ceg COMPETITION ECONOMISTS GROUP

Demand in forward-looking cost models

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COMPETITION ECONOMISTS GROUP

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1 Overview

1.1 Introduction

1. We have been asked by Chorus for our opinion on the Commerce Commission's (the Commission's) proposal to model "100% demand" in its total service long-run incremental cost (TSLRIC) modelling of the price of the unbundled copper local loop service (UCLL).

2. Chorus has applied for a final pricing principle for the UCLL. The final pricing principle requires that a TSLRIC price for the UCLL be based on the forward-looking costs of providing the service. As part of developing its approach, the Commission has indicated that it will be "modelling the efficient costs of building a network to meet 100% of demand".[1]

3. We understand the 100% demand assumption to mean that the Commission will include demand that has or is expected to migrate to fibre to the home (FTTH or generally 'fibre') services and fixed wireless access services (FWA) - including those customers served by non-Chorus local fibre companies.[2]

4. In providing this opinion we are aware that the Commission is required to set a price for the UCLL based on forward-looking costs. We also understand that the Commission in setting such a price might consider the objective of promoting competition for the long-term benefit of end-users.[3]

5. In the context of a forward-looking pricing regime, we have considered the implication of modelling 100% of demand for:

   - efficient build/buy decisions;
   - incentives for efficient investment.

6. In considering these factors, we also consider the assumptions made in regards to the modelled technology and the extent of sharing with other networks. In this report, we consider the combinations of these modelling choices proposed by the Chorus and the Commission.

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1 Commerce Commission, *Consultation paper outlining our proposed view on regulatory framework and modelling approach for UBA and UCLL services*, 9 July 2014, paragraph 236.

2 TERA report page 60. The Commission's position is unclear but we understand that it may also include demand that has or is expected to migrate to HFC and mobile operators. Including the demand that would migrate to mobile and HFC would, in our view, only highlight the error in the Commission's decision to include demand that migrates to fibre and FWA, discussed later in this report.

3 As provided by Section 18 of the Telecommunications Act 2001.

1.2 Summary of opinion

7. The Commission has proposed to model an 'efficient operator' who can deploy a 'greenfields' network immediately serving 100% of demand. In economic terms, the operator has complete flexibility over its costs and choice of technology (i.e., no sunk costs) and has access to economies of scale reflecting the entire market and the scope economies reflecting those of Chorus (and perhaps other operators).

8. We believe this approach is inconsistent with the objective of ensuring efficient build/buy decisions and is inconsistent with incentives for efficient investment in providing the regulated service. In our view, this price will involve setting the price for the UCLL below the price floor for efficient build/buy decisions. It will also set a price that will likely undermine long-run incentives to invest efficiently in the existing infrastructure.

9. The pricing principles we set out below apply in the context of the application of TSLRIC. It may be thought that because the copper assets may not be replaced and the ultra-fast broadband network is being built, that it is not important to provide adequate incentives to maintain the assets in the long run and/or to promote competition. In our view, this is not correct. The TSLRIC method needs to be applied in a 'time consistent' manner throughout the life of the asset. This is needed to ensure compliance with the NPV=0 objective which is critical to signalling certainty for investors of regulated assets.

1.2.1 Breaching price floor for efficient build/buy decisions

10. In our view the Commission's approach will, over time, likely set a price that is below the forward-looking unit costs of providing the actual regulated service. In our view this would be inconsistent with one of the primary economic justifications for using TSLRIC to set prices, namely, to encourage efficient new entry. If we are looking to send a signal for efficient entry (infrastructure competition), the price floor is the costs the incumbent would incur in the long run. If a new entrant cannot actually provide the service at a lower (quality adjusted) unit cost than the incumbent, infrastructure competition would be undesirable. In fact to the extent that the Commission considered that infrastructure competition is desirable for reasons of promoting dynamic efficiency, access prices might, other things equal, be set above the costs of the incumbent to reflect the external benefits of promoting such competition.

11. Also, an inevitable consequence of pricing below the forward-looking unit costs of providing the actual regulated services is that the supplier of that service will not have an incentive to replace and maintain it in the long-run. In our view, this is inconsistent with another primary economic justification for using TSLRIC to set prices – to ensure that the service provider has a continuing incentive to maintain the provision of services in the long run.

12. This means that the price floor for efficient build/buy choices must be based on the long-run costs of using the existing technology serving the demand served by that technology. This also provides the incumbent with the necessary revenue stream to continue in the long term.

1.2.2 Undermining incentives for efficient investment

13. In our view, modelling unit costs based on an impossibly high level of demand (unavailable to Chorus or to any feasible definition of a hypothetical new entrant) is a *de facto* adoption of an asset value that is less than the current optimised replacement cost. Consequently, we consider that this approach involves a breaking of the Commission's previous commitments to compensate for costs based on current replacement costs with additional negative consequences for dynamic efficiency (including in relation to the regulation of other services such as new fibre networks).

14. Whilst TSLRIC involves re-setting prices periodically based on forward-looking costs, it is axiomatic that this (and any) form of regulation must give the investor an *ex ante* expectation of a normal return.

15. As the Commission notes, under TSLRIC investors should have had an expectation of re-optimisations and revaluations of their assets over time. However, investors could not reasonably have had an expectation that the Commission would not give Chorus the opportunity to recover the optimised cost of their assets from end-users. Nevertheless, the Commission's approach of calculating the price based on demand which Chorus does not serve, will result in a revenue stream that does not recover forward looking costs.

16. In other words, it is one thing for the Commission to implement TSLRIC in a manner that re-optimises the asset base to exclude assets that are no longer needed to serve Chorus' demand. It is quite another thing to say that the asset value[4] should be further reduced to reflect end-users migrating to other networks.

1.2.3 Modelling demand in the appropriate price floor

17. We consider that Chorus' approach sets a lower bound for prices that provide efficient long-run signals (i.e., it will provide a floor for efficient build/buy choices and dynamic efficiency in the long run). This is because it is consistent with an estimate of the forward-looking costs that would be incurred given the technology used to deliver UCLL. That is, prices would be consistent with the costs that would

[4] In this regard, I note that the relevant asset value is not the asset value that enters the Commission's model. Rather, it is the discounted value of cash-flows in that model based on the demand that Chorus can reasonably expect to serve. These will not be the same thing if the Commission uses a demand that differs from the demand that Chorus can reasonably expect to serve.

be prudently incurred by the service provider if it was meeting *actual* and *forecast* demand for UCLL with the existing technology.[5]

18. In terms of Chorus' approach to demand, we believe this approach is consistent with the common implementation of TSLRIC. Indeed, it appears to accord with the Commission's own statements defining the 'total service' component of TSLRIC and the practice of regulators in other jurisdictions.

5 When we refer to UCLL demand in this report, we include demand for unbundled bitstream access (UBA) and unbundled copper low frequency service (UCLF) services that are priced on the basis of the UCLL.

2 Price floors

19. In this section we discuss the legislative context for setting the UCLL price and the economic issues that arise. We identify a price floor to ensure efficient build/buy decisions. We also identify a price floor to ensure incentives for efficient investment under forward-looking access pricing regimes.

2.1 Legislative context

20. The Commission is required to set prices in a final pricing principle for the UCLL service at the total service long run incremental cost (TSLRIC) of providing the service.

21. The Telecommunications Act (2001) defines TSLRIC as follows:

> ***TSLRIC**, in relation to a telecommunications service,—(a) means the forward-looking costs over the long run of the total quantity of the facilities and functions that are directly attributable to, or reasonably identifiable as incremental to, the service, taking into account the service provider's provision of other telecommunications services; and (b) includes a reasonable allocation of forward-looking common costs.*

22. Where forward-looking common costs are defined as follows:

> ***forward-looking common costs**— (a) means those costs efficiently incurred by the service provider in providing the service that are not directly attributable to providing an additional unit to that service; but (b) does not include any costs incurred by the service provider in relation to a TSO instrument.*

23. An essential requirement of TSLRIC is that costs are forward-looking, rather than backward-looking. This requirement comes in the context where the majority of the costs of providing the regulated services are sunk.

24. The motivations for setting prices based on forward-looking cost must be consistent with the legislative purpose of regulating telecommunications services in New Zealand, which according to legislative purpose in the Act, is:

> *To promote competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand by regulating, and providing for the regulation of, the supply of certain telecommunications services between service providers.*
>
> *In determining whether or not, or the extent to which, any act or omission will result, or will be likely to result, in competition in telecommunications markets for the long-term benefit of end-users of telecommunications*

services within New Zealand, the efficiencies that will result, or will be likely to result, from that act or omission must be considered.

To avoid doubt, in determining whether or not, or the extent to which, competition in telecommunications markets for the long-term benefit of end-users of telecommunications services within New Zealand is promoted, consideration must be given to the ***incentives to innovate that exist for, and the risks faced by, investors in new telecommunications services that involve significant capital investment and that offer capabilities not available from established services***. [Emphasis added]

2.2 Efficient build/buy decisions

25. The Commission interprets Section 18 to encompass a requirement for prices to provide efficient build/buy decisions:[6]

> *Incentivising efficient build or buy choices sits comfortably with the section 18 purpose of promoting competition, which could include investment in alternative infrastructure, for the long-term benefit of end-users.*

26. Section 18 sets the objective of promoting competition when it results in higher economic welfare for end-users or, in other words, when it is efficient. Inefficient duplication can occur when the price of the regulated service is set below the forward-looking unit cost of providing the actual regulated service. Pricing below this level results in inefficient duplication because it:

    a. Discourages a new entrant from entering when they can, in the long run, provide a competing service at a lower (quality adjusted) unit cost than the long run costs incurred by the regulated service provider, and hence, when such entry would be efficient in the long run; and

    b. Provides the regulated service provider with insufficient remuneration to maintain the existing assets in perpetuity, thereby encouraging entry by alternative networks when the provision of the regulated service via existing assets would be efficient.

27. Importantly, each of these build/buy considerations indicate a price floor that is based on the long-run costs of providing the regulated service using the actual assets and technology adopted by the regulated service provider, assuming they are operating efficiently.

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[6] Commerce Commission, *Consultation paper outlining our proposed view on regulatory framework and modelling approach for UBA and UCLL services*, 9 July 2014, Paragraph 116.

2.2.1 Efficient infrastructure competition

28. In simple terms, it would be efficient for competing networks and new technologies to be deployed if it would mean that lower costs were incurred in providing services to end-users. That is, if, over the long-run, the costs that would be incurred in providing the service were lower on the new network using superior (lower-cost) technologies, it would be efficient for that network to displace the existing network.

29. In these circumstances, efficient investment could be stifled if regulated prices for using the existing network were set such that potential new entrants would choose to use the existing network (buy) rather than enter with their own, lower cost, network (build). Therefore, prices for access to existing infrastructure must be set at above the level that does not stifle efficient investment. This will be achieved if the price for using existing infrastructure is above the long-run unit costs of new capacity in the existing network. That is, if prices for the existing infrastructure are set at the long-run unit costs of providing services using that infrastructure, potential entrants will make efficient decisions about whether to use the existing network or to build their own network.

30. It should be noted that infrastructure competition has the potential to create spill over benefits to end-users. The spill over benefits are typically derived from innovation and product differentiation that result from competition. Competition in the market means that suppliers cannot capture all of the value created by innovation and product differentiation, which in turn results in all spill over benefits accruing to customers. The existence of spill over benefits means that a case can be made that the price for using existing infrastructure might be set higher than the long-run costs of using that infrastructure. This means that in so far as the objective of promoting efficient competition is concerned, pricing based on the current cost of replacing existing assets represents a floor in the access price.

2.2.2 Inefficient duplication

31. A natural monopoly exists when it is most efficient for the market in question to be supplied by a single provider rather than multiple providers. The standard example of a natural monopoly involves a service with powerful economies of scale relative to the size of the market.

32. Inefficient entry may occur even if the service is a natural monopoly. This could occur because an incumbent with monopoly power is free to price at the profit maximising (monopoly) price. At this price, a new entrant could be encouraged to enter and 'steal' all or some customers from the incumbent. However, because of the sunk nature of assets and/or the existence of economies of scale this may increase the total costs to society of serving customers relative to allowing them to be served on the incumbent's network. That is, entry may result in inefficient duplication of the incumbent's infrastructure without necessarily providing any, or sufficient, offsetting benefits.

33. If the service being regulated is a true natural monopoly then all new entry is, by definition, inefficient. In this case, the regulator's primary objective in terms of sending build/buy signals will be to prevent entry and duplication of sunk infrastructure. Again, in this case, the duplication of such infrastructure comes at a cost to society which suggests that, other things equal, it should generally be discouraged.

34. However, it is not only prices being set "too high" that can promote inefficient duplication. Setting regulated prices too low can also promote inefficient duplication of natural monopoly infrastructure. This will be the case if prices are set below a level that would recover the incumbent's long run costs.[7] In this case, the incumbent will not have an incentive to continue to maintain/upgrade their infrastructure and ultimately new entrants will enter to serve customers no longer able to be served by the incumbent (or that are served by the incumbent at a level of quality which is too low).

2.3 "NPV=0" and incentives for efficient investment

35. The legislation requires that the Commission have regard to the efficiency consequences of setting access prices. It must also have regard to the effect on investors' incentive to sink new capital into telecommunications networks. In economic terms, this requires the Commission to have regard to dynamic efficiency.

36. A central element of achieving dynamic efficiency is that investors must have an expectation of getting their money back, plus a return reflecting the risks associated with their investment. This expectation is sometimes referred to as expected financial capital maintenance or NPV=0. If investors expect to receive a normal return on their past investments they will have an incentive to continue making investments in new assets. The other central element of achieving dynamic efficiency is that investors have an incentive to invest in a manner that minimises the cost of providing services into the future. That is, achieving dynamic efficiency is not simply a matter of ensuring that investors 'get their money back' plus a normal return. Dynamic efficiency requires some mechanism to ensure that investors only receive a return on and of prudently made investments. The periodic optimisation of the network can provide a check on the prudency of past investments in the network.

[7] Long-run costs are modelled as a proxy for the present value of future short-run marginal costs which will be incurred by the incumbent in the long run. Using short-run marginal costs would produce an erratic answer as at some points in time the costs would be large due to imminent asset replacement, whilst at others it would be close to zero. It is possible to argue that a scrap value of existing assets would be sufficient to provide the incentive for the incumbent to maintain the asset. However, this would rely on the incumbent trusting the regulator not to value future existing assets at scrap value (i.e., simply value all assets at scrap value immediately after they are sunk). The decision to value existing assets at scrap today, does not forebode well for committing to the incumbent not doing so in the future.

37. Whilst TSLRIC involves re-setting prices periodically based on forward-looking costs, it is axiomatic that this (and any) form of regulation must give the investor an *ex ante* expectation of a normal return.[8]

38. In order for dynamic efficiency to be achieved, investors must have an expectation of recovering their investment. This expectation must be at least actuarially fair - it cannot be biased toward under recovery. TSLRIC achieves this, albeit with considerable uncertainty, by ensuring that prices are set based on the expected change in the costs of re-building assets over time.[9]

39. In order for this process to achieve expected recovery of the initial investment, two things must be true. First, the modelling of re-building the asset must be realistic. It must reflect the costs that an actual service provider would incur in providing the service provided. If it does not do this, it stands no chance of offering fair compensation. Second, it must provide a realistic expectation of the change in the replacement costs of assets. This would include changes in costs due that are driven by change in the rules and regulation of building networks in New Zealand. It needs to do the latter in order to compensate for actual future costs in replacing and refurbishing assets.

40. A simple numerical example of the effect of a change in expected cost of replacing assets on TSLRIC prices is illustrated at Box 1 below.

Box 1: Expected financial capital maintenance or NPV=0

A regulated business pays $100 for asset A of infinite life. Due to market pressures, the cost of replacing the asset A is expected to increase next year by 5% and the cost of capital is 10%. What revenue does the business require this year to provide it with

8 In expectation, TSLRIC pricing can meet the basic requirement of allowing the sunk cost of an investment to be recovered. However, it is important to note that this is true in expectation only. It may not be true ex post. This is because, when prices are reset, there is no "wash up" of the inevitable differences that emerged over the previous period between forecast and outturn changes in asset values. This means that when forecast movements in asset values turn out to be wrong, future prices will reflect windfalls from these forecasting errors.

The resulting uncertainty has the potential to impose significant costs on society. It may deter investment by incumbent access provider, as well as by potential competitors considering investing in their own specialised assets.

9 In TSLRIC, if the cost of rebuilding existing assets is expected to increase, this increase is a source of expected future cash flow for the business, as the higher future cost of replacing the existing assets is expected to be used by the regulator to set prices in the future. This additional source of future expected revenue offsets the revenue that the service provider requires now to achieve expected financial capital maintenance. Similarly, a service provider that expects reductions in the cost of rebuilding assets in the future would require relatively higher revenue to offset lower expected revenues in the future.

expected financial capital maintenance?

Given its initial outlay of $100 and its cost of capital, the business requires a total value of $110 at the end of the year in order to maintain its financial capital (its initial investment). The cost of replacing the asset, and therefore the forward looking value of the asset, is expected to be $105 next year. Therefore the business requires the residual $5 in revenue this year to afford it expected capital maintenance.[10]

It is useful to note that in this example, the required return is less than the return on capital of $10. That is, the return *of* capital, or depreciation, is -$5, reflecting the infinite life of the asset and its expected increase in replacement cost.

41. For an asset that has a limited life but is replaced in perpetuity, the original cost of an investment[11] would be *expected to* be recovered if TSLRIC prices ensured that: [12]

    - at each price reset, future revenues are set to recover the optimised replacement cost (ORC) of the asset over the life of new assets (including a normal return); and
    - the profile of revenues is set based on expected changes in the ORC of the asset.[13]

42. This means that in setting *prices*, the price floor necessary to achieve dynamic efficiency is one that delivers *revenues* that are consistent with the expectation of a consistent application of TSLRIC method as described above.[14] In other words, in order to encourage efficient investment, the Commission needs to implement TSLRIC in a manner that if applied in perpetuity to new assets would be consistent with the NPV=0 principle.[15] This requires realistic, achievable modelling

10 For simplicity, this example assumes that the timing of the revenues is end-year.

11 And the investment costs when it is actually replaced.

12 The original investment cost may not be recovered if the ORC changes in a way that is unexpected.

13 The same is true for an asset that is not replaced in perpetuity. If prices are set each year (or number of years) based on the recovery of the ORC of new assets over the life of new assets (given the expected change in the ORC), the original investment cost of the asset would be expected to be recovered.

14 It is meaningless to talk about setting prices based on ORC without talking about how that large capital amount will be translated into annual revenues and prices. An essential element of the TSLRIC pricing principle is that prices will be set on the basis of ORC in all regulatory period into the future. It is the expected change in the ORC that represents the 'forward-looking cost' of the using regulated service.

15 It should be noted that TSLRIC does not provide a guarantee for investors or consumers that prices will reflect even efficiently incurred past costs. As TSLRIC prices are based on expected changes in the forward-looking costs of rebuilding assets, unexpected changes in forward-looking costs (either upwards or downwards) mean that even efficiently incurred costs may be under or over recovered. However, if consistently implemented over time TSLRIC will provide an unbiased expectation of cost recovery (i.e., expected financial capital maintenance).

assumptions and it requires that, at a minimum, prices be set to recover the expected change in the replacement cost of assets over the pricing period (including a normal return on those replacement costs).

3 Breaching the price floor

43. In this section we outline the position of the parties (including the Commission in as much as it outlines its position in its most recent paper) on the key questions of technology choice, demand and sharing assumptions. In our view, the answers to these questions must be provided with a consistent logic for the TSLRIC method to produce a sensible answer.

3.1 Positions of the parties and the Commission

44. We understand that it is common ground between the Commission and all interested parties that setting UCLL prices based on forward-looking costs over the long run must compensate the service provider the costs of investing in new assets (and, in doing so, incurring sunk costs).

45. This means that in order to derive a price for the UCLL (and UBA), the contentious questions are threefold:

- What technology should be used to value the sunk assets?
- What demand should be assumed to be provided with those assets?
- What level of sharing should be assumed with other networks?

46. If unconstrained by considerations of economic efficiency or legal requirements relating to service functionality, these questions could be answered in any number of ways. Two possible answers are that the technology, demand and sharing assumptions should:

a. reflect the unit costs of an operator:

   i. operating with the copper technology that the regulated service provider expects to use in providing the regulated service, assuming they are and will operate to minimise long run costs;

   ii. optimised to reflect the demand the existing service provider can be expected to achieve (given its technology used);

   iii. with a level of cost sharing it can expect to achieve with other providers in New Zealand; or

b. reflect the unit costs of an operator who:

   i. is unconstrained by the technology used by the existing regulated service provider;

   ii. can achieve a level of demand that is beyond:

- the demand that the existing service provider can be expected to achieve (given its technology); and
- the demand that a new entrant, with a new technology, could *actually* expect to achieve given the availability of substitute services in New Zealand (i.e., those provided by LFCs, HFC operators).

iii. who would not expect to share cost with other providers in New Zealand.

47. As we understand it, option a. broadly characterises Chorus' position and option b. broadly characterises the Commission's position.

48. Chorus has proposed to model the efficient forward-looking costs of the actual copper network that is used to provide the regulated service. That is, Chorus argues that a 'new entrant' would deploy a copper network and that it would service the demand that Chorus will supply as the regulated service provider using that network.[16] Chorus propose that its sunk assets would be valued based on the costs a new entrant would incur at current replacement cost to build a copper network that is optimised to serve the demand that is presently and forecast to be served by copper. In this case, the migration of end-users to fibre and other services would represent a loss of scale for the operator of the copper network. Chorus allow that this 'new entrant' could share its network with other operators, including LFCs – this would have the 'new entrant' sharing some of its network infrastructure with Chorus in its capacity as the LFC. This sharing will ameliorate the loss of scale that would otherwise exist and would be consistent with the reality that Chorus will actually re-use some of its UCLL/UBA assets for UFB deployment.

49. In our view, this might fairly be described as a **realistically efficient operator (REO)** of the existing technology because it provides an estimate of the unit costs efficiently incurred in operating the existing technology in the long run (including realistic modelling of cost benefits from sharing as customers increasingly transition to alternative technologies).

50. In contrast, the Commission has proposed to model an 'efficient operator' that can deploy a new technology (a mix of FTTH and FWA) and immediately serve 100% of demand. There is some uncertainty as to what the Commission means by '100% demand'. We take it to mean the operator would service all Chorus' existing customers immediately and not suffer any migration away to competing networks. We understand the Commission to include FTTH and FWA networks in its definition of 'competing networks', but this may extend to HFC and mobile

[16] We understand that in the alternative Chorus is submitting that a new entrant may build a point-to-point fibre network. Notwithstanding this, our view is that a price floor based on the long-run cost of the existing technology remains a necessary component of ensuring that the price does not harm build/buy signals and/or undermines incentives for efficient investment.

networks.[17] The Commission's operator therefore, over time, will serve demand that is not available to Chorus using its existing technology.

51. In economic terms, the operator has complete flexibility over its costs and choice of technology (i.e., no sunk costs) and access to economies of scale reflecting as much as the entire fixed line market but has the scope economies reflecting those of Chorus (and perhaps other operators, though this is not clear).

52. In our view, this might fairly be described as a **supra efficient operator (SEO)** of the new technology because it can costlessly change technology and costlessly achieve scale and scope that would not be available into any realistic scenario.[18] In reality, deploying a new technology inevitably involves a period of underutilisation and, for a competing network in a market with substantial sunk costs, the network would be unlikely to capture the entire market.

53. The Commission says that this is an efficient benchmark of cost that will promote efficient build/buy choices and is consistent with promoting dynamic efficiency. The Commission state:

> *… the TSLRIC-based price represents an efficiency benchmark – the regulated prices will be based on the efficient costs of building the network at the existing level of demand. This level will promote the efficient choice (on average) of whether to build or buy. We do not believe that modelling either ramping up demand or expected migration away from Chorus' copper network will meet this objective. This has led us to conclude that modelling 100% of demand will best meet the TSLRIC objectives.*

54. In our view, the Commission has misconceived of the appropriate 'efficiency benchmark' such that it will model a unit cost (annualised cost divided by demand) that distorts relevant build/buy decisions, and one that will likely undermine investor confidence. We discuss why below.

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[17] If the Commission is making a distinction between competing FTTH, HFC and mobile networks, the basis on which the distinction is made is unclear. It could for example, be based on whether they are in the same market. However, if demand is leaving to mobile and HFC networks they are, by definition, substitutes. Therefore, it is unclear why is that demand being treated differently? It is also unclear why the current level of demand is sacrosanct. Taken to its logical end, the Commission would include all past migration away from copper to mobile and HFC networks. It might also have its operator building gas and electricity networks if that was considered to offer economies of scope. For the reasons discussed below, we consider this extension of the logic would be wrong and would only worsen the problems associated with the Commission's conception of an efficient operator.

[18] A similar observation can be made in respect of any modelling assumption that imposes an unrealistic standard of efficiency.

3.2 Commission breaches the price floor for efficient build/buy decisions

55. Over time, the Commission's approach will set a price that is below the forward-looking unit costs of providing the actual regulated service. This occurs because the reduction in the demand (due to migration away from the copper technology) is not recognised in the calculation of prices.

56. As discussed above, the revenue that needs to be achieved in order to maintain the provision of the regulated service in the long run can be estimated by the change in the optimised replacement cost of the existing technology. Abstracting from sharing of assets with new networks, the total costs of maintaining the existing network are unlikely to change significantly with a migration of customers away from copper services due to economies of scale in the network.[19] Therefore, as demand for the copper network falls, the unit cost of maintaining the network rises. Taking into account the sharing of assets with new networks (such as sharing trenches with fibre networks) may ameliorate this unit cost rise but will not necessarily eliminate it. If prices are calculated based on a higher level of demand (i.e., the current volumes of copper services in perpetuity), they will not recover the forward-looking unit cost of providing the service.

57. In our view, this approach yields a price that is inconsistent with the one of the primary economic justifications for using TSLRIC to set prices, namely, to encourage efficient new entry. If we are looking to send a signal for efficient entry (infrastructure competition), the price floor is the costs the incumbent would incur in the long run. If a new entrant cannot actually provide the service at a lower (quality adjusted) unit cost than the incumbent, infrastructure competition would be undesirable. In fact, to the extent infrastructure competition is desirable, a case exists for setting access prices above the costs of the incumbent to reflect the external benefits that such competition would produce.

58. An inevitable consequence of this is that the actual supplier of that service will not have an incentive to replace and maintain it in the long-run, even if the supplier operates as efficiently as it can reasonably be expected to. In our view, this is inconsistent with another of the primary economic justifications for using TSLRIC to set prices – to ensure that the service provider is compensated for, and has a continuing incentive to maintain the provision of services in the long run.

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[19] Economies of scale exist where the marginal cost of serving an additional customer is declining with the number of customers served such that the costs of one provider serving the market is lower than the costs of two providers. Economies of scope is a similar concept. Economies of scope exist where the costs of providing one service is lower if you are already providing another service (for example, if each customer is defined to have a distinct 'service' and if serving neighbours is lower cost than serving distant customers then economies of scope exist). In this report we will use 'economies of scale' to cover both economies of scale and scope.

59. This means that the price floor for efficient build/buy choices must be based on the long-run costs of using the existing technology serving the demand served by that technology – factoring in efficient sharing of assets with alternative technologies. This also provides the incumbent with the necessary revenue stream to continue in the long term.

3.3 Commission breaches price floor for efficient investment incentives

60. In our view, modelling unit costs based on an impossibly high level of demand (unavailable to Chorus or to any feasible definition of a hypothetical new entrant) is a *de facto* adoption of an asset value that is less than current replacement cost. . This is true even if assets are valued at replacement cost in the Commission's model, because the prices do not allow the recovery of replacement costs in present value terms given the Commission's demand assumptions.

61. Consequently, we consider that this approach involves a breaking of the Commissions previous commitments to compensate for costs based on current replacement costs with additional negative consequences for dynamic efficiency (including in relation to the regulation of other services such as new fibre networks).

62. Whilst TSLRIC involves re-setting prices periodically based on forward-looking costs, it is axiomatic that this (and any) form of regulation must give the investor an *ex ante* expectation of a normal return.

63. As the Commission notes, under TSLRIC investors should have had an expectation of re-optimisations and revaluations of their assets over time. However, investors could not reasonably have had an expectation that the Commission would not give Chorus the opportunity to recover the optimised cost of their assets from end-users. However, the Commission's approach of calculating the price based on demand which Chorus does not serve, will result in a revenue stream that does not recover forward looking costs.

64. In other words, it is one thing for the Commission to implement TSLRIC in a manner that re-optimises the asset base to exclude assets that are no longer needed to serve Chorus' demand, it is another to say that the implicit asset value should be further reduced to reflect end-users migrating to other networks.

65. In order to encourage efficient investment, the Commission needs to implement TSLRIC in a manner that if applied in perpetuity to new assets would be consistent with the NPV=0 principle. This could be achieved by a thought experiment which required us to imagine an investor making a new investment today that would initially be fully utilised but where there was some probability that demand may decline in the future due to migration to alternative networks. Under the Commission's 100% demand approach to TSLRIC, such an investment would never

be made, as the investor would not expect to recover its investment in the state of world in which demand did fall.

3.4 Chorus' position consistent with the price floors

66. We consider that Chorus' approach is consistent with a lower bound for prices that provide efficient long-run signals (i.e., it will provide a floor for efficient build/buy choices and dynamic efficiency in the long run). This is because it is consistent with an estimate of the forward-looking costs that would be incurred given the technology used to deliver UCLL.[20]

67. It should be emphasised that a price floor for efficient build/buy decisions:

- is made based on the unit costs that would be prudently incurred in supplying services using the existing technology at the actual and forecast level of demand that is expected to be served using that technology; and
- is based on the costs that would be incurred over the long-run at current and expected future replacement costs.

68. The first point says that a price floor for efficient build/buy decisions is based on the costs that would be prudently incurred by the service provider if it was meeting actual demand for UCLL with the existing technology.[21] Note that this is not simply the actual costs incurred; rather, it is the costs that would be prudently incurred managing and developing the existing technology to meet the demand for the actual demand for the services (and potential for efficient sharing of assets with other technologies). Therefore, whilst the costing should reflect the costs that would be incurred if the service provider operated in an efficient manner (e.g., by deploying the least cost production methods throughout the entire network), the costs are rooted in the current technological configuration. Similarly, it must also reflect the demand that is actually expected to be served using the network. This would need to be forecast over the regulatory period in order to ensure, in expectation, that the level of revenues reflects the expected change in the replacement cost of the asset over that period (including a normal return).

69. The second point says that a price floor for efficient build/buy decisions is based on the future costs that would be incurred in providing services on the existing network over the long-run. This requires that prices be based on the current and expected future costs of providing the services (i.e., the optimised replacement cost (ORC)).

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20 We understand that in the alternative Chorus is submitting that a new entrant may build a point-to-point fibre network. Notwithstanding this, our view is that a price floor based on the long-run cost of the existing technology remains a necessary component of ensuring that the price does not harm build/buy signals and/or undermines incentives for efficient investment.

21 As noted above, when we refer to UCLL demand in this report, we include demand for UBA and UCLF services that are priced on the basis of the UCLL.

70. Prices set above the price floor will allow any potential new entrant to make an efficient entry decision based on the long-run costs of the existing network or the current costs of building a new network.

71. In terms of incentives to invest, it is recognised that, in reality, a significant proportion of Chorus' assets will not be replaced. Nevertheless, as discussed above, for assets with a finite life a consistent application of TSLRIC over the remaining life will provide a revenue path that achieves an expectation of recovery of the initial investment. This is achieved if prices are set to recover the revenue associated with the expected change in the optimised replacement cost of assets over the remaining life of the asset.[22]

72. As is well recognised in these proceedings this will inevitably involve a rising unit cost (price) as demand falls. Therefore, the Commission has a 'window of opportunity' to smooth prices during this period of transition.[23] If this is not undertaken, the inescapable outcome is a *de facto* adoption of a lower asset value than the optimised replacement cost and a truncation of the prices below forward-looking costs.

3.4.1 Consistency with TSLRIC practice

73. TSLRIC stands for the total service long-run incremental cost. A key step in implementing the TSLRIC method is to define the 'total service' that is being costed.

74. The Commission's position in relation to demand is a substantial deviation from accepted regulatory practice in relation to TSLRIC. In the language of TSLRIC, the Commission has defined the *total service* to include services beyond those supplied by the service provider using its assets.

75. The Commission has previously guided Chorus that it would model the *total service* (or demand) based on all services that use the assets used to provide the regulated service:[24]

> *The total service should in principle include all services that use the assets used by the designated interconnection services. This definition of the total service takes into account the access provider's provision of other telecommunications services, in the sense that these services share costs with interconnection services. This should lead to an appropriate range of services over which to allocate the assets' costs*

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22 See for example, Incenta Economics, TSLRIC for UCLL service – asset valuation issues, Memorandum to Chorus, 28 February 2014.

23 One option for achieving this smoothing and avoiding a rising price is a demand-adjusted tilted annuity.

24 TSLRIC pricing principles, para 261.

76. This original position was reiterated in its process and issues paper which stated:[25]

> *The term 'total service' refers to the total amount of the service provided by the network operator. The total amount includes the quantity supplied to the various access seekers and the quantity the network operator supplies to itself. This means that the TSLRIC is different from the incremental cost the network operator incurs in supplying the last unit of the service, or the incremental cost of providing the service to one particular access seeker*

77. This approach to defining the total service is reflected in many overseas jurisdictions.

78. The TSLRIC pricing principle is based on the forward-looking costs that would be incurred in providing the regulated services.[26] In determining the incremental cost of providing the regulated service in the long-run, TSLRIC asks what additional costs would be incurred in providing the regulated service. In a declining market, this might be put as what costs would be avoided in not providing the regulated service.[27] These incremental costs are modelled based on the total service being provided.

79. By modelling the total service to include services that are not supplied by Chorus, the Commission will, in the presence of economies of scale, understate the unit costs of providing the regulated service. This is an error in terms of arriving at the forward-looking costs of providing the regulated services.

80. In this respect, the Commission's approach to demand amounts to a re-writing of TSLRIC that is inconsistent with good regulatory practice because it involves setting a level of prices that will not allow Chorus to recover the estimated forward-looking costs at the quantity of service provided. This will be inconsistent with providing an incentive to invest because it sets prices based on a level of efficiency that cannot be achieved by Chorus, or any other realistic notional service provider, even in the long run, in providing the regulated service.

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25 Para 65 of Process and Issues paper.

26 It therefore abstracts from the costs incurred by the service provider.

27 TSLRIC typically includes an allocation of common costs.