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Executive officer: Jan Gerhard Rødal

Draft - Decision on Weighted Average Cost of Capital

1 Introduction

1.1 Background

The Norwegian Communications Authority (Nkom) determines the cost of capital used in price regulation in the electronic communications markets. Weighted average cost of capital (WACC)¹ is used as an expression of the required return on invested capital.

A provider with significant market power (SMP)² may be subject to specific obligations that may entail, among other things, various forms of price regulation and financial reporting. Price regulation, for example, may impose requirements for cost-oriented prices. The cost of capital can have a material effect on the cost basis for reporting accounting separation and cost accounting, so as to account for a reasonable rate of return on invested capital.

The current decision concerning WACC is from 28 November 2017 regarding fixed networks and from 27 November 2017 regarding mobile networks. Both decisions are based on calculations by professor of finance Thore Johnsen. Nkom believes the decisions from 2017 should now be updated. In this regard, Nkom has considered the guidelines for calculation of WACC laid down by the European Commission, including assessment of whether it is appropriate to use a common WACC for mobile and fixed networks.

¹ *Weighted Average Cost of Capital.*

² *Provider with "Significant Market Power" (SMP).*

On 6 November 2019, the European Commission published³ a notice with guidelines for the calculation of WACC. The guidelines are intended to ensure consistency in the calculation of WACC across member states. The purpose is also to promote effective investment and innovation through an appropriate level of risk reflected in WACC. This common approach will also promote transparency for all stakeholders in terms of the regulators' method of calculating WACC.

In particular, the European Commission has assessed where it may be appropriate to use a common value for specific parameters included in WACC calculations, and in which cases it is appropriate to use more differentiated parameters based on national conditions.

In June 2021, Nkom published a notification of price regulation of VULA fibre. In its response⁴ to the notification, ESA referred to how, in the current WACC decision, Nkom has not based the calculations on the European Commission's notice from 2019. ESA recommended Nkom to adapt the method of calculating WACC to the European Commission's guidelines.

1.2 Notice of change in the determination of WACC

On 25 November 2021, Nkom notified that the method for and determination of the WACC, is to be harmonised with the European Commission's guidelines from 6 November 2019.

The notification describes how the various elements of the calculation are to be calculated. The methodological approach is based on the European Commission's guidelines and BEREC's "WACC Parameters Report 2021". The procedure for the calculation of WACC is presented in Chapter 4 of the notification.

In the assessment of the elements of WACC which concern matters relating to individual companies, it is specifically assessed in the notification whether a group of companies is to be used in the basis for calculation, as a "Peer Group", or data for the national SMP operator. Nkom chooses to follow the guidelines from the European Commission, which is to use a "Peer Group". This is discussed in further detail in Chapter 3 of the notification.

The notification entails that in future a common WACC will be determined for fixed and mobile networks. This approach is justified by the convergence in the development of mobile and fixed networks and is discussed in Chapter 2 of the notification.

Nkom has also notified a common WACC for fixed and mobile networks of 5.33% before tax.

³ OJ 2019/C 375/01 of 6 November. 2019, [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1106\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1106(01)&from=EN)

⁴ https://www.nkom.no/ekom-markedet/markeder/marked-3a-og-3b-lokal-og-sentral-tilgang-til-faste-aksessnett/_attachment/download/90512206-3db5-4172-bfb8-e24511da0d7b:5afc6562bcd57f00c8cdc1068a70f79fad677608/Kommentarer%20fra%20ESA,%2023.%20juli%202020.pdf

Nkom only received a consultation response from Telenor Norge AS (Telenor) in connection with the notification.

1.3 Summary of consultation

Consultation remarks

Telenor considers it to be complex and challenging to define WACC so as to take account of both old equipment and investments in new technology on one and the same basis. In Telenor's view, a lower WACC could be considered reasonable in terms of the return on older equipment, while the situation will be different for investments in modern new equipment. Here, there will be a risk that a WACC which is too low may entail a reduced appetite for investment if a higher return and a lower risk can be achieved from investing in other areas. These various considerations need to be balanced, Telenor believes.

Telenor also believes there is an inherent risk associated with investments in new technology, in particular when legacy technology might potentially serve as a substitute. Telenor believes the authorities must choose a regulatory design that provides incentives for, and strengthens, investors' willingness to commit to investments in new technologies.

Telenor refers to how in BEREC's calculation of country-specific risk-free interest rates, a five-year average based on monthly data from Eurostat is used. Telenor therefore believes that an inflation rate used for the calculation of WACC should also be based on five-year averages based on monthly inflation data released by Norges Bank, and that this will result in the right balance between predictability and efficiency.

Telenor furthermore believes that it provides little predictability for Telenor's pricing if a new WACC is set on 1 July with retroactive effect from 1 January of the same year. It is of significance to Telenor's opportunity to comply with the requirement for cost-oriented prices that a new WACC is notified early enough for Telenor to be able to calculate the effect of the new interest rate and notify any new prices before a new WACC is applied. Telenor proposes that any updating of WACC as of 1 July must be with effect for the subsequent financial year, and not the current year as described in the notification.

Finally, Telenor refers to how the notification does not state at what time the new WACC will become effective. Telenor believes the new WACC must come into effect going forward in time.

Nkom's assessment

Nkom shares Telenor's comment regarding challenges related to defining a WACC used for different types of technology. These are issues that have been assessed in connection with determining the WACC, both in conjunction with the current method and in the method set out in

this decision. This decision is based on guidelines from the European Commission and BEREC's "WACCs parameter report 2021".

The guidelines are intended to ensure consistency in the calculation of WACC across member states. The purpose is also to promote effective investment and innovation through an appropriate level of risk, as reflected in WACC.

Both in the current method and in the notified method of determining WACC, a "Peer Group" is used to calculate parameters associated with individual companies. The "Peer Group" consists of 14 different companies from various European countries. The companies use various technologies. This includes technologies for both fixed and mobile networks and different generations of technology. Nkom believes that this approach will balance the considerations to which Telenor refer in their comments.

Certain countries have an addition to WACC, to take account of the greater risk on investing in NGA⁵. Such an addition was assessed for Norway by Professor Johnsen in 2017. The conclusion then was that no such addition would be introduced in Norway⁶. Nkom believes there is no basis for changing this conclusion.

Nkom believes there is no basis for making changes to the notified regulation based on this section of Telenor's comments.

Telenor believes the authorities must apply a regulatory design that provides incentives for, and strengthens, investors' willingness to commit to investments in new technology. Nkom believes that this input is directed at the holistic design of the regulation. Nkom believes the decision regarding the WACC contributes to achieving the purpose indicated by Telenor.

Telenor believes that the rate of inflation should be based on the average monthly inflation data released by Norges Bank for the past five years. Telenor refers to how BEREC's calculation of country-specific interest rates uses a five-year average based on monthly data from Eurostat.

According to BEREC,⁷ a Eurozone-wide inflation rate is appropriate for the Eurozone's member states, while for other member states, national inflation estimates may be justified. The ECB's inflation forecast for five years going forward is considered to be appropriate. Brattle Group recommends that NRAs which are not in the Eurozone apply inflation forecasts for their own national currency. Within this framework, Denmark bases the inflation rate on the ECB's

⁵ According to an overview from Cullen International (www.cullen-international.com), 10 out of 27 countries in Europe have a risk addition in WACC for VHCN.

⁶ Cf. Chapter 5, "Kapitalkostnad for norsk telekom fastlinjevirksomhet" (Cost of capital for Norwegian telecom fixed-network activity), 31 January 2017, revised 30 August 2017.

⁷ Cf. Section 64, [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1106\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC1106(01)&from=EN)

expected long-term inflation target⁸. Nkom believes that the European Commission's guidelines state that inflation must be fixed from a forward-looking perspective. Nkom believes there is no basis to change the notified approach whereby Norges Bank's long-term inflation target is applied.

Concerning the date of entry into force of the new WACC, Nkom can see that the notified design gives Telenor some challenges in terms of adjustment if a new WACC determined as off 1 July is to apply retroactively to the current year. After a new assessment, Nkom has come to the conclusion that the new WACC to be updated on around 1 July will not come into effect until subsequent financial years. The text of Chapters 5 and 6 is amended to match this amendment. Nkom emphasises that this applies to cases where the regulation relates to financial years and to Telenor's financial reporting, such as cost accounting and accounting separation.

The WACC laid down in this decision will take effect immediately and apply to the 2022 financial year.

1.4 Regulatory starting point

Under Section 4-9 of the Norwegian Electronic Communications Act, Nkom may require a provider with significant market power to apply specific price regulation methods, including the application of a WACC.

The need for harmonisation advocates that Nkom applies the guidelines set out in the European Commission's notice of 6 November 2019 concerning a method to estimate WACC. The method set out in the European Commission's notice is described in detail in the "Commission staff working document" (SWD) of 5 November 2019⁹.

In the European Commission's communication, BEREC's role and duties are described in Chapter 7, sections 64 - 67. According to Chapter 7 of the communication, in close cooperation with the European Commission BEREC must estimate parameters according to the approach described in the European Commission's guidelines. BEREC's working group has calculated WACC parameters for the years 2020 and 2021. A new aspect in 2021 is that BEREC has calculated parameters for Telenor and included data for Norway.

On an annual basis, in close cooperation with the European Commission, BEREC will estimate parameters necessary to calculate WACC for the individual member state¹⁰:

⁸ Danish Business Authority (2017): "The Business Authority uses the European Central Bank's (ECB) expected long-term inflation target to determine inflation."

⁹ SWD(2019) 397_final, https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=62834

¹⁰ https://bereg.europa.eu/eng/document_register/subject_matter/bereg/reports/9977-bereg-report-on-wacc-parameter-calculations-according-to-the-european-commissions-wacc-notice-of-6-november-2019

The points under Chapter 7 of the European Commission's communication:

64. In the preparatory steps leading to the adoption of the Notice, the Commission services worked in close cooperation with BEREC. In the context of this collaboration, the Commission invited BEREC to estimate the WACC parameters consistent with the approach described in this Notice. BEREC agreed to estimate the parameter values and publish them on an annual basis. This will greatly facilitate the work of NRAs in preparing periodic WACC reviews and the Commission's review of such notifications.

65. In the annual calculation exercise, BEREC, in close collaboration with the Commission, will estimate (i) the parameters reflecting general economic conditions and (ii) the company-specific parameters for the peer group.

66. Regarding the parameters reflecting general economic conditions, BEREC will estimate the RFR for each Member State and a single Union-wide ERP.

67. Regarding the company-specific parameters, BEREC will prepare a list of companies suitable for the peer group and estimate the equity beta, gearing, debt premium and cost of debt for each company included in the list. Further, BEREC will describe factors that may justify NRAs removing one or more companies from the list to take account of national specificities.

In 2021, BEREC has also included parameters for Norway in its calculations. Nkom thereby finds it appropriate going forward to apply the European Commission's WACC method, with parameters calculated by BEREC, to Norwegian conditions. Nkom will update WACC for Norway when there are new metrics from BEREC.

1.5 Current regulation

Nkom adopted decisions on the WACC in the mobile and fixed network markets on 27 and 28 November 2017, respectively. The decisions show that the WACC to be used in future financial reporting and price regulation must be 9.1% in the mobile markets and 8.3% in the fixed network markets (in nominal terms before tax). The new WACC replaced previously adopted WACC in Nkom's decisions of 16 December 2013 and 18 December 2014.

The basis for the adopted WACC in the mobile and fixed network markets was calculations undertaken by Professor Thore Johnsen in the reports "Kapitalkostnad for norsk telekom mobilvirksomhet i 2016" (Cost of capital for Norwegian telecom mobile activity in 2016) and "Kapitalkostnad for norsk telekom fastnettvirksomhet i 2016" (Cost of capital for Norwegian telecom fixed network activity in 2016). In the reports, Johnsen used the Capital Asset Pricing Model (CAPM) to calculate the risk-adjusted required return (WACC) for employed capital (equity + interest-bearing debt). The method corresponds to established regulatory practice.

In the current regulation of the mobile and fixed network markets, the WACC is used in the following financial reports and cost models:

Cost accounting

In Telenor's regulatory cost accounting, the applicable WACC is used to calculate the costs of capital for the book capital applied. In the fixed network markets (Markets 3a and 3b), Telenor is required to report cost-accounting for co-location, backhaul services, copper-based broadband access and local, physical access to copper-based access networks. In the mobile market (Market 15), Telenor is required to report cost-accounting for co-location.

Accounting separation

Costs of capital are included in the reporting of accounting separation so as to take account of a reasonable return on the investments included in the retail activities. Telenor must use the rate defined in the current Nkom decision on WACC for the mobile or fixed network markets. In Markets 3a and 3b, Telenor is required to report accounting separation for local, physical access to fibre-based access networks (fibre-based LLUB), accounting separation for local, virtual access to fibre-based access networks (VULA fibre) and accounting separation for central access to fibre-based access networks (VUA fibre). In Market 15, Telenor is required to report accounting separation for its mobile activity in Norway as the basis for verifying compliance with the ban on price discrimination towards external buyers of national roaming and MVNO access.

Margin squeeze tests

WACC is included in Nkom's margin squeeze tests to ensure that an effective, alternative provider will be able to achieve a reasonable return on invested capital. Nkom performs margin squeeze tests for fibre in Markets 3a and 3b at six-month intervals. Nkom has also notified that Telenor will be required to offer access to fixed wireless broadband (FTB) at prices which entail that the access buyer is not subject to margin squeeze, with associated margin squeeze tests.

Cost models

Nkom has developed cost models for mobile networks, fixed core networks and fixed access networks that are based on the Long Run Incremental Cost (LRIC) method. The WACC is included in these models and is used in the calculations of reasonable returns on invested capital.

2 Common WACC for mobile and fixed networks

Chapter 1.5 describes the current regulation where WACC is used. In current regulation, there are different WACC for fixed and mobile networks because mobile activity has traditionally been assessed to entail more risk than fixed network activity. There are nonetheless several parameters in the WACC formula¹¹ that are common to fixed and mobile networks, respectively. Nkom believes that key aspects of the development in the electronic communications markets advocate a common WACC for fixed and mobile networks. The converging development of technologies is an important factor in this assessment. Investments in 5G entail significant investments in fixed networks based on using fibre and will account for an increasing and significant share of the mobile access network. Moreover, fixed wireless broadband (FTB), which is based on 4G and 5G in the mobile network, is now also included in the pre-defined broadband market, more specifically defined as Market 3b. In this market, FTB competes with traditional fixed network technology such as fibre and HFC¹². The copper network must be phased out over a few years and is experiencing a strong decline in prevalence and active accesses. To a significant extent, FTB will function as a replacement product for copper-based accesses.

On this basis, Nkom will use one WACC for fixed and mobile networks, based on BEREC's parameter calculation. Nkom believes this ensures a more transparent procedure for determining the WACC. Brattle Group (2016)¹³ also refer to how the breakdown of beta on various business areas is problematic¹⁴. According to BEREC's calculation basis in conjunction with the European Commission's notice, for an NRA only the selection of companies in the "Peer Group"¹⁵ will result in different WACC results in this context. In Nkom's view, it will not be very appropriate to have different companies in the "Peer Group", depending on whether fixed network or mobile activity is being assessed, as all the companies in BEREC's "Peer Group" operate with both areas of activity.

Mobile activity has previously been considered to entail more risk than fixed networks, and has previously been an argument for a difference in WACC. In Nkom's view, there is insufficient basis to assert this in 2021, based on prevalence and technology development.

¹¹ The WACC formula is described in further detail in Chapter 4.

¹² Broadband based on cable TV technology.

¹³ Prior to the European Commission's notice from 2019, the Commission published a report prepared by Brattle Group. The study examined the approach taken by different regulators to estimate WACC and identified different options to increase consistency and predictability in selection methods among the member states.

¹⁴ Brattle Group's analyses also indicate that beta for mobile and fixed networks are approximately equivalent, cf. Chapter VI.C.9 in the report from Brattle Group.

¹⁵ "Peer Group" is described in further detail in Chapter 3.

3 Use of “Peer Group” – group of European telecom companies

Some of the elements that make up WACC consist of parameters that say something about general economic conditions such as risk-free interest rate and ERP (equity risk premium). Other parameters, such as business and stock betas, debt ratios and credit premiums, reflect conditions related to individual companies. Details for the individual parameters are reviewed in Chapter 4. To calculate parameters associated with individual companies, data for the national SMP operator, or data from a “Peer Group” consisting of several companies providing electronic communications services, can be used. “Peer Group” typically includes the national SMP operator.

The guidelines from the European Commission assume the use of a “Peer Group”. The European Commission’s reason for this is that it will lend greater predictability and stability to the calculations. Furthermore, the European Commission will use “Peer Group” for all parameters for individual companies, i.e. beta, debt ratio and cost of debt. Parameters for individual companies will entail a greater degree of statistical uncertainty than parameters based on a group of companies. The European Commission assesses that it is only appropriate to use beta from a national SMP if it can be documented that the national SMP operator has significantly different systematic risk to other equivalent companies within the EEA. The benefit that might be achieved must exceed the drawbacks entailed by increased uncertainty on using data for an individual company.

Any such assessment of the beta calculation basis should be based on a longer period of time. According to BEREC 2021, the 95% confidence interval for Telenor’s equity beta (0.42) lies outside the “Peer Group” average¹⁶. This can advocate using beta solely for Telenor. In the current decision for WACC fixed networks, the data basis (2012-2016 average) shows that Telenor’s stock beta and business beta are very close to the average¹⁷. This exerts influence in the opposite direction.

Telenor’s activities include operations in many countries beyond Norway and the EEA. This will also be reflected in Telenor’s beta. A beta based solely on values from Telenor might give misleading values for Norwegian conditions, due to the high proportion of activities outside the EEA. Furthermore, values based solely on one company will be subject to greater fluctuation over time, compared to a “Peer Group”.

Use of a “Peer Group” corresponds to the method that Nkom has applied historically. The group of companies that Professor Johnsen has applied in the basis for his calculations essentially

¹⁶ Figure A8 in WACC Parameters Report 2021.

¹⁷ Table 5 of the report “Kapitalkostnad for norsk telekom fastlinjevirksomhet” (Cost of capital for Norwegian telecom fixed-network activity), January 2017/revised 30 August 2017. Table 5 of the report “Kapitalkostnad for norsk telekom fastlinjevirksomhet” (Cost of capital for Norwegian telecom fixed-network activity), 20 May 2017.

corresponds to the group of companies BEREC has picked out for its “Peer Group.” This entails a greater degree of stability and predictability for the calculation of WACC.

A majority of member states¹⁸ calculate beta based on a group of companies.

Nkom has not found sufficient basis to apply data based solely on national SMP, rather than data based on a “Peer Group”.

In the basis for Nkom’s current WACC fixed network decision, Professor Thore Johnsen has applied a group of 14 European telecom companies as the basis for his calculations. In current decisions for WACC mobile networks, the group of companies is expanded to 16 companies. To a significant degree these companies correspond to the group of companies in both current decisions for WACC fixed networks and the European Commission’s recommended “Peer Group” of companies.

The European Commission’s Recommendation in Chapter 5.1 sets criteria for companies that may be included in a “Peer Group”:

- 1) Listed and liquid, i.e. regularly traded
- 2) Companies own and invest in infrastructure
- 3) Mainly operate within the EU/EEA
- 4) Have a credit score of¹⁹ BBB/Baa3 or higher
- 5) Have not recently been nor are currently involved in substantial mergers and acquisitions.

Table 1 Refers to the group of companies from the basis for Nkom’s current decisions for fixed network and mobile networks, respectively, and the group picked by BEREC as the “Peer Group” in 2021. As a consequence of Brexit, British Telecom is no longer included in BEREC’s “Peer Group”.

¹⁸ Cf. Chapter 5.3.1.1 of the Commission Staff Working Document (SWD), SWD (2019) 397, https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=62834, the SWD.

¹⁹ Investment grade credit rating

Table 1: “Peer Group” in Johnsen 2017 and in BEREC WACC parameter report 2021

Johnsen 2017 fixed network	Johnsen 2017 mobile	BEREC 2021
Telecom Italia	Telecom Italia	Telecom Italia
Swisscom	Swisscom	NOS
British Telecom	British Telecom	Telecom Austria
OTE	OTE	Telenet Group Holding N.V.
TDC	TDC	Vodafone Group plc
Elisa	Elisa	Elisa
Orange	Orange Belgium	Orange
Telefonica	Telefonica	Telefonica
TeliaSonera	TeliaSonera	Telia
Proximus (Belgaco)	Proximus (Belgaco)	Proximus
KPN	KPN	KPN
Tele2	Tele2	Tele2
Deutsche Telecom	Deutsche Telecom	Deutsche Telecom
Telenor	Telenor	Telenor
	Drillisch	
	Vodafone	

Table 1 presents the groups of companies that are the basis for the “Peer Group” in current decisions for fixed and mobile networks, as well as BEREC’s “Peer Group” for 2021. Companies in black text are included in all the groups. Companies in red text are included in the “Peer Group” used in current fixed and mobile network decisions from 2017, but are not among the companies in BEREC’s “Peer Group” for 2021. Companies in green text are included in the “Peer Group” in the BEREC parameter report, but are not included in the basis for the current regulation.

The European Commission’s notice gives an opening in section 67 for regulators, based on specific factors, to remove one or more companies from the “Peer Group” in order to take account of national conditions.

Chapter 3.4 of the BEREC parameter report lists which factors may provide a basis for removing companies from the “Peer Group”:

- a) *Certain companies in the peer group may not reflect the size of the SMP operator in the particular member state. For example, it may be inappropriate to include a very large company in the peer*

- group if its scale is significantly greater than the SMP operator or the member state itself has a relatively small population*
- b) Competition conditions within the electronic communications sector, and in particular infrastructure-based competition, may vary between member states increasing risk for both SMP and OAO operators (access seekers and wholesalers). For example the presence of a significant cable operator could present particular competitive conditions in one member state that may be absent from another*
 - c) The share of regulated vs non-regulated revenues of peer group members may vary. Indeed as mentioned by the Brattle report, regulated telecommunication activities could be seen to be less sensitive to changes in the economy than those of an average firm with non-regulated activities;*
 - d) The scope of segments of activity (i.e. mainly mobile, mainly fixed, mainly TV, combined, etc.) of certain companies in the peer group may differ significantly from the SMP's types of business to an extent of not being representative.*

Concerning section a above: It is not clear how relatively large a company must be for it to be excluded from the "Peer Group." Telenor has a relatively low market value compared to e.g. Deutsche Telekom. Among BEREC's 2021 "Peer Group", Telenor is the fifth largest company among 14, and is thus a relatively large company in this context. Nor is the companies' size weighted into the calculation of WACC. In Nkom's view, there is insufficient basis to remove companies as a consequence of size.

Concerning section b above: Nkom believes there are no infrastructure competition-related circumstances to indicate that individual companies should be withdrawn from the "Peer Group".

Concerning section c: Nkom has not found specific reasons for individual companies to be excluded on the basis of the proportion of revenue from regulated activities. It is difficult to establish a good basis for the execution of any such breakdown, cf. Brattle Group's report²⁰.

Concerning section d: Nkom has not found that the composition of an individual company in the "Peer Group" is so different from Telenor as SMP operator that it is not representative. There will naturally be differences between the companies in the "Peer Group", but overall the "Peer Group" provides a good basis for preparing company-specific parameters over time.

As shown above, BEREC's "Peer Group" proposal will ensure that calculation of beta is based on a group of companies that to a significant degree coincides with previous calculations applied as the basis for WACC in Norway. This ensures that the group of companies used for calculation of WACC for Norway is relatively stable over time. The European Commission leaves no scope for the addition of companies. Nkom therefore does not make any such assessment.

²⁰ Cf. VI.C.9 in the report from Brattle Group: https://www.brattle.com/wp-content/uploads/2017/10/7177_review_of_approaches_to_estimate_a_reasonable_rate_of_return_for_investments_in_telecoms_networks_in_regulatory_proceedings_and_options_for_eu_harmonization.pdf

BEREC's "Peer Group" for 2021 forms the basis for the calculation of WACC parameters in 2021. Nkom will apply this as the basis for the calculation of WACC for Norway.

4 Determination of the WACC

The WACC is the weighted cost of capital split into an investor's required return on equity (E) and the cost of capital associated with debt (D). The cost of equity is calculated using the Capital Asset Pricing Model (CAPM).

$$(1) Wacc = Re \times \frac{E}{D + E} + Rd \times \frac{D}{D + E}$$

Where Re is the required return on equity, and Rd is interest on the debt. E stands for equity and D stands for debt. The fractions in the formula are thereby the equity and debt ratios.

$$(2) Re = RFR + \beta \times ERP$$

Re , the required return on equity, consists of the risk-free interest rate, RFR , and the expected risk premium on investing in the capital market with a diversified portfolio. The beta here is the co-variation between the investment object (in this case, the telecom company) and the market portfolio. The investment object for which the cost of capital is calculated in this case is the average of a group of larger European telecom companies (see section Use of "Peer Group" – group of European telecom companies).

$$(3) Rd = RFR + credit\ premium$$

Rd is the cost of debt, consisting of the risk-free interest rate plus a credit premium required by lenders. The credit premium is estimated on the basis of the corporate bonds issued.

The above formulas can be combined to derive this total formula for the cost of capital:

$$(4) Wacc = \frac{E}{D + E} \times (RFR + \beta \times ERP) + \frac{D}{D + E} \times (RFR + credit\ premium)$$

Later in this chapter, the determination of parameters for this formula for the WACC is reviewed, based on BEREC's calculations of parameters in 2021.

4.1 Risk-free interest rate for Norway during the past five years

The risk-free interest rate is the return that an investor can expect from investments that theoretically do not entail any risk of losses²¹. Government bonds are a typical example of this type of investment object. According to BEREC, the established practice among member states is to calculate the risk-free interest rate on the basis of domestic 10-year government bond yields

To estimate the risk-free interest rate for Norway, current 10-year government bonds are used. The data period is from April 2016 to March 2021, with monthly values²². The risk-free interest rate underpinning Nkom's calculation of the new WACC is 1.43%. This is calculated as an average based on monthly values during the data period.

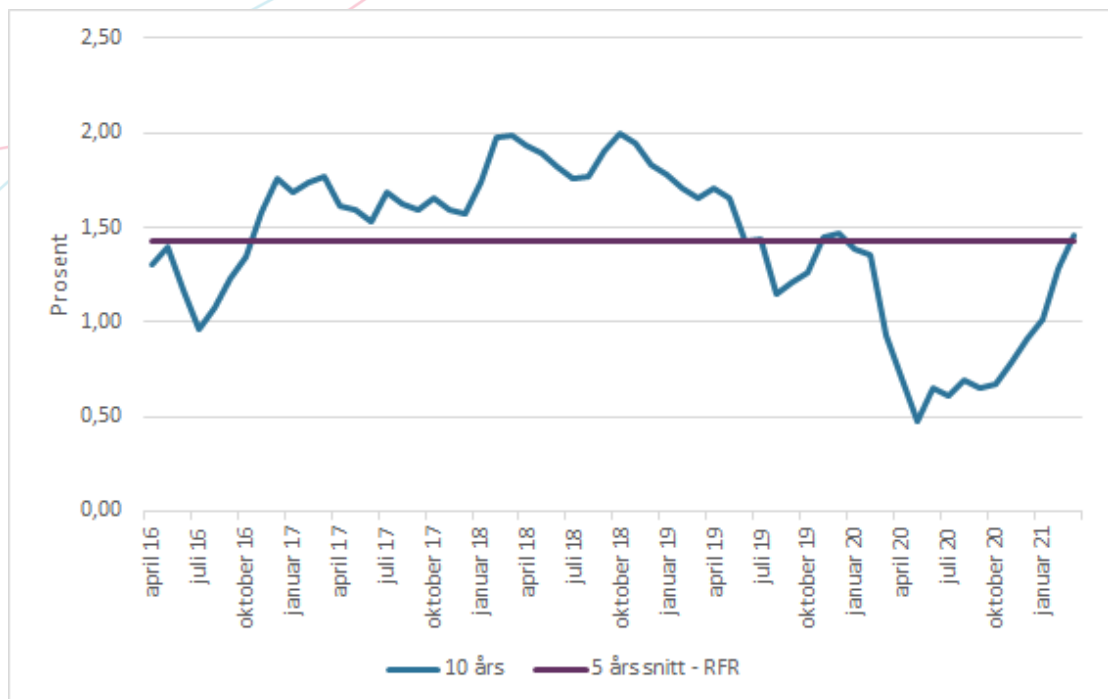


Figure 1: Risk-free interest rate for Norway (1.43%), 10-year government bonds (current).

Source: Norges Bank.

This reflects the current monetary policy regime and the economic situation during the past five years. The risk-free interest rate used in the new WACC calculation in Norway, at 1.43%,²³

²² The data source is: https://www.norges-bank.no/globalassets/marketdata/stat/no/renter/v2/renter_mnd.xlsx

²³ By mistake, 1.38% for RFR in Norway is stated in "BEREC Report on WACC parameter calculations" p. 16. The correct figure from the data from Norges Bank is 1.43%. The data for RFR in Norway is correctly stated in Annex 1 of the report.

represents a significant reduction compared with the current risk-free interest rates of 4.58% for mobile, and 4.55 % for fixed networks (pre-tax).

It is Nkom's view that the updated risk-free interest rate provides a good starting point, in line with the European Commission's communication, for the calculation of the cost of capital. With annual updates, the WACC will keep pace with the course of the economy.

4.2 Credit premiums and cost of debt

Cost of debt is defined by BEREC as the financial cost paid by a company for its debt. Cost of debt consists of the risk-free interest rate plus a credit premium required by lenders, see equation (3) above.

The estimated cost of debt to be applied to the WACC is the estimated debt interest rates for the companies in the "Peer Group", in addition to the risk-free interest rate. Debt interest rates are estimated as an average of interest-yielding bonds issued by the companies in the group in the period from April 2016 to March 2021.

The calculations below adhere to BEREC's approach in line with the European Commission's recommendation.

Table 2: Credit premiums and cost of debt for companies in the "Peer Group". Source: Bloomberg via BEREC WACC Parameters Report 2021.

Company	Credit premium (basis points)	Domestic RFR	Cost of debt (RFR + credit premium)
Deutsche Telekom AG	124	-0.03	1.21
Elisa Oyj	73	0.24	0.97
Koninklijke KPN N.V.	116	0.15	1.31
NOS	54	1.71	2.25
Orange S.A.	80	0.37	1.17
Proximus S.A.	92	0.36	1.28
Tele 2 AB	152	0.34	1.86
Telecom Italia	101	1.82	2.83
Telefónica S.A.	44	1.01	1.45
Telekom Austria AG	78	0.25	1.03
Telenet Group Holding N.V.	312	0.36	3.48
Telenor	100	1.43	2.43
Telia Company AB	131	0.34	1.65
Vodafone Group plc	156	0.95	2.51
Average	115		

Based on an average of the estimated credit premiums among the European telecom companies, BEREC has arrived at an estimated 115 basis points as a credit premium. Combined with a risk-free interest rate in Norway of 1.43%, this gives an estimated cost of debt of 2.58% for a European telecom company based in Norway.

Nkom will thereby apply 2.58% as the cost of debt in the calculation of new WACC.

4.3 Beta values and debt ratio²⁴

Beta values are a measure of how much a share fluctuates in step with the market. With a value above 0, the share is fluctuating in the same direction as the market generally. With values exceeding 1, a share will have greater volatility than the market. Beta values are thus a measure of the risk on a share or other securities. By devising beta values for companies in the telecom sector, it is possible to break down an investor's required return in terms of debt risk, and the risk presented by a company compared to other investments in the market. The calculated beta values thereby constitute the weighting on calculating the costs of capital.

A company's equity beta (β_E), or stock beta, is defined as the share's non-diversifiable yield risk within a well-diversified portfolio, the market portfolio, relative to the market portfolio's risk.

$$(5) \beta_e = \frac{\text{Korr}(Re, Rm) \cdot \text{Std}(Re)}{\text{Std}(Rm)}$$

The equity beta is calculated by BEREC on the basis of regression between the companies' share returns (Re) and the STOXX Europe TMI Index (Rm), which is considered by BEREC to be the market portfolio. The correlation between the returns on the share and on the market portfolio indicates the proportion of non-diversifiable risk, i.e. share variation in step with the return on the portfolio.

Below, beta values for European telecom shares are estimated as slope coefficients in linear regressions between returns on shares and on the relevant market portfolio ("beta"). An example of a slope coefficient between the Telenor share and the European market index can be seen in Figure 2 below:

²⁴ Debt ratio is here defined as a company's debt as a ratio of the sum of equity and liabilities, $\text{Debt}/\text{Equity}+\text{Debt}$

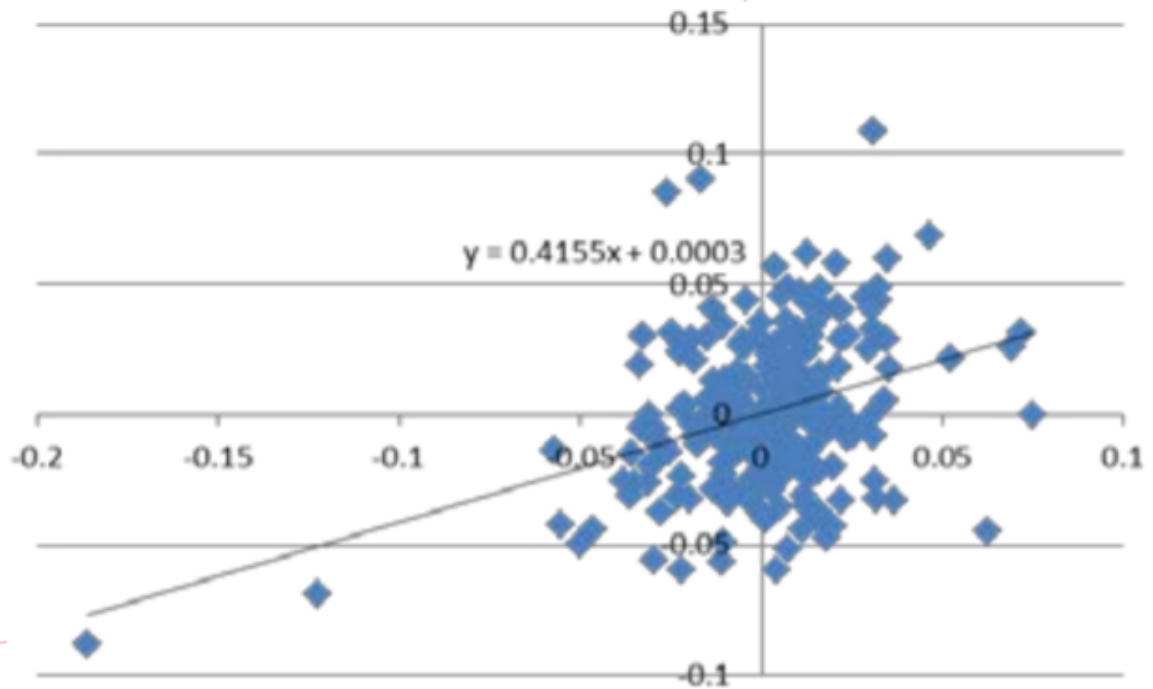


Figure 2: Example of calculation of equity beta for Telenor. This slope yielded a stock beta of 0.42. Source: BEREC Report on WACC parameter (...), p 79.

The basis for the calculations is the five-year period from April 2016 to March 2021. The data points are average weekly returns.

Using “Miller’s formula” and a debt beta set at 0.1 , the business beta for a listed company can be calculated:

$$(6) \beta_A = \beta_E \frac{E}{D + E} + \beta_D \frac{D}{D + E}$$

There β_A is the business beta, and β_E the equity beta.

The results for the calculated beta values for the European companies are presented in Table 3 below:

Table 3: Beta values for company in the “Peer Group”. Source: BEREC WACC Parameters Report 2021.

No.	Company	Equity beta	Debt ratio	Business beta	Market value in EUR billion (average 5 last year)
1	Deutsche Telekom AG	0.84	48.85%	0.48	70.32
2	Elisa Oyj	0.46	13.61%	0.41	6.45
3	Koninklijke KPN N.V.	0.75	39.12%	0.49	11.28
4	NOS	0.78	31.90%	0.57	2.51
5	Orange S.A.	0.79	50.19%	0.44	35.32
6	Proximus S.A.	0.62	23.02%	0.50	7.90
7	Tele2 AB	0.64	21.32%	0.52	6.70
8	Telecom Italia	1.08	68.24%	0.42	12.59
9	Telefónica S.A.	1.12	55.29%	0.56	37.42
10	Telecom Austria AG	0.69	37.66%	0.47	4.40
11	Telenet Group Holding N.V.	0.70	48.71%	0.41	5.25
12	Telenor ASA	0.42	27.04%	0.33	23.23
13	Telia Company AB	0.68	35.81%	0.48	15.93
14	Vodafone Group plc	0.90	48.26%	0.52	53.31
Average		0.75	39.22%	0.47	

The average equity beta for the European companies is 0.75. The average business beta is 0.47.

In the market decision from 2017, Nkom uses an equity beta of 0.77 and a business beta of 0.50 for fixed network activity. On the mobile side, the current decision has an equity beta of 0.82 and a business beta of 0.65. On calculating a new common WACC for mobile and fixed networks, it is thus only business beta for mobile that will have a significant change from 0.65 to 0.47.

Nkom will use average values for beta values and the debt ratio from the “Peer Group” to determine new WACC.

4.4 Equity risk premium (market premium)

The European Commission recommends using a common risk premium for the EU to calculate an investor’s required return from European telecom companies. BEREC has expanded the calculation to also include the EEA, with market data for Norway. To calculate the market premium, BEREC has taken a long time series of market data and calculated the average return on equity (equity risk premium) in EU member states and in the EEA. BEREC retrieves data for

the 2021 calculations from the Morningstar dataset, which includes DMS Global Returns data. For details of the calculations and a further description of the data set, Nkom refers to the BEREC Report on WACC parameter calculations, Chapter 6²⁵.

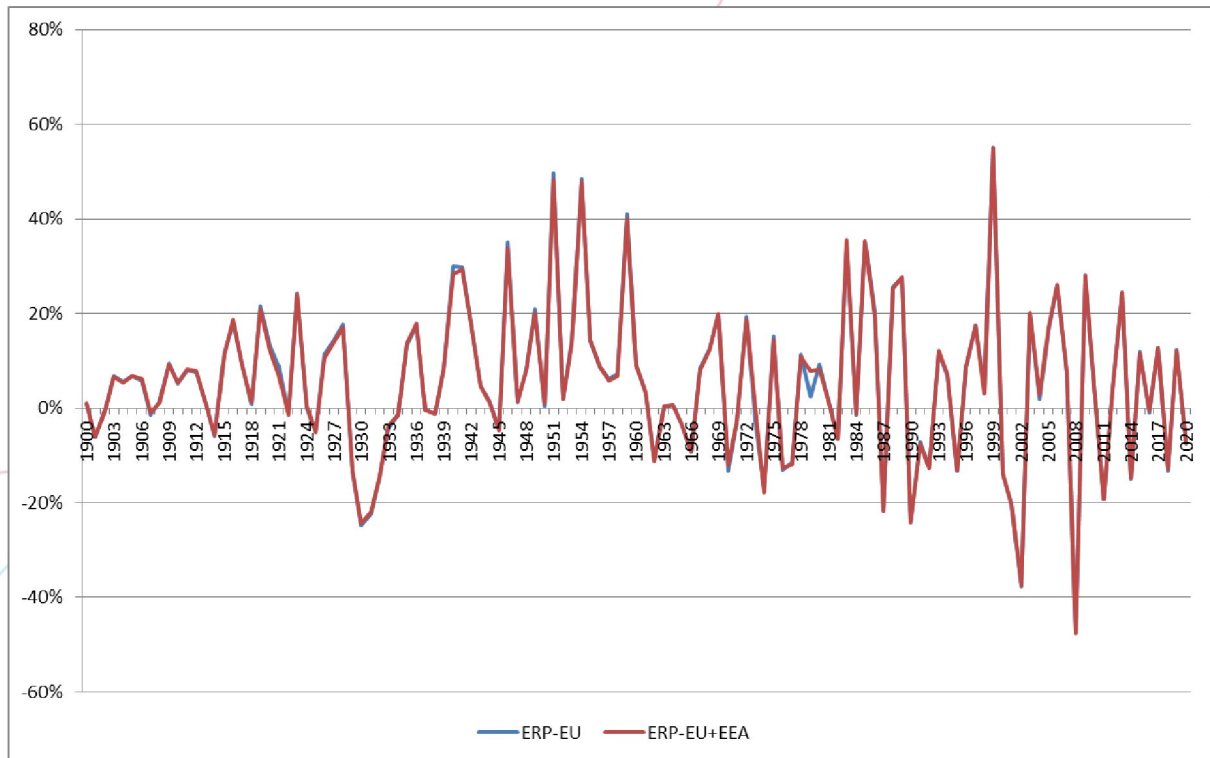


Figure 3: Equity risk premium stated as the annual return, 1900-2020 time series.

Table 4: Market premium on invested equity.

Source: Morningstar via BEREC WACC Parameters Report 2021.

	Geometric average (GG)	Arithmetic average (AG)
EU-ERP	4.18%	5.50%
EU/EEA-ERP	4.18%	5.48%

In Table 4, BEREC has calculated both geometric and arithmetic averages for the market premium. The calculations for the EEA will be applicable to Iceland and Norway. BEREC refers to how, in the interests of transparency, the European Commission recommends the use of arithmetic averages. Nkom will use the arithmetic average of 5.48% as the risk premium on invested equity on calculating the new WACC.

²⁵ https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/9977-berec-report-on-wacc-parameter-calculations-according-to-the-european-commissions-wacc-notice-of-6-november-2019

4.5 Result for Norway and determination of a new WACC

By taking the average values from the “Peer Group” for WACC parameters and inserting the risk-free interest rate for Norway, as well as the Norwegian tax rate, the new WACC can be calculated.

Table 5 shows the various constituent elements of the WACC calculation, and the result it gives for an average of European telecom companies with activities in Norway.

Table 5: Overview of WACC parameters for Norway and calculation of new WACC.

	Source	WACC for Norway.
Risk-free interest rate	10-year government bond, Norges Bank	1.43%
Credit premium	BEREC’s “WACC Parameters Report 2021”. Average of “Peer Group”	1.15%
Cost of debt		2.58%
Corporate tax	Current corporate tax in Norway	22%
Cost of debt before tax		2.58%
Risk premium on equity	BEREC’s “WACC Parameters Report 2021”. Average market premium for EEA	5.48%
Debt ratio	BEREC’s “WACC Parameters Report 2021”. Average of “Peer Group”	39.22%
Business beta	BEREC’s “WACC Parameters Report 2021”. Average of “Peer Group”	0.47
Equity beta	BEREC’s “WACC Parameters Report 2021”. Average of “Peer Group”	0.75
Cost of equity after tax		5.54%
Cost of equity before tax		7.10%
Nominal WACC before tax		5.33%
Real WACC before tax		3.26%
Inflation	Inflation target Norges Bank	2.00%

On this basis, Nkom sets a new WACC of 5.33% before tax.

5 Consequences for current regulation

Chapter 1.5 provides an overview of current WACC decisions in the mobile and fixed network markets, and of the elements of price regulation for which WACC is used. This decision replaces current decisions in the mobile and fixed network markets, respectively, as from 27 and 28 November 2017.

Updating WACC will adhere to the method laid down in this decision and will be implemented annually on the basis of BEREC’s updated data basis. The update will take place on around 1 July each year. For regulation that is based on financial reporting and relates to financial years,

such as cost accounting and accounting separation, the updated interest rate will apply to the subsequent financial year.

Updating of WACC will not affect the markets for voice call termination in fixed and mobile networks, Market 1 and Market 2, respectively. Current maximum termination rates are continued until the EU's regulation with the common European price cap for termination laid down by the European Commission is incorporated into the EEA agreement and Norwegian law²⁶.

6 Decision

As there is a new calculation of the required return for Norwegian fixed network and mobile activity, pursuant to Section 4-9 of the Norwegian Electronic Communications Act Nkom determines that the WACC to be used in the fixed network and mobile markets in future financial reporting and price regulation will be 5.33% (nominally before tax)²⁷. For regulation that is based on accounts and financial years, the required return applies to the subsequent financial year. The rate will apply to future reporting and will be updated once a year, normally around 1 July. Updating of WACC around 1 July 2022 will apply to the 2023 financial year for regulation that is based on accounts and financial years.

The new WACC for the fixed network and mobile markets replaces previously adopted interest rates in Nkom's decisions of 28 November 2017 and 27 November 2017, respectively.

7 Entry into force

The Decision enters into force immediately.

²⁶ Market 1: <https://www.nkom.no/ekom-markedet/markeder/marked-1-terminering-av-tale-i-fastnett>, Market 2: <https://www.nkom.no/ekom-markedet/markeder/marked-2-terminering-av-tale-i-mobilnett>.

²⁷ The change in WACC will not affect the current maximum termination rates in mobile and fixed networks, Market 2 and Market 1, respectively.



8 Right of appeal and deadline for initiating legal proceedings concerning individual decisions.

The Decision may be appealed, cf. Section 11-6 of the Norwegian Electronic Communications Act, and Section 28 of the Norwegian Public Administration Act. The deadline for appealing decisions is three weeks, cf. Section 29(1), of the Public Administration Act. Any appeal must be addressed to the Norwegian Ministry of Local Government and Modernisation and sent to Nkom, cf. Sections 28 and 32 of the Public Administration Act.

It follows from Section 11-8(1) of the Norwegian Electronic Communications Act that lawsuits concerning individual decisions made under or pursuant to this Act must be brought within six months after the decision was made. The time limit for legal action is interrupted by an appeal against the decision and does not run as long as the appeal is being processed, cf. Section 11-8, second paragraph of the Norwegian Electronic Communications Act.

With kind regards,

Hans Jørgen Enger
Director of Competition Department

Inger Vollstad
Head of Section

The document is approved electronically and dispatched without signature

9 Annexes

Table 6: Overview of parameters for companies in the “Peer Group”. Source: BEREC WACC Parameters Report 2021.

Peer Group Company	SMP (legacy infrastructure)	Company Credit Rating (S&P)	Country	Country Credit Rating (Moody's)	Debt Premium	RFR (domestic = national) of home country	Cost of Debt (= Debt Premium + RFR)	Equity beta	Gearing	Asset beta	Equity share (1-gearing)
Deutsche Telekom AG	Yes	BBB	DE	AAA	124	-0.03	1.21	0.84	49%	0.48	48%
Elisa Oyj	Yes	BBB+	FI	AA1	73	0.24	0.97	0.46	14%	0.41	41%
Koninklijke KPN N.V.	Yes	BBB	NL	AAA	116	0.15	1.31	0.75	39%	0.49	49%
NOS	No	BBB-	PT	BAA3	42	1.71	2.25	0.78	32%	0.57	57%
Orange S.A.	Yes	BBB+	FR	AA2	80	0.37	1.17	0.79	50%	0.44	44%
Proximus S.A.	Yes	A	BE	A3	92	0.36	1.28	0.62	23%	0.5	50%
Tele 2 AB	No	BBB	SE	AAA	152	0.34	1.86	0.64	21%	0.52	52%
Telecom Italia	Yes	BB+	IT	BAA3	101	1.82	2.83	1.08	68%	0.42	42%
Telefónica S.A.	Yes	BBB-	ES	BAA1	44	1.01	1.45	1.12	55%	0.56	56%
Telekom Austria AG	Yes	BBB+	AT	AA1	78	0.25	1.03	0.69	38%	0.47	47%
Telenet Group Holding N.V.	No	BB-	BE	A3	312	0.36	3.48	0.70	49%	0.41	41%
Telenor	Yes	A-	NO	AAA	100	1.38	2.38	0.42	27%	0.33	33%
Telia Company AB	Yes	BBB+	SE	AAA	131	0.34	1.65	0.68	36%	0.48	48%
Vodafone Group plc	No	BBB	UK	(Aa3)	156	0.95	2.51	0.90	48%	0.52	52%