICP since 2020 (although the gap has reduced in recent months). We consider the historical evidence of the CSO's capital goods index to be broadly supportive of an expected positive RPE in PC5, but indicative of a figure considerably lower than the assumption GNI proposed in its recent business plan submissions.

SCSI Tender Price Index

GNI presents information from the semi-annual SCSI TPI as a cross-check on its materials RPEs findings, focusing on the period from 2012 to 2021. GNI also refers to the SCSI TPI as justification for outturn RPEs during PC4, particularly in the context of recent retendering of major contracts.

The SCSI TPI is based on surveys of SCSI members on the cost of commercial construction projects over €0.5m. Figure 3.6 below shows its annual growth since 1999, alongside HICP.

Figure 3.6: SCSI TPI and HICP (% year-on-year), H1 1999 to H2 2022



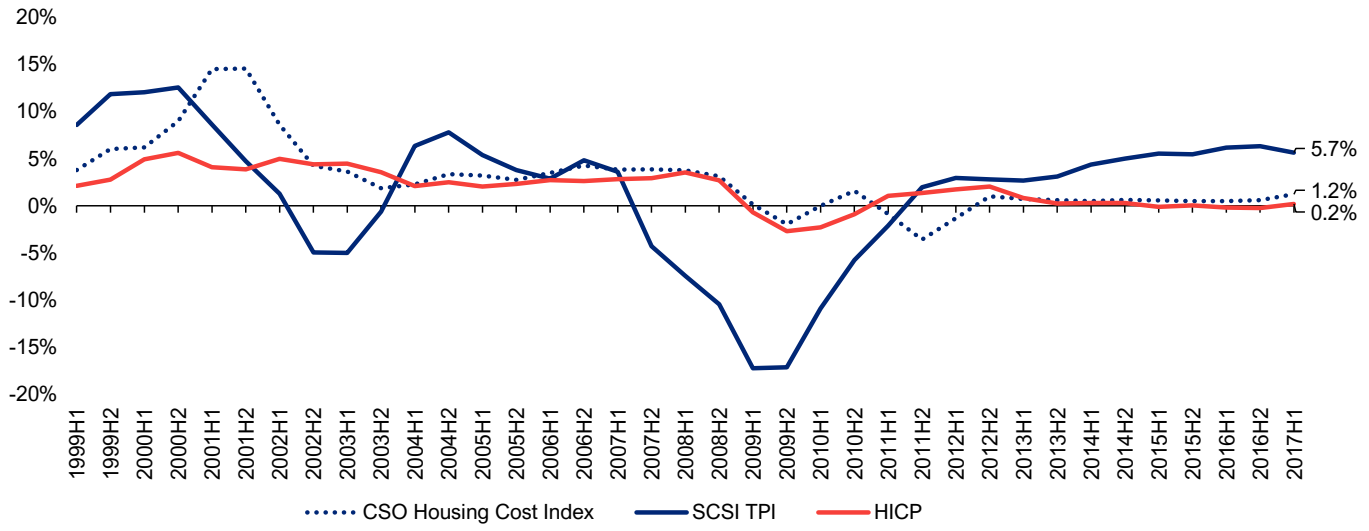
Source: CEPA analysis of SCSI and CSO data

Figure 3.6 shows that the SCSI TPI has been growing faster than HICP for several years, potentially suggesting a positive RPE. However, we have some concerns with using this evidence directly as its movements are much larger than can be explained by the AHE evidence in Section 3.2.1 or the WPI building and construction materials index shown above, particularly the large fall in the aftermath of the GFC.

Some of that difference may be explained by changes in the cost of labour and/or new building regulations. However, we expect that that the SCSI TPI is affected by market-specific factors that go beyond the cost of construction, making it less relevant for setting GNI's cost allowances for PC5.[36]

To understand the potential impact of factors beyond underlying input cost movements, we compared the SCSI TPI with a (now discontinued) CSO House Construction Cost index. Figure 3.7 below compares those series and shows that the cost of construction was much more comparable to HICP than the headline SCSI TPI. This suggests that the SCSI TPI is driven by construction sector factors that cannot easily be explained and so may not be relevant to consider when assessing potential RPEs for GNI.

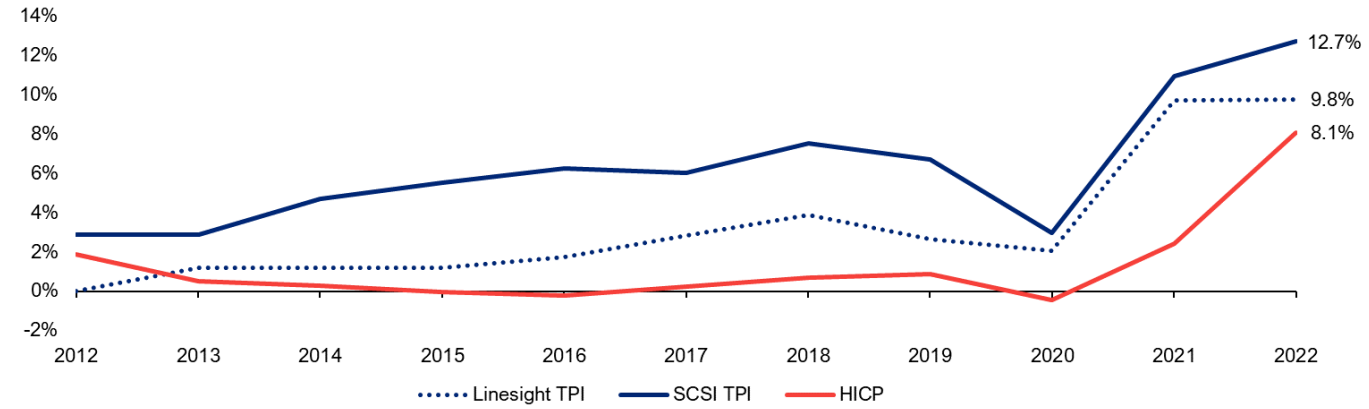
Figure 3.7: SCSI TPI and House Construction Cost Index (% year-on-year), H1 1999 to H1 2017



Source: CEPA analysis of SCSI and CSO

As a further cross-check, we note that Linesight, an international construction consultancy, also produces an annual TPI for Ireland. Figure 3.8 compares the SCSI and Linesight TPIs and shows HICP over the same period.

Figure 3.8: SCSI TPI and Linesight Ireland TPI (% year-on-year), 2012 to 2022



Source: CEPA analysis of SCSI and Linesight data [37]

[36] For some discussion of factors affecting construction costs in the Irish housing sector see pages 10 to 16, DoF (2022), Economic Insights, Summer 2022, July.

[37] Page 5, SCSI (2023), Tender Price Index February 2023, March; and page 4, Linesight (2023), Country Insights and Commodity Report, Q4 2022, February.

We note that Linesight—which produces TPIs for multiple countries—does show a significant increase in tender prices during 2021 that was sustained in 2022, but it has tended to register an annual rate of growth materially lower than recorded by the SCSI. We have not been able to verify the reason for these differences.

We accept that some of the underlying factors driving the SCSI TPI higher may also affect GNI's costs, but many of those factors will either be specific to the construction of buildings or will also be affecting HICP. As such, it is difficult to interpret the SCSI TPI as clear evidence that GNI should expect to experience materials inflation a given margin above or below HICP during PC5.

GNI contracts

Frontier's report compiled seven (confidential) examples of cases where GNI's materials contracts had increased either as part of recent orders, or due to contractual indexation provisions. It noted that many of the materials have a *"large component of embedded energy within them, and therefore increased energy costs are resulting in substantial increased in materials costs, above HICP."*[38]

Evidence on actual price pressures experienced by GNI is valuable in understanding the extent to which HICP can be expected to capture GNI's cost pressures. However, that evidence can be difficult to interpret without information on what proportion of GNI's opex and capex each contract relates to, or information on how other contract prices are moving. CEPA requested that GNI provide an indication of how large a portion of its opex and capex each contract cited related to. However, GNI did not provide any such information in its response to our question. We also note that the NSWC2 contracts include some materials within its scope. As that step up in costs is being considered separately as part of CEPA and LOD's bottom-up cost assessments, if the CRU were to apply a top-down adjustment for materials RPEs, care would need to be taken to avoid double counting any materials RPEs already embedded within that step up in GNI's costs.

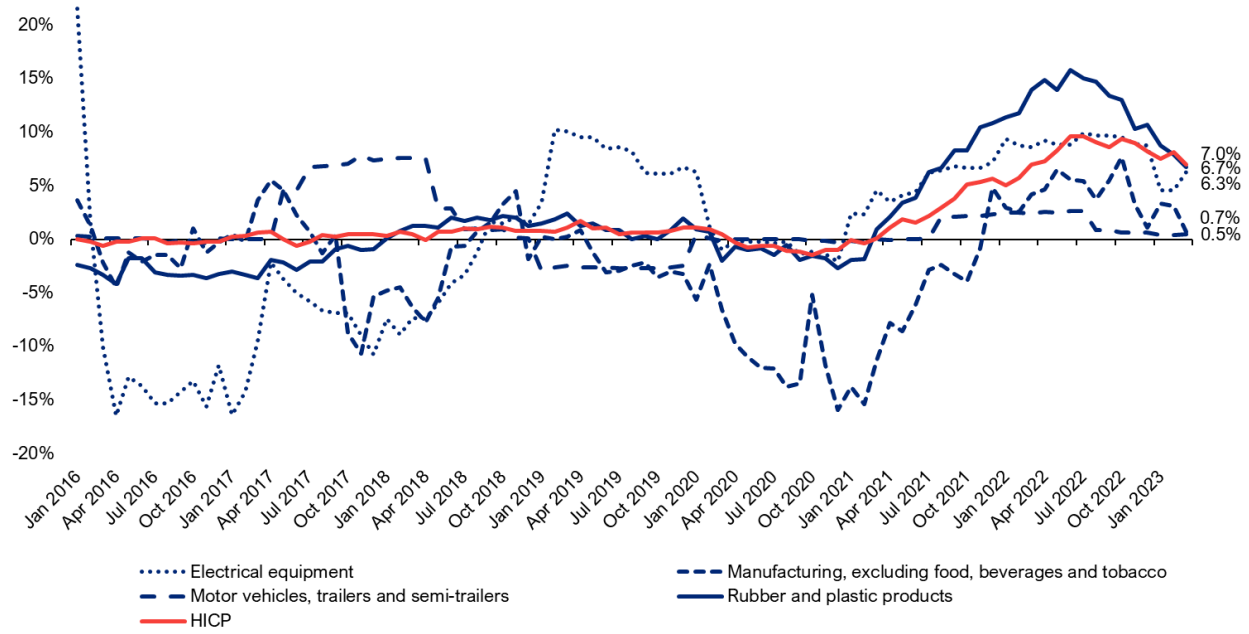
Industrial Price Index

Noting the sensitivity of this analysis presented above to the weightings in any generic index, we examined alternative evidence from the year-on-year growth of a set of Industrial Price Index (IPI) sub-indices from 2016 to March 2023, as show in Figure 3.9 and Table 3.5 below. Frontier did not include any assessment of IPI in its analysis; however, we have identified these sectors as being relevant for some of the sectors where GNI will be procuring materials and equipment. CEPA considered these series when assessing potential materials RPEs of ESB Networks for the PR5 price control.[39]

[38] Page 15, Frontier (2022)

[39] Page 39, CEPA (2020), Real price effects and ongoing productivity improvements for PR5, July.

Figure 3.9: IPI (Excl. VAT), selected industry sectors (real, % year-on-year), Jan 2016 to Mar 2023



Source: CEPA analysis of CSO data

Table 3.5: IPI (Excl. VAT), selected industry sectors net of HICP (% year-on-year) 2016 to 2022

	2016	2017	2018	2019	2020	2021	2022
Electrical equipment	-9.9%	-8.6%	-4.0%	6.8%	0.5%	2.6%	1.1%
Manufacturing, excluding food	-0.7%	-1.2%	-2.7%	-2.5%	-9.4%	-8.6%	-3.6%
Motor vehicles, trailers and semi-trailers	0.2%	4.0%	2.5%	-3.6%	0.5%	-1.6%	-6.3%
Rubber and plastic products	-2.8%	-2.3%	0.8%	0.2%	-0.6%	2.2%	5.2%
Unweighted average (selected sectors)	**-3.3%**	**-2.0%**	**-0.8%**	**0.2%**	**-2.3%**	**-1.3%**	**-0.9%**

Source: CEPA analysis of CSO data

As can be seen from Figure 3.9 and Table 3.5, the case for a positive materials RPE becomes weaker once alternative cost categories are considered, and we can see that while some relevant cost indices have increased faster than HICP, others have not. We found the unweighted average change of these indices to be on average 1.5% below HICP inflation from January 2016 to March 2023. Frontier did not comment on IPI in its 2021 or 2022 reports.

Recommended range

The evidence presented above suggests that the cost of many materials is currently increasing significantly. Common underlying themes are the ongoing impact of post-lockdown supply chain problems, the conflict in Ukraine and higher energy costs. However, HICP inflation is also being driven higher by those factors, meaning that GNI may already benefit from significant protection from changes in its materials costs. Furthermore, given the mixture of evidence in this area, we consider a relatively wide RPE range from -0.9% to 2.0%.

- The low end of our range is consistent with the longer-term average IPI in Table 3.5 for selected sectors from January 2016 to December 2022.
- The high end of our range is consistent with the longer-term average growth of WPI Building and Construction materials from November 2007 to March 2023.

Overall, we have built our range around longer-term evidence, but note that with current volatility it may be difficult to rely on that as a basis for forecasts, and we find the balance of evidence to more likely point towards a notional gas networks company facing a positive materials RPE during PC5.

Regarding outturn materials RPEs for the capex look-back, we consider the top-down evidence that GNI has been exposed to a significant and positive materials RPE over the relevant period is mixed, although some indices – with the limitations for assessing GNI's RPE pressures we have noted above – are supportive of an assumption that economic and efficient capex materials costs could have risen faster HICP inflation. We consider that evidence from the SCSI TPI is likely to overstate the materials cost pressures faced by GNI and that where some indices do show high real price growth, that is more often for the final year of PC4 (i.e., Oct 2021 to Sep 2022), which is important to note but will not be reviewed until the PC6 decision.

3.2.3. Business services

GNI proposal and Frontier analysis

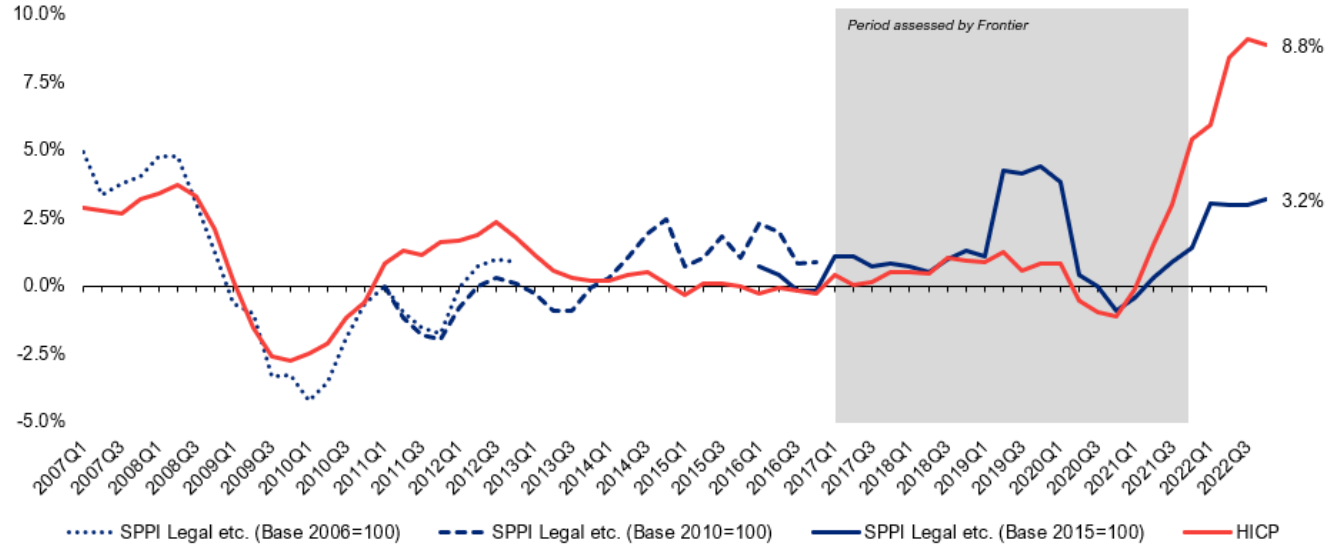
GNI proposes a business services RPE of 0.5%. Its proposal is consistent with the recommendation in Frontier's September 2022 update.[40] Frontier based its recommendation on real growth in the 'Legal, Accounting, Public Relations and Consultancy' sub-index of the CSO's Service Producer Price Index (SPPI) from 2017 to 2021.

CEPA comments and analysis

CEPA used the same series for the analysis of business service RPEs for the PR5 price control, where we noted that it covered a broad range of services that may be outsourced by regulated network companies.[41]

Consistent with our analysis for PR5, we prefer to consider a longer time series than Frontier has used. Figure 3.10 shows year-on-year growth in this SPPI subindex alongside HICP from Q1 2007Q1 to Q4 2022.

Figure 3.10: SPPI Legal, Accounting, Public Relations and Consultancy sub-index and HICP (% year-on-year), Q1 2007 to Q4 2022



Source: CEPA analysis of CSO data

[40] Page 19, Frontier (2022).

[41] Page 40, CEPA (2020), Real price effects and ongoing productivity improvements for PR5, July.

Considering the full time series shown in Figure 3.10, we find that on average the sub-index increased just under HICP inflation: -0.2% average real growth. To consider this longer period we must combine multiple rebased series; however, we consider that more reliable when considering potential future movements. Frontier considers only the 2017 to 2021 period, which does not include two quarters of 2022 with material negative real growth and puts an outsized weight on the unusual spike in real growth from Q2 2019 to Q1 2020, which also raises questions about the reliability of this particular SPPI sub-index.

Overall, we conclude that there is no clear case for an RPE for PC5 as: (i) GNI did not previously consider it to be needed;[42] (ii) evidence from the most relevant SPPI market segment does not suggest RPEs in this area should necessarily be expected to persist over time; and (iii) the portion of GNI's cost base covered by this category (Frontier assumes 5% of opex) is small.

3.3. Conclusions

For **labour costs**, our analysis has found recent earnings and HICP projections to suggest a reasonable likelihood of GNI enjoying a negative labour RPE in the early years of PC5, counteracting longer-term historic evidence that pointed to grounds for a modest positive labour RPE. Recent CBI forecasts, however, project a positive expected labour RPE in the general Irish economy in the later years of the price control.

In acknowledgement of the fact that while forward-looking estimates by the CBI showing higher levels of wage inflation in later years of the price control are currently very uncertain, there is still the potential they may impact GNI's future cost base. As a result, as a top end of the range we have assumed an expected labour RPE of 0.3% and as a lower end of the range a figure of -0.2% if placing less weight on longer-term forecasts.

A balanced regulatory approach would potentially be for the CRU to keep with its standard HICP indexation assumption for utility company labour prices in Ireland, leaving GNI to manage its costs on that basis between years and across price controls. As a significant portion of GNI's labour costs are bought in through external contracts (e.g., NSWC2), when assessing potential top-down adjustments, it is also important to note we are already considering a major step up in those costs as part of the bottom-up analysis of GNI's cost step proposals.[43]

For **materials**, recent evidence from published indices and GNI's submitted evidence on contracts suggest utilities are experiencing significant supply chain cost pressure. Some of GNI's materials costs may run significantly ahead of inflation. However, as many of the factors driving those increases higher also affect HICP, it is hard to say at an aggregate level if HICP indexation would over- or under-compensate GNI for materials costs changes during PC5. It is also difficult to ensure a top-down adjustment would not double count changes GNI may have already embedded in its bottom-up proposals. For capex in particular, materials covers a significant greater proportion of GNI's costs, and while we consider it is a possibility that GNI's costs may not rise faster than HICP,[44] we recognise that GNI has been under pressure and so provide further guidance in Section 5 on principles for how materials RPEs could be considered for PC5 and as part of the capex lookback and look forward review.

Business services is a small portion of GNI's cost base and there is limited evidence to suggest cost pressures should be expected to deviate materially from HICP.

Overall, based on the data and forecasts used to prepare this report, we consider the evidence is mixed as to whether a non-zero RPE can be justified for PC5 with the exception of materials in relation to capex. A conclusion that no explicit RPEs are justified for PC5 would be consistent with precedent from the PC4 price control and other regulated network businesses in Ireland, as summarised in Appendix A.

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[42] GNI did not include a business services RPE in its December 2021 business plan submission.

[43] Effectively considering a major embedded labour RPE in that way reduces the need for a further top-down adjustment to other labour costs, where relevant.

[44] Increases in HICP and GNI's materials costs share many of the same drivers, notably energy cost rises and international supply chain bottlenecks post-lockdown or because of the conflict in Ukraine.

There is greater precedent for positive RPEs in the UK, where Ofgem has introduced mechanistic RPE indexation within the RIIO-GD2 and RIIO-GT2 price control.

The CRU has not asked CEPA to consider if any such mechanism would be appropriate in Ireland. However, we note from our work to assess potential RPEs for PC5 that there is more limited availability of key cost indices in Ireland compared to GB, making indexation more challenging to implement for GNI.

GNI will certainly face a range of cost pressures during PC5. However, the application of HICP indexation to its cost allowances and the opportunity to revisit costs in full at PC6, including the opportunity to review GNI's capex allowances ex-post, are mechanisms that significantly reduce GNI's exposure to inflation in a way that is not available to commercial organisations operating in competitive sectors of the Irish economy.

4. ONGOING EFFICIENCY

This section considers the scope for GNI to achieve ongoing efficiency gains over PC5 (i.e., in line with companies at the 'efficient frontier'), and the appropriate adjustment that should be made to its cost allowances to account for this. For that assessment, we first summarise GNI's proposal and the supporting analysis from Frontier (Section 4.1). We then assess GNI's proposal (Section 4.2) and conclude with a summary of our conclusions (Section 4.3).

As discussed in Section 2.2, given the CRU's regulatory framework for GNI, we focus our analysis on producing a forward-looking estimate of ongoing efficiency improvements for GNI's opex.

However, as context for LOD and the CRU's assessment of GNI's capex proposals, we note that we would expect the potential for GNI to make ongoing efficiency improvements in its capex programme would be of a comparable order of magnitude to those we estimate for opex. Our expectation on this point is supported by recent regulatory precedent from other jurisdictions where regulators have set equal or similar ongoing efficiency challenges for opex and capex allowances. For example, as shown in Appendix A, the Utility Regulator in Northern Ireland recently set the same ongoing efficiency challenge for both opex and capex for GD23, and Ofgem's estimates of the scope for ongoing efficiency in opex and capex only differed by 0.1%.

4.1. GNI PROPOSAL AND FRONTIER ANALYSIS

GNI applies a 1% efficiency *"ambition"* for PC5 to its opex proposals;[45] it does not apply an efficiency challenge to its PC5 capex. Frontier's November 2021 advice to GNI states that a 1% productivity challenge is *"at the high end of an achievable target"* for PC5 and that there were *"sufficient grounds for CRU to consider a more conservative target"*.[46]

Frontier's analysis focuses on: (i) historic productivity trends for related comparator industries using the EU KLEMS database; and (ii) further supporting analysis of a wider *"productivity slowdown"* and the impact of COVID-19.

4.1.1. EU KLEMS analysis

Frontier calculates an ongoing efficiency challenge for Ireland using the EU KLEMS database. EU KLEMS is a standard source for ongoing efficiency analysis but its results can be sensitive to decisions in the following areas:

- dataset choice;
- use of productivity measures;
- comparator industry selection; and
- historic timeframe.

We summarise Frontier's choices and supporting rationale for each area below.

Dataset

When Frontier conducted its analysis,[47] the two most recent EU KLEMS statistical releases were the 2009 release (March 2011 update), covering 1988 to 2007; and the EU KLEMS 2019 release, covering 2009 to 2016. Frontier used the 2009 EU KLEMS release as it considered the 2019 dataset to be too volatile and because of missing data for comparator industries that it considered to be relevant.

[45] Page 61, SD008; and page 60, SD009.

[46] Page 28, Exhibit 059.

[47] Frontier presented its analysis of ongoing efficiency in its November 2021 report. No further analysis was included in its September 2022 update.

Productivity measures

Various productivity measures can be calculated from the EU KLEMS dataset:

- **Total factor productivity (TFP):** Measures how productively the combined factors of production are used to generate output. There are two standard measures of TFP growth which differ in that they use different measures of outputs but also separate measures of inputs:
    - TFP gross output (TFP GO) productivity is measured as the ratio of gross output to all inputs including labour, capital *and* intermediate inputs.
    - TFP value added (TFP VA) productivity is measured as the ratio of outputs (after subtracting the value of intermediate inputs) to labour and capital inputs only.
- **Partial factor productivity (PFP):** 'Partial factor' measures can be used to show how productively certain categories of input (e.g., labour) are used to generate output over time. PFP measures of productivity growth can be defined using a GO or VA definition of output. PFP measures that include intermediate inputs, can only be measured in terms of GO.

Frontier chose two total factor productivity measures: TFP (VA) and TFP (GO). It also used a partial factor productivity measure: labour and intermediate inputs gross output (LP and IIP (GO)).

Comparator industries

Frontier used estimates for all industries and a *"close comparator"* sample selected to more closely represent GNI, comprising the following sectors:

- manufacture of chemicals and chemical products;
- manufacture of electrical and optical equipment;
- manufacture of transport equipment;
- construction;
- sale, maintenance & repair of motor vehicles/motorcycles;
- retail sale of fuel;
- transport and storage and communication; and
- financial intermediation.

Timeframe

Frontier used two time periods in its analysis: (i) the full EU KLEMS 2011 data series from 1988 to 2007; and (ii) 1999 to 2007.

Results

Using the methodology summarised above, Frontier calculated the following ongoing efficiency estimates.

Table 4.1 Estimates of ongoing efficiency provided by Frontier (% change p.a.)

Time period	Comparator	TFP (VA)	TFP (GO)	LP & IIP (GO), constant capital
1988 to 2007	All industries	1.2%	0.5%	0.7%
	Selected industries	2.0%	0.6%	0.9%
1999 to 2007	All industries	0.0%	-0.1%	-0.1%
	Selected industries	-0.2%	-0.7%	-1.1%

Source: Frontier

Frontier considered the range of evidence shown in Table 4.1 to help inform its view on an appropriate ongoing efficiency target for PC5. For opex, it referenced CEPA's PC4 recommendation to use the Labour and Intermediate Input productivity measures as the most applicable statistics, which gave a narrower range of -1.1% to 0.9% p.a.

4.1.2. Frontier broader analysis

Frontier also provided analysis to argue that there has been a 'productivity slowdown' and the likelihood that there will be a 'productivity wedge' lost because of COVID-19.

Productivity slowdown

Frontier presented estimates (based on CSO data) of GVA per hour worked for labour productivity growth in Ireland, excluding sectors identified as being dominated by multi-national enterprises. For the remaining *"domestic and other"* category, Frontier estimates growth of 1.1% for 2000 to 2007, 3.6% for 2008-2011 and 0.5% for 2012-2019 (removing 2015 as an outlier).

Frontier also reports UK Office for National Statistics (ONS) data for annual growth in output per hour worked, output per worker and multifactor productivity; and OECD data for GDP per hour worked. Those metrics report productivity as having declined since the financial crisis in the UK, Eurozone, European Union and OECD countries.

COVID-19 impact

Frontier considered that the COVID-19 pandemic has introduced *"substantial uncertainty into the long-term outlook for productivity"*.[48] Evidence is provided from the Department of Finance (DoF), the UK Office for Budget Responsibility (OBR) and the ECB. This included a March 2021 OBR forecast for UK productivity, which Frontier described as having explained that since the outbreak of COVID-19, productivity has been affected by *"disruption to working practices reducing productivity"* and *"concentration of lockdowns / furlough schemes in below-average productivity jobs, increasing productivity per hour worked"*.[49]

4.2. CEPA COMMENTS AND ASSESSMENT

In this section we assess GNI's proposal and the supporting Frontier analysis. We set out further analysis where we consider there are potential limitations with Frontier's proposals or alternative assumptions merit consideration.

4.2.1. EU KLEMS analysis

Our assessment of the EU KLEMS analysis undertaken by Frontier is as follows:

- **Dataset**: We agree that the 2011 EU KLEMS dataset is the most appropriate for this specific context. This is because of the issues highlighted by Frontier with the more recent EU KLEMS release in relation to Ireland

[48] Page 28, Exhibit 059.

[49] Pages 27 to 28, Exhibit 059. Frontier does not cite whether it was referencing the March 2021 or October 2021 OBR papers. However, we understand it to be referencing page 68, OBR (2021) Economic and fiscal outlook, March.

(i.e., high volatility in recent Irish productivity data, as well as incomplete data for key metrics for Ireland). CEPA reached similar conclusions and followed the same approach at PR5.[50] Since Frontier conducted its analysis, an update to the 2019 EU KLEMS dataset has been published. However, this new release raises similar issues with the Irish data and so we do not present it with our analysis.

- **Productivity measures:** Frontier has followed what we recognise to be good practice in presenting a range of input and output measures. This includes both GO and VA measures, and TFP and PFP estimates. We report the same TFP measures as Frontier but use the 'variable capital' method of calculating the partial productivity LP and IIP (GO) measure instead of the constant capital method as we consider there are issues in the latter's estimation.[51] We also present the partial labour productivity value added (LP (VA)) measure as we consider it best practice to present VA and GO measures for both TFP and PFP.[52]
- **Comparator industry:** We find reporting 'all industries' and the 'selected industries' composite to be appropriate and justified. We have also reported a 'GNI specific' category, which is a weighted average of sectors that were identified in PC4 as closely corresponding to GNI's activities.[53]
- **Timeframe:** there are two generally accepted approaches taken when selecting a time period for ongoing productivity analysis: either selecting a whole business cycle (to limit the chance of upwardly or downwardly biasing estimates) or considering average productivity over a longer period of time such as the entire time period from an EU KLEMS release (which reduces the level of subjectivity from selecting a sample time period). We have not seen evidence that the shorter 1999 to 2007 period fits with either of these approaches, so we only report results for 1988 to 2007 (which is the entire 2011 release time period). This is consistent with CEPA's approach for PR5.

In the table below we present updated estimates of ongoing efficiency alongside the estimates provided by Frontier.

[50] See CEPA (2020), Real price effects and ongoing productivity improvements for PR5 - Report for CRU. In that report we noted the significant volatility in the Irish data referenced by Frontier and how productivity averages over the period for Ireland were particularly sensitive (potentially biased upwards) by reported data in one year (2015). For price review purposes, there were also certain limitations in the data and productivity estimates that were reported in the release.

[51] This is a change from CEPA's position at PC4. We now consider that the updated formula which does not place any restrictions on the growth of capital over time provides a more straightforward definition of historic labour productivity growth.

[52] We use labour as, by construction, we cannot estimate LP and IIP (VA).

[53] The 'GNI specific' category is a weighted average of 'renting of machinery & equipment and other business activities' (48%), 'electricity gas and water supply' (33%) and 'financial intermediation' (18%).

Table 4.2 Estimates of ongoing efficiency provided by CEPA and Frontier (% change p.a.)

Dataset and years	Industry selection	TFP (VA)	TFP (GO)[54]	LP (VA), variable capital	LP & IIP (GO), variable capital	LP & IIP (GO), constant capital
CEPA						
EU KLEMS 2011 (1988–2007)	All industries	1.2%	0.6%	2.7%	0.7%	n/a
	Select industries	2.0%	0.9%	3.5%	0.7%	n/a
	GNI specific	2.1%	0.8%	2.7%	0.6%	n/a
Frontier						
EU KLEMS 2011 (1988–2007)	All industries	1.2%	0.5%	n/a	n/a	0.7%
	Select industries	2.0%	0.6%	n/a	n/a	0.9%
EU KLEMS 2011 (1999–2007)	All industries	0.0%	-0.1%	n/a	n/a	-0.1%
	Select industries	-0.2%	-0.7%	n/a	n/a	-1.1%

Source: CEPA and Frontier analysis of EU KLEMS data

The productivity estimates in our analysis are generally higher than the estimates presented by Frontier, as its lowest estimate was informed by the shorter 1999 to 2007 time period and as we also present evidence from the LP (VA) measure. As previously discussed, we consider it best practice[55] to base estimates of historical productivity growth on full business cycles or longer time periods to reduce the chance of bias caused by phases of the business cycle where productivity would be expected to be higher or lower than normal.

Table 4.2 presents a broad range of productivity estimates. In using this analysis to inform an appropriate ongoing efficiency target for PC5, we note the highest productivity estimates in the analysis must be interpreted with caution:

- The highest productivity estimates shown above would be significantly above regulatory precedent for ongoing efficiency targets (see Appendix A) which have tended to be c. 1% (with some variation depending on the regulated sector in question).
- The LP (VA) and TFP (VA) measures produce higher productivity estimates than TFP (GO) and LP & IIP (GO). There are reasons why we consider weight should be placed on both VA and GO measures of productivity for the purposes of setting an ongoing efficiency target for network utility price controls. This position has precedent in other recent regulatory decisions (i.e., CMA PR19 and CMA RIIO-G2 and T2), which outline the rationale behind this decision in their Final Determinations.[56]
- The LP (VA) measure is representative of backwards-looking productivity improvements achieved by labour within some sections of the Irish economy. This is not directly applicable to GNI's opex base and is unlikely to be fully representative of productivity gains that they could achieve. It is reasonable to believe

[54] Several different assumptions can be embedded in the calculation of TFP GO. We presume that this is the cause of the difference in estimates between Frontier and CEPA's estimates.

[55] For the purposes of determining an ongoing efficiency target for a network utility company,

[56] The use of VA and GO measures of productivity was debated at length in the recent Competition and Markets Authority (CMA) price review referrals for PR19 (water sector) and RIIO-2 (transmission and gas distribution).

The CMA in the PR19 appeals for example stated that "*it would be inappropriate to fully weight the 1.5% value added estimate without some downward adjustment. This is because we apply the frontier shift to costs which are akin to intermediate inputs.*" The CMA noted evidence put forward to it that the value added measure would be higher than the gross output measure and, therefore, decided "*to focus on the gross output measure but give some qualitative weight to the value added metric being higher."* See CMA (17 March 2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report, para. 4.545.

that (if mechanistically applied) these estimates may overstate achievable productivity as labour productivity is generally higher than capital productivity or TFP on account of capital substitution.

We note that TFP estimates developed using data from the EU KLEMS database are representative of 'disembodied' technical change, but do not capture 'embodied' technical change.[57] Both effects can lead to productivity improvements. Therefore, GO-based TFP estimates developed using the EU KLEMS database may underestimate the potential for cost savings which could be delivered through quality improvements which are embodied within the capital and labour inputs.[58]

Taking these factors in the round, we consider the evidence from the 2011 EU KLEMS database for Ireland is broadly supportive of the long-term ongoing efficiency target of 1% for opex that the CRU has adopted in its recent network price control determinations, including PC4.

4.2.2. Productivity slowdown

The argument provided by Frontier on the productivity slowdown—sometimes referred to as the 'productivity puzzle'—is supported by analysis of information from a range of credible sources and shows that growth rates since the GFC have fallen below long-term trends. But only one of Frontier's sources is specific to Ireland: the figures from the CSO. That source shows that labour productivity growth has fallen for the 'domestic and other' category since 2012. However, its evidence also shows that labour productivity growth was highest during the GFC, over 2% higher than in the preceding period. This seems counterintuitive for a recession and raises questions about underlying dynamics driving the estimates, and whether they could be affecting estimates in other periods as well.

Notwithstanding these issues, we acknowledge that there is evidence of weak productivity growth globally over the past decade, including in Ireland.[59] But there is still uncertainty of the cause, with a variety of drivers having been proposed. Frontier cites drivers proposed by the ECB, and there are a number of other institutions that have undertaken analysis, such as the UK OBR, which proposed drivers including measurement issues, lower investment, compositional effects, labour market factors and impaired financial markets.[60]

This uncertainty, and the breadth and variety of the proposed drivers, makes it difficult to assess the relevance of the slowdown for GNI. For example, some explanations emphasise weak recovery of business investment since the GFC. However, it is unlikely that this would have a major impact on GNI which, as a monopoly service provider, would be supported by regulated revenue streams.[61] This is a view that regulators in the UK have referenced as a justification for maintaining ongoing efficiency targets based on longer-term productivity trends in their recent network utility price control decisions, despite a range of evidence of weak productivity growth in the general economy more recently. As such, we have not considered it necessary to adjust the long-term ongoing efficiency estimate for GNI.

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[57] Disembodied technical change refers to the productivity gains which are made through the process by which output is produced from inputs of a given quality (e.g., through the introduction of new business practices which employ a more efficient approach to utilising inputs). Embodied technical change refers to the productivity gains made from employing new inputs relative to the use of a comparable amount of pre-existing inputs (e.g., from updating the quality of existing stock of machinery).

[58] The CMA stated that embodied technical change provided a '*valid conceptual basis for increasing [their estimate]*' but they reached their estimate in recent water appeals qualitatively and in the round. See paragraph 4.554, CMA (2021), Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations: Final report, March. See also CMA (2021) "Energy Licence Modification Appeals: Final determination Volume 2B: Joined Grounds B, C and D" para 7.259.

[59] While we have not been able to confirm this is the case, Frontier appears to employ different definitions of the GFC between the different sources of their analysis. It is not clear why or if this affects their findings.

[60] Pages 43 to 46, OBR (2012), Economic and Fiscal Outlook, December.

[61] For example, regulated revenue streams should allow GNI to protect innovation and investment activity and maintain scale during periods or low demand growth in the wider economy when compared to companies in competitive industries.

4.2.3. COVID-19 impact

As with the productivity slowdown, and arguably even to a greater extent, evidence of a negative impact from COVID-19 is inconclusive.

In the short term, greater costs may have been incurred (e.g., through the need to purchase personal protective equipment or supply chain disruption); but over the medium-to-long term, it is not yet clear what the net impact will be. At an economy-wide level, disruption to working practices or reduced rates of productivity transfer could reduce productivity, but equally the impact could be limited,[62] or outweighed by the adoption of new technology or business practices that have developed as business pivoted to new ways of working during lockdowns.

As outlined in the previous section, GNI is likely to be shielded by the relative stability of the regulated environment that it operates in. GNI receives secure revenues, providing protection from experiencing productivity shocks of the same magnitude as firms in industries with greater levels of competition. Bearing this in mind, we do not modify our recommendation based on the evidence that Frontier presents.

4.3. Conclusions

The decision on an appropriate ongoing efficiency target should be conducted in the round, holistically appraising the body of evidence to determine the gains that can be made by an efficient company. On that basis, we consider a challenge of 1% for opex, as proposed by GNI and applied in PC4, to be reasonable and achievable in PC5.

Overall, we conclude that analysis utilising the 2011 EU KLEMS database, which provides evidence of the historic productivity changes across different sectors of the Irish economy from 1988-2007, broadly supports the long-term 1% assumption that has been used by the CRU in its recent price control decisions for opex.

We find that many parts of the approach taken by Frontier generally align with precedent and that a 1% ongoing efficiency target for opex (which has been applied by GNI in its PC5 business plan) is equivalent to the value applied at PC4 and by many other regulators in recent price controls. We expect a comparable ongoing efficiency challenge could also be appropriate for GNI's capex if LOD and the CRU were to find it appropriate to apply a top-down challenge to elements of GNI's bottom-up capex proposals.

Having appraised more recent evidence of macroeconomic trends that could impact on GNI's productivity, we do not think the ongoing efficiency target needs to be altered downwards (or upwards for that matter). The drivers of the productivity puzzle are uncertain and may not affect GNI as a regulated company. The impact of COVID-19 on GNI is equally uncertain and could feasibly have a limited impact on productivity, or even a positive one given the evolution of working practices over the last two years and the scope for increased use of technology in the management and operations of GNI's network.

[62] For example, see Bloom, N. et al (2020), The impact of Covid-19 on productivity – Bank of England Staff Working Paper No. 900, December.

5. CONCLUSIONS

The preceding sections of this paper present our assessment of GNI's proposals for RPEs and ongoing efficiency improvements in PC5. That assessment focuses on publicly available statistics that may give insights on the macroeconomic pressures affecting the unit costs of a gas network company like GNI. In this section, we summarise how we propose the CRU apply those 'top-down' findings on frontier shift to GNI's controllable opex (Section 5.1) and capex allowances (Section 5.2), recognising how our top-down assessment must fit in and complement our bottom-up assessment of step changes in GNI's opex, and LOD's bottom-up assessment of GNI's capex.

5.1. CONTROLLABLE OPEX

The level of frontier shift challenge applied to GNI's controllable opex will remain a key area for the CRU's judgement; this report suggests there is a range of what GNI might be expected to achieve in PC5 based on current macro-economic evidence and recent regulatory precedent in Ireland and the UK.

RPEs

GNI has requested RPEs for its controllable opex based on analysis commissioned from Frontier. However, based on the data we used to prepare this report, we found the evidence to be more mixed, particularly after accounting for our separate analysis of input price changes embedded within GNI's bottom-up cost proposals.

We considered evidence for RPEs for three cost categories: (i) labour; (ii) materials; and (iii) business services.

Labour costs

Labour costs represent a significant proportion of GNI's controllable opex and so are particularly important when assessing the case for opex RPEs.

We have found that GNI may benefit from negative labour RPEs at the start of PC5, with HICP expected to keep growing faster than earnings, but that recent CBI forecasts[63] can support a positive labour RPE later in PC5, where expected labour price pressures in the general economy are also expected to impact GNI's opex. For the price control as a whole, this could support a small positive labour RPE assumption in PC5, consistent with long-term compensation data in the Irish economy, or a negative labour RPE assumption if greater weight is placed on the latest near-term forecasts of real compensation by the CBI.

A balanced regulatory approach would potentially be for the CRU to keep with its standard HICP indexation assumption for utility company labour prices in Ireland, leaving GNI to manage its costs on that basis between years and across price controls. As a significant portion of GNI's labour costs are bought in through external contracts (e.g., NSWC2), when assessing potential top-down adjustments, it is important to note we are already considering a major step up in those costs as part of the bottom-up analysis of GNI's cost step proposals.

Materials costs

We have also assessed potential RPEs for opex materials and business services. There are factors that currently point towards GNI's material costs growing faster than HICP for periods of PC5. However, recent outturn evidence leading into the PC5 period would suggest that the positive wedge between HICP and price indices that reflect the input costs of capital goods in the Irish economy has started to reduce.[64] There is also recent market evidence of materials prices falling in the past few months.[65]

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[63] See CBI (2023): Q1 2023 Quarterly Bulletin

[64] For example, the WSI and Capital Goods (Building & Construction) price indices published by the Central Statistics Office.

[65] Metals prices have recently fallen from previous highs in 2021 and there is an indication of backwardation for some metals prices when comparing current and forward prices, suggesting that supply pressure may ease over the longer term.

Business services

There was limited evidence to suggest cost pressures affecting business services would have a significant impact on GNI's cost base.

Ongoing efficiency improvements

We consider an ongoing efficiency challenge of 1% for opex, as proposed by GNI and applied in PC4, to be reasonable and achievable in PC5.

Much of the evidence to assess ongoing efficiency in this area is long-run and historic, and remains unchanged from PC4. We considered challenges to that approach regarding the potential for a wider 'productivity slowdown' and the impact of COVID-19. We found it hard to justify making any adjustment for either factor as evidence in both cases remained mixed and must be interpreted in GNI's price control framework, which gives a predictable framework to invest and update working practices throughout the business cycle.

Summary

Overall, we consider that an opex frontier shift target in the range 0-1% per annum (net of RPEs) can potentially be justified for PC5, depending in particular on the expected impacts of RPEs on GNI's opex over the price control period. We have accommodated this conclusion into the top-down efficiency challenge that we apply to arrive at our proposed opex allowances for GNI's transmission and distribution business units in PC5.

We understand that GNI is already facing some cost pressures that are running faster than inflation. However, we do not consider that GNI has presented sufficient evidence to justify the opex RPE it has proposed in its business plan, particularly after taking into account our assessment of the input cost driven steps up in its opex compared to PC4, in particular, the impacts of the new network works and services contract.

5.2. CAPEX

PC4 capex look-back

GNI has experienced cost overruns compared to allowances on a range of capex projects and programmes during PC4. In its submissions, GNI argues that one of the contributing factors to the overruns has been positive RPEs that were outside of its control; input price inflation that GNI consider was not accounted for in the ex-ante capex allowances for PC4 and that was above the rate of HICP inflation experienced during this period.

Macroeconomic information on 'outturn' RPEs provides useful context for considering whether GNI's representations on capex price inflation are justified. Our assessment of labour and, in particular materials, indices suggest there have been macroeconomic trends that could have increased unit costs faster than HICP during the years covered by the PC4 look-back review. Very low HICP in Ireland is an important part of that story alongside global price pressures on network utilities' capex related to increases in commodity prices.

However, the applicability of certain external labour and materials/construction price indices to GNI's PC4 capex programme is unclear. The emerging input price pressures in the Irish macro-economy were at the back end (rather than all) of PC4. Under the current regulatory framework for GNI's capex, it is also important for GNI to be able to present to the CRU evidence to justify precisely why and to what extent its costs increased relative to expectations at the time of the PC4 decision and in this case how input price inflation contributed to this.

In particular, it is difficult to discern what if any RPE or ongoing efficiency assumptions were already embedded in the PC4 allowances and while evidence on outturn cost indices may be informative of the external cost pressures that GNI has faced during PC4—noting we have some concerns with the applicability of specific indices that GNI refers to—it cannot on its own provide compelling evidence to reopen PC4 allowances.

For capex overspends in PC4 to be considered economic and efficient for the purposes of their treatment in GNI's revenue controls, i.e. attributable to external input price inflation over and above any ex-ante allowance and HICP

indexation provision for input price changes, we consider the following factors also need to be demonstrated to the satisfaction of the CRU, as supported by LOD, its technical advisor:

- **Materiality:** GNI can demonstrate that changes in its project/programme unit costs[66] were materially higher than HICP inflation (which CRU's capex allowances were already indexed to).
- **Attribution:** Capex allowance overruns are not attributable to factors other than price effects and how these contributed to higher project/programme costs than expected. [67]
- **Controllability:** The increase in unit prices was outside GNI's control and consistent with the broader macroeconomic cost trends we observe in our analysis in PC4.
- **Management and mitigation:** GNI sought to appropriately mitigate and manage the input price cost escalation it faced, in line with good industry practice.[68]

In summary, we consider the impact GNI claim RPEs have had on its capital portfolio costs in PC4 is not fully inconsistent with macro-economic trend evidence, however:

- the macro-economic evidence of positive RPEs for the full period of PC4 is mixed and more compelling for the final year of the price control rather than earlier years; and
- the extent of pass-through of trends in macro-economy to GNI's cost base is not clear, and so cannot on its own justify the CRU reopening its allowances.

PC5 capex allowance setting

GNI has requested a 1.4% to 2.2% RPE in its capex allowances for PC5.[69] Its request is based on analysis from its economic advisor, Frontier Economics, of an RPE placing equal weight on an assessment of labour RPEs (0.8%) and materials RPEs (2.0% to 3.5%).

An important difference between opex and capex is the large share of capex covered by materials costs. GNI has provided evidence that at least some of its materials costs have already grown faster than HICP. However, with HICP itself being driven higher by many of the same underlying factors (e.g., post-lockdown supply chain issues and energy costs), simple HICP indexation may already go much of the way for mitigating that risk. The direction and size of any differential between HICP and material costs is also uncertain, linked to the fact that global commodity prices remain volatile and the market price outlook for these inputs uncertain.

It is important to note that unless there is a significant change to the regulatory framework for GNI's capex, GNI should have the opportunity to argue in the PC6 look-back review why any overspend vs. unit cost allowances was in fact efficient. This is an important difference from the treatment of controllable opex, which is currently not reassessed and so must be set as accurately as possible from the outset. However, as seen from the discussion above on the PC4 capex lookback, it may be difficult for GNI to make that case using top-down (macroeconomic) evidence alone, particularly if it has not been transparent in how it built up its proposals.

As discussed above, when considering GNI's capex proposals, it is also important to note that as an area that is fully assessed based on a bottom-up basis, it is hard to control for frontier shift assumptions that may already be embedded within GNI's forecasts.[70] Therefore, we consider it most appropriate for the CRU to focus on bottom-up evidence and the case for embedded RPEs when setting allowed unit prices and ultimately PC5 capex allowances.

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[66] Relative to the assumptions used to set ex-ante allowances.

[67] That is, GNI can adequately demonstrate that price effects contributed to cost overruns on specific capex programmes.

[68] This would include adequate cost monitoring processes and contractual mitigations.

[69] Page 49, GNI (2022), PC5 SD001 Submission overview, September.

[70] As with opex, there is a risk of double counting RPEs particularly in relation to tendered contracts.

If the CRU were to find it appropriate to apply a top-down frontier shift adjustment to some or all capex allowances, it would also be important to account for *both* expected RPEs and ongoing efficiency gains. It appears GNI has proposed RPEs in this area but no ongoing efficiency adjustment.[71]

We recognise GNI is facing a difficult period for managing its costs and will need to work hard to contain its own costs and manage market pressures as it negotiates and manages its key contracts with suppliers. We consider a zero top-down frontier shift challenge may not be an unreasonable starting point for setting GNI's capex allowances for PC5[72], with the current macroeconomic evidence suggesting that there is some justification for supposing that GNI's capex material prices may rise faster than Irish HICP in PC5, albeit this is considerably more mixed than GNI has presented in its most recent business plan submission.

We conclude that any additional provision for RPEs in the PC5 capex allowances should be premised on GNI also being able to satisfy the CRU and LOD, its technical advisor, on the following points:

- **Additionality:** Relevant trends in material prices are not already accounted for within the project capex forecasts GNI has prepared for PC5 (e.g., existing network works contracts).
- **Materiality:** The expected price effect on specific projects and programmes of capex is structurally and materially higher than forecast HICP.
- **Balance:** Any additional request is premised on 'frontier shift', not solely RPEs (i.e., the allowance accounts for both expected RPEs and ongoing efficiency).

[71] RIIO-GD2, for example, incorporates a 0.95% ongoing efficiency adjustment for capex and repex.

[72] Particularly once consideration is given to the need for GNI to account for the scope for ongoing efficiency gains in its capex programme.

Appendix A REGULATORY PRECEDENT

This appendix summarises regulatory precedent on RPEs and ongoing efficiency in Ireland and other selected jurisdictions.

Table A.1: Recent RPE and ongoing efficiency regulatory precedent (comparative jurisdictions and industries)

Country	Regulator	Sector	Period	RPEs (% p.a.)	Ongoing efficiency (% p.a.)
Ireland	CRU	Electricity Transmission & Distribution (PR5)	2021-25	No explicit RPE	1.0% (opex, ESBN) 0.4% (opex, EirGrid)
		Water and sewerage (RC3)	2020-24	No explicit RPE[73]	Not explicit[46]
		Water and sewerage (RC2)	2017-19	1.0% (capex)	Not explicit
		Gas transmission & distribution (PC4)	2017-22	No explicit RPE	1.0% (opex)
		Electricity transmission & distribution (PR4)	2016-20	No explicit RPE	Not explicit[74]
	CAR	Airports (Dublin 5th Determination)	2020-24	No explicit RPE	Not explicit
		Airports (Dublin 4th Determination)	2015-19	No explicit RPE	0.8%
	ComReg	Postal Services (An Post price cap)	2014-19	No explicit RPE	0% (opex)
Northern Ireland	UR	Gas transmission sector (GT22)	2022-27	RPI – 0.8% frontier shift	
		Electricity system operator (SONI)	2020-25	CPIH + 0.68%	0.6%
		Gas distribution sector (GD23)	2023-28	-1.0% to 1.6% (opex & capex)	1.0% (opex) 1.0% (capex)
		Electricity transmission & distribution (RP6)	2017-24	-1.1 to 0.6% (opex) -1.2 to 0.5% (capex)	1.0% (opex) 1.0% (capex)
		Water & Sewerage (PC21)	2021-27	0.0 to 0.5% (opex) -0.1 to 0.4% (capex)	0.8% (opex) 0.6% (capex)
		Water & Sewerage (PC15)	2015-21	0.6 to 0.8% (opex)	0.9% (opex) 0.6% (capex)
		Gas distribution (GD17)	2017-22	0.2 to 0.6% (opex & capex)	1.0% (opex) 1.0% (capex)
England & Wales	CMA	Water (PR19)[75]	2020-24	n/a	1.0% (totex)
	Ofwat	Water (PR19)	2020-24	0.4 to 0.5% (totex)	1.1% (totex)

[73] Ongoing productivity CRU's determination on opex was informed by a view that productivity improvements would offset certain cost increases.

[74] Ongoing productivity built into unit costs, rather than a percentage reduction across the board.

[75] Appeals by Anglian Water, Bristol Water, Northumbrian Water and Yorkshire Water.

Country	Regulator	Sector	Period	RPEs (% p.a.)	Ongoing efficiency (% p.a.)
GB	CMA	Gas Distribution and Transmission (RIIO-GD2 & T2)[76]	2021-26	n/a	1.05% (opex) 0.95% (capex & repex)
	Ofgem	Electricity Distribution (RIIO ED2)	2023-28	Use of indexation	1.0%
		Gas Distribution (RIIO-GD2)[77]	2021-26	0.9 to 1.4% (totex) forecast with indexation	1.25% (opex) 1.15% (capex & repex)
		Transmission (RIIO-T2)	2021-26	0.5 to 1.5% (totex) forecast with indexation	1.25% (opex) 1.15% (capex & repex)
		Electricity Distribution (RIIO ED1)	2016-23	-1.4 to 0.6% (totex)	0.8%-1.1%[78]
	ORR	Rail (PR13)	2014-19	No explicit RPE	0.4% (enhancements)

Source: CEPA analysis of various regulatory decisions

[76] Appeals by the four Gas Distribution Networks and Scottish Power Transmission. National Grid Gas Transmission did not appeal the ongoing efficiency aspects of the RIIO-T2 Final Determination.

[77] Ongoing efficiency figures for each Gas Distribution company for RIIO-GD2 have been superseded by the CMA ongoing efficiency ruling.

[78] Ofgem used company-specific proposals, which were captured as a time trend in the totex benchmarking models.

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