

Norges Bank Investment Management

Presentation of investment performance
in compliance with the Global Investment
Performance Standards (GIPS®)

Manual

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1. Introduction to the GIPS standards

The Global Investment Performance Standards (GIPS®) are global standards for the calculation and presentation of investment performance based on the principles of fair representation and full disclosure. There are two types of entities that comply with the GIPS standards – investment management firms and asset owners. The GIPS standards were created by the CFA Institute in the later 1990's. CFA Institute is a global association of investment professionals with a mission to lead the investment profession globally by promoting the highest standards of ethics, education, and professional excellence for the ultimate benefit of society. In June 2019, the 2020 edition of the GIPS standards was adopted with an effective date 1 January 2020. In the 2020 edition, separate provisions are created so firms and asset owners each have provisions designed for them. Firms and those asset owners that market their services must follow the GIPS standards for Firms. Asset owners that do not market their services will follow the GIPS standards for Asset Owners. The GIPS standards for Verifiers explain the procedures a verifier must follow when conducting a verification or performance examination.

Norges Bank Investment Management manages the Government Pension Fund Global based on a management mandate issued by the asset owner the Ministry of Finance. Norges Bank Investment Management manages the equity investments of Norges Bank's foreign exchange reserves based on a management mandate issued by the asset owner; Norges Bank. Norges Bank Investment Management claims compliance under the 2020 edition of the GIPS standards first chapter: GIPS standards for firms.

The GIPS standards are ethical and voluntary standards to be used by investment managers for creating GIPS composite reports that ensure fair representation and full disclosure. Global standardisation of investment performance reporting allows investors to compare investment managers more effectively and managers to better compete for new business.

When presenting investment performance in compliance with the GIPS standards, an investment management firm must state how it defines itself as a "Firm". In other words, for which part(s) of the firm the GIPS composite reports is relevant and representative.

Firms must follow the required elements of the GIPS standards to claim compliance with the Standards. Firms are strongly encouraged to adopt and implement the recommendations to ensure that the firm fully adheres to the spirit and the intent of the GIPS standards. Norges Bank Investment management monitors and identify changes to the GIPS standards and relevant Guidance Statements given by the CFA Institute and keep updated on interpretations and Q&As. Changes to the GIPS standards can be found on CFA Institutes webpage and an assessment will be done if these will apply for Norges Banks Investment management.

Norges Bank Investment Management is regulated through the Central Bank act, the Act on the Government Pension Fund and the Investment Mandate issued by the Ministry of Finance.

Calculation and presentation of performance is regulated in the investment mandate issue by the Ministry of Finance. Section 3-2 (3) states that 'The return calculations shall be prepared in accordance with the Global Investment Performance Standards (GIPS) methodology'. Any changes to the laws and mandate are closely monitored by Norges Bank Investment management.

To further increase the level of confidence of Norges Bank Investment Management's claim of compliance, a qualified, independent third party, TSG (former The Spaulding Group), has performed an independent verification. The contract for GIPS standards verification for Norges Bank Investment management is awarded through a public procurement. Norges Bank Investment Management is reviewing and assess the verifiers independence and independence policies on an annual basis.

Compliance Statement

Norges Bank Investment Management claims compliance with the Global Investment Performance Standards (GIPS®) and has prepared and presented this report in compliance with the GIPS standards. Norges Bank Investment Management has been independently verified for the periods 31 December 1997 through 31 December 2022. A firm that claims compliance with the GIPS standards must establish policies and procedures for complying with all the applicable requirements of the GIPS standards. Verification provides assurance on whether the firm's policies and procedures related to composite and pooled fund maintenance, as well as the calculation, presentation, and distribution of performance, have been designed in compliance with the GIPS standards and have been implemented on a firm-wide basis. The verification reports are available upon request.

Verification assesses whether (1) the firm has complied with all the composite construction requirements of the GIPS standards on a firm-wide basis and (2) the firm's policies and procedures are designed to calculate and present performance in compliance with the GIPS standards. Verification does not ensure the accuracy of any specific GIPS composite reports.

2. Definitions and Fundamental Information

Firm Definition

Norges Bank Investment Management, as the firm, is the asset management unit of the Norwegian central bank (Norges Bank). Norges Bank Investment Management manages the Government Pension Fund Global (Pension Fund) and the equity investments of Norges Bank's foreign exchange reserves (Reserves Fund, equity).

List of Composites

Norges Bank Investment Management invests in international equities, fixed income instruments, money market instruments, derivatives and real estate. Firm assets represent all assets for which Norges Bank Investment Management has responsibility. As of year-end 2022 this is the sum of the Government Pension Fund Global and the equity investments of Norges Bank's foreign exchange reserves. The performance results include the history as defined below:

- The Government Pension Fund Global:
 - Fund 31 December 1997
 - Fund ex. real estate through the end of 2016 31 December 1997
 - Equity 31 December 1998
 - Equity management 31 December 1998
 - Fixed income 31 December 1997
 - Real estate 31 March 2011
 - Real estate management 31 March 2011
 - Unlisted real estate 31 March 2011
 - Unlisted renewable infrastructure 31 May 2021
- The investment portfolio of Norges Bank's foreign exchange reserves:
 - Fund 31 December 1997 (terminated 30 November 2016)
 - Equity 31 December 2001
 - Fixed Income 31 December 1997 (terminated 30 November 2016)

Definition of Firm Assets

Total firm assets are defined as the sum of the Government Pension Fund Global, the investment portfolio of the foreign exchange reserves, the Government Petroleum Insurance Fund, and the Petroleum Buffer portfolio of the foreign exchange reserves. The money market portfolio of the foreign exchange reserves is managed by the Norges Bank Markets division and is not part of firm assets. On close of 31 December 2010 the Insurance Fund was terminated, and its assets were moved to the Pension Fund since the Pension Fund is able to buffer large and unexpected claims arising from petroleum activities on its own. The termination of the Insurance Fund was approved by the Norwegian Parliament after proposal from the Ministry of Finance. The termination was treated as an inflow to the Pension Fund and an outflow from the Insurance Fund and the Insurance Fund's assets are therefore zero at year-end 2010. On June 1, 2012, the management of the Petroleum Buffer portfolio was transferred to Norges Bank Markets division. On close November 2016, the Fixed Income part of the foreign exchange reserves was transferred to Norges Banks Markets division.

Norges Bank Investment Management's total firm assets in millions of Norwegian kroner for each year-end are presented in the table below:

Year	Firm Assets
1997	244,299
1998	279,205
1999	340,855
2000	522,544
2001	739,116
2002	743,670
2003	1,044,264
2004	1,236,653
2005	1,648,874
2006	2,047,074
2007	2,261,368
2008	2,498,961
2009	2,851,020
2010	3,317,700
2011	3,539,396
2012	4,043,153
2013	5,311,043
2014	6,778,049
2015	7,886,255
2016	7,687,711
2017	8,672,176
2018	8,353,411
2019	10,215,370
2020	11,032,367
2021	12,461,505
2022	12,539,505

Definition of Discretion

Discretion is the ability of Norges Bank Investment Management to implement its intended strategy. If documented restrictions significantly hinder the firm from fully implementing its intended strategy Norges Bank Investment Management will determine that the portfolio is non-discretionary.

The following situations are judged by the Norges Bank Investment Management to entail significant restrictions that cause a portfolio to be classified as non-discretionary:

- Portfolios which are advisory in nature where the client in co-operation with Norges Bank Investment Management carries out asset allocation (this mean that the underlying portfolios are discretionary, while the total account is not) and/or where assets in the portfolio (e.g., strategic investments or “old” assets that the client wishes to keep due to tax reasons) hinder the Firm from managing the portfolio in line with relevant composites’ intended strategy
- Cash flow requirements that significantly hinder the implementation of the intended strategy (e.g., the client requires large cash distributions on a regular basis)
- New portfolios during establishment or portfolios under liquidation as a result of being closed
- Portfolios where the sole purpose is to invest in units of a single “parent” account, where the portfolio would consist of a holding of only one unit fund and a minimum cash balance (used to handle in/out-flows of the account).

The Petroleum Buffer portfolio of the foreign exchange reserves was classified as a non-discretionary portfolio. The portfolio’s purpose was to build up foreign exchange for the Pension Fund and to facilitate cost-effective transition of external inflow capital. The foreign exchange sourced to the portfolio comes from the Government’s direct financial interest in petroleum activities and by Norges Bank’s purchases in the market. The Petroleum Buffer portfolio did neither have a specific return target nor an assigned benchmark.

Irrespective of whether a portfolio is classified as discretionary or non-discretionary, its value is included in the Firm’s assets.

3. Composites

The composite return is the asset-weighted average of the performance results of all the portfolios in the composite. Norges Bank Investment Management currently has only one portfolio in each composite. The GIPS standards require that firms include all discretionary fee-paying portfolios in at least one composite that is managed according to a particular strategy or style. All discretionary fee-paying portfolios are included in at least one composite.

Composite name	Category	Benchmark description	Composite inception and creation dates	Composite assets 31 December 2021 (NOKm)
The Government Pension Fund Global	Balanced	<i>70% Equity - FTSE Global All Cap factor and market cap weighted tax-adjusted and 30% Fixed Income - of which, 70% government developed debt - Barclays Global Treasury (GDP weighted), Barclays Global inflation-linked index and subgroup supranational within Barclays Global Aggregate, and 30% corporate developed debt - the corporate bonds and subgroup covered bonds (USD, CAD, EUR, GBP, SEK, DKK, CHF) within the Barclays Global Aggregate.</i>	31 December 1997	12,429,059
The Government Pension Fund Global ex. real estate through the end of 2016	Balanced	<i>70% Equity - FTSE Global All Cap factor and market cap weighted tax-adjusted and 30% Fixed Income - of which, 70% government developed debt - Barclays Global Treasury (GDP weighted), Barclays Global inflation-linked index and subgroup supranational within Barclays Global Aggregate, and 30% corporate developed debt - the corporate bonds and subgroup covered bonds (USD, CAD, EUR, GBP, SEK, DKK, CHF) within the Barclays Global Aggregate.</i>	31 December 1997	12,429,059
The Government Pension Fund Global equity	Equity	<i>FTSE Global All Cap factor and market cap weighted tax-adjusted.</i>	31 December 1998	8,672,186
The Government Pension Fund Global equity management	Equity	<i>FTSE Global All Cap factor and market cap weighted tax-adjusted. The funding of listed and unlisted real estate are drawn from the asset class strategic benchmark.</i>	31 December 1998 (Creation date 31 December 2017)	8,455,209
The Government Pension Fund Global fixed income	Fixed Income	<i>70% government developed debt - Barclays Global Treasury (GDP weighted), Barclays Global inflation-linked index and subgroup supranational within Barclays Global Aggregate, and 30% corporate developed debt - the corporate bonds and subgroup covered bonds (USD, CAD, EUR, GBP, SEK, DKK, CHF) within the Barclays Global Aggregate. In addition a management benchmark where the listed and unlisted real estate and unlisted renewable infrastructure benchmark has been drawn from the asset class benchmark is shown.</i>	31 December 1997	3,412,044
The Government Pension Fund Global real estate	Real Estate	<i>Equity and fixed income funding benchmark tailored to the currencies and the perceived asset class mix of the unlisted real estate investments. The current asset class mix is 60.8% fixed income and 39.2% equity and the currencies are USD, EUR, GBP, CHF and JPY.</i>	31 March 2011	330,300
The Government Pension Fund Global real estate management	Real Estate	<i>Equity and fixed income funding benchmark tailored to the currencies and the perceived asset class mix of the listed and unlisted real estate investments. The current asset class mix is 46% fixed income and 54% equity and the currencies are USD, EUR, GBP, SEK, CHF and JPY.</i>	31 March 2011 (Creation date 31 December 2017)	547,277
The Government Pension Fund Global unlisted real estate	Real Estate	<i>Equity and fixed income funding benchmark tailored to the currencies and the perceived asset class mix of the unlisted real estate investments. The current asset class mix is 60.% fixed income and 39.3% equity and the currencies are USD, EUR, GBP, CHF and JPY.</i>	31 March 2011 (Creation date 31 December 2015)	330,300
The Government Pension Fund Global unlisted renewable infrastructure	Renewable Infrastructure	<i>Equity and fixed income funding benchmark tailored to the currencies and the perceived asset class mix of the unlisted renewable infrastructure investments. The current asset class mix is 100% fixed income in the currency EUR.</i>	31 May 2021	14,530
The investment portfolio of Norges Bank's foreign exchange reserves, equity	Equity	<i>FTSE Global All World Developed Market (Eurozone, USA, United Kingdom, Japan, Canada, Australia, Switzerland, Sweden and Denmark) tax-adjusted.</i>	31 December 2001	110,445

Minimum Asset Level

Norges Bank Investment Management has not established a minimum asset level for a composite to identify portfolios that are too small to be representative of the intended strategy. All portfolios irrespective of size are included.

Significant Cash Flow Policy

Norges Bank Investment Management has not adopted a significant cash flow policy.

Inclusion Policy

A new mandate is included in the relevant composite from the first full month it is fully invested.

Exclusion Policy

A discontinued portfolio is included in at least one composite up to and including the last month it is fully invested. From the time the liquidation has started, the portfolio is no longer included in any composite. However, the discontinued portfolio's historic performance remains with the composite.

Change of composite

Not applicable.

Carve-outs

In addition to the Pension Fund aggregate composites, we present what constitute two types of carve-outs; the traditional composites are carve-outs from the Pension Fund along the conventional investment asset class definitions of equity, fixed income, unlisted real estate and unlisted renewable infrastructure.

With the updated management mandate of January 2017, however, we included a set of composites that represent how NBIM has organised the asset management into three investment areas: equity management, fixed-income management and real estate management. During 2021 the first investment in unlisted renewable infrastructure was made, the asset class is managed as a separate management area identical to the asset class.

For fixed-income management, the composite assets are identical to the traditional composite, and we present the fixed-income composite versus the corresponding benchmarks. For equity management and real estate management, the difference in composite assets is the inclusion of selected listed real estate holdings managed together with unlisted real estate in the real estate management composite.

In 2017, the listed real estate investments were transferred over to the equity asset class, leaving only unlisted real estate investments in the real estate composite. From 2017, the real estate composite is therefore identical to the unlisted real estate composite. The real estate management composite includes both listed and unlisted real estate since November 2014 and represents the Pension Fund's overall real estate strategy.

All assets managed by the firm are represented in one or more composites. Each composite holds its own cash balance.

Composite assets

Composite assets that are moved or terminated at the end of a measurement period are included in the composite's assets for the period-end in question.

4. Input Data

Consistency of input data is critical to effective compliance with the GIPS standards and establishes the foundation for full, fair, and comparable investment GIPS composite reports. The GIPS standards provide the blueprint for a firm to follow in constructing this foundation.

All data and information necessary to support a firm's GIPS composite reports and to perform the required calculations must be captured and maintained.

To ensure the existence and ownership of client assets all composite assets are reconciled against custodian on a daily basis.

Norges Bank Investment Management has the underlying data necessary to recreate the performance of our composites for all periods for which performance is presented, including beginning and ending period fair values and cash flows for composites.

Portfolio valuations based on fair values

The GIPS standards require the use of a fair value methodology in order to best identify the fair economic value of the firm's portfolios. The GIPS standards detail a recommended valuation hierarchy and firms need to disclose if the composite's valuation hierarchy materially differs from the recommended hierarchy.

The Valuation Policy outlines the methodologies governing the valuation process and is linked to the framework given by the Ministry of Finance. It states that fair values are based on the following valuation hierarchy:

- For all assets and liabilities, the tradable price (for normal trade sizes in unstressed situations) gives the fair value and shall be the representative price.
- For conversion between currencies WM/Reuters Closing Spot Rates 16:00 GMT Dollar fix shall be applied.
- For assets and liabilities that are traded in active exchange or dealer markets, closing exchange prices shall be used for securities traded in exchange markets and bid prices for securities trading in dealer markets if available and if reflecting the tradable price.
- For securities not trading in active markets, indicative (or alternatively independently evaluated) bid prices shall be used where these are available.
- Bilateral derivative products will be valued at observable market quotes relevant to timing of the underlying cash flows.
- For securities with unobservable prices, model-derived prices are used. Where model-derived prices are implemented, industry standard models with observable market inputs should be used as far as possible.
- Prices shall be sourced independently of the investment area.

- All unlisted real estate and renewable infrastructure investments (properties/physical assets, financial assets and liabilities related to real estate) shall at least be valued annually by an appointed and certified independent valuation firm. Property valuations are required to be prepared in compliance with internationally recognised valuation standards. In the event an alternative standard is used, compliance with Norges Bank Investment Management requirements shall be reviewed on a case-by-case basis. The unlisted real estate and renewable infrastructure valuations should be produced so that they are suitable for use in preparing financial statements under IFRS.
- Prices are obtained from independent market data providers and prioritised according to an internal hierarchy. If the prices received do not represent fair value, the principles outlined in this policy are applied to arrive at a price representing fair value.

Norges Bank Investment Management uses fair value in valuation of all assets and values all portfolios daily. The valuation hierarchy is well aligned to the recommended hierarchy in the standards. There is a daily reconciliation of the asset values with the custodian. Unlisted real estate investments and unlisted infrastructure investments are valued quarterly by an appointed and certified independent valuation firm.

Trade-date accounting

Trade-date accounting determines the correct economic value of the portfolio assets as of the transaction date. Because of the lengthy settlement periods of some markets, the GIPS standards require the use of trade-date accounting to achieve accurate performance results.

Norges Bank Investment Management uses trade-date accounting.

Interest Income

Accrual accounting must be used for fixed-income securities and all other investments that earn interest income. When determining what fair value to report, firms must include the income that would have been received had the security actually been sold at the end of the performance period. Accrued interest income must be included in the beginning and ending portfolio fair values.

Norges Bank Investment Management uses accrual accounting for all investments that earn interest income and the reported fair values include the accrued income.

Dividends

Accrual accounting is recommended for dividends (as of the ex-dividend date). Dividends are payable if the stock was owned on the ex-dividend date. Therefore, dividends should be accrued as income on the ex-dividend date.

Norges Bank Investment Management uses accrual accounting for dividends.

5. Calculation Methodology

Achieving comparability among investment management firms' GIPS composite reports requires uniformity in methods used to calculate returns. The Standards mandate the use of certain calculation methodologies.

Portfolio

In calculating the performance of the portfolios within a composite, the GIPS standards require firms to use a total rate of return. Total return includes income and realised and unrealised gains and losses.

Norges Bank Investment Management includes income and realised and unrealised gains and losses when calculating performance.

The GIPS standards require firms to use a time-weighted rate of return unless very specific circumstances are met. The portfolio must be valued at least monthly and adjusted for large cash flows. Interim returns must be geometrically linked. Methods that include adjustments to remove the effect of cash flows from the performance return are called time-weighted rate-of-return.

Norges Bank Investment Management uses time-weighted rate of return based on daily valuations and calculation of net asset value adjusted for cash flows.

Returns for cash and cash equivalents held in portfolios must be combined with the returns of other assets to calculate the total portfolio return.

Norges Bank Investment Management includes cash and cash equivalents in total-return calculations.

Performance must be calculated after the deduction of all trading expenses. Trading expenses refer to the direct transaction costs incurred in the purchase or sale of securities. These costs must be included when calculating performance because these are costs that must be paid in order to implement the investment strategy. Trading expenses can be direct, as in the case of brokerage commissions, or indirect, as in the case of a bid/ask spread.

Norges Bank Investment Management calculates performance after deduction of all direct trading expenses.

Gross-of-fee performance

Firms may present either gross-of-fee composite returns or net-of-fee composite returns and may also choose to present both. The Gross-of-fees return is defined to be the return on assets reduced by any direct trading expenses incurred and non-reclaimable withholding taxes paid during the period. Because the Gross-of-fees return includes only the return on assets and the associated cost of buying and selling those assets, it is the best measure of the firm's investment management ability and can be thought of as the "investment return". The Net-of-fees return is defined to be the Gross-of-fee return reduced by the Investment Management Fees paid by clients. Gross-of fee returns should be used for calculating risk measures.

Norges Bank Investment Management presents gross-of-fee performance after deductions of direct trading expenses and non-reclaimable withholding taxes paid during the period but before deduction of custodian fees. All risk measures are calculated on gross-of-fee performance.

Composites

The Norges Bank Investment Management composite structure is based on investment mandates and asset class carve-outs. The total number of composites is 13; however, the Government Petroleum Insurance Fund was terminated as of December 31, 2010, and the investment portfolio of Norges Bank's foreign exchange reserves and the investment portfolio of Norges Bank's foreign exchange reserves, fixed income, were both terminated on November 30, 2016.

Taxes

Returns should be calculated net of non-reclaimable withholding taxes on dividends, interest, and capital gains. Reclaimable withholding taxes should be accrued. The GIPS standards require recognition of the tax consequences of investing in different countries. Some countries allow certain investor types to reclaim a portion of the withholding taxes that are paid when transactions or payments occur. The GIPS standards recommend that reclaimable withholding taxes are recognised when incurred.

Norges Bank Investment Management recognises estimated withholding taxes when incurred. The actual amount of withholding tax may differ slightly from the estimated figure. This difference is posted as an income/cost when the actual figure is known. All portfolios are calculated net of non-reclaimable withholding tax.

Benchmarks

The strategic benchmark for the fund is set by the Ministry of Finance. The strategic benchmark is further divided into equity and fixed-income parts by asset class, that forms the basis of carve-outs for use in our composites.

Norges Bank Investment Management measures the equity composites against custom benchmarks which are adjusted for tax on dividends according to the fund's tax position in different markets and treats the portfolio and the benchmark equivalently. The funds managed by Norges Bank Investment Management do not pay taxes on coupon payments; as such, the fixed income benchmarks are not adjusted for withholding tax. The return of the benchmarks is calculated daily on the respective indices' value at close. The conversion from the index's quotation currency to other currencies is based on WM Reuters Company's exchange rates (mid-rate 16:00 GMT). These exchange rates are the same as those used for the portfolio.

Relative Return

Norges Bank Investment Management calculates relative return as the arithmetic difference between the returns on the actual portfolio and the benchmark portfolio for the period to be presented.

6. Error Correction Guideline

The purpose of the error correction guideline is to ensure a transparent error correction framework applied in all of Norges Bank Investment Management's GIPS composite reports. The error correction guideline includes the framework for assessing the materiality of errors and for recalculation, documentation and correction of errors. Norges Bank Investment Management aims to proactively respond to errors in accordance with the GIPS standards requirements in order to maintain the quality and integrity of Norges Bank Investment Management performance measurement and reporting.

Defining error

Errors may arise in a previously verified GIPS composite reports and corrections need to be made. For GIPS composite reports, errors exist when any component of the GIPS report is inaccurate or missing. In the GIPS report, errors may be related to fair values, return numbers, risk/return numbers as well as the qualitative disclosures supporting the composites. Norges Bank Investment Management strives to minimise the probability of errors through robust processes and independent controls.

Assessing materiality of error

The one-year composite return and the one-year benchmark return are used as the relevant metrics when evaluating quantitative errors. Errors related to market values and risk numbers will be corrected according to the significance level for the portfolio return and benchmark return, hence if the error in market value impact the composite return more than five basis points it would be considered a material error. Likewise, corresponding risk numbers will be corrected according to the deviation levels for the returns. If the error occurred on the composite side, the portfolio return is evaluated. If the error occurred on the benchmark side, the benchmark return is evaluated. The metrics capture the main quantitative aspects of the GIPS report. Qualitative errors, i.e., errors in the required disclosures, are generally considered 'Immaterial error' for the purposes of determining appropriate corrective actions, unless specifically listed under 'Not material error' or 'Material error'.

The assessment of materiality will depend on the following three error categorisations:

- **Immaterial error: $\pm [\leq 1 \text{ basis point}]$**

In the case of an immaterial quantitative error, the error does not significantly affect returns, meaning that there is no significant effect on the one-year composite return or benchmark return. No significant effect means within a $\pm 0.01\%$ (1 basis point) tolerance range. A qualitative error is considered immaterial when the error does not alter the common understanding of the current disclosure. Unless specifically listed under the 'not material error' or 'material error' categories, qualitative disclosure errors would generally be considered as 'Immaterial error' for the purposes of the error correction procedures. This categorisation applies to all composites.

- **Not material error: $\pm [> 1 \text{ basis point but } \leq 5 \text{ basis points}]$**

In the case of a not material quantitative error, the error leads the one-year composite return or benchmark return to change by less than $\pm 0.05\%$ (5 basis points) but more than $\pm 0.01\%$ (1 basis point). A qualitative error is considered not material when the error does not alter the common understanding of the current

disclosures, but the informational content is deemed to be important for the evaluation of the composite. This categorisation applies to all composites.

– **Material error: \pm [> 5 basis points]**

In the case of a material quantitative error, the error leads the one-year composite return or benchmark return to change by more than $\pm 0.05\%$ (5 basis points). Generally, a qualitative error is considered material when the error alters the common understanding or the evaluation of the composite or may specifically be associated with the omission of a required disclosure. If missing, the following required disclosures are considered a material error: the claim of compliance with the GIPS standards, the definition of the firm, the composite description, the benchmark descriptions and, if material, the disclosure of leverage, derivatives and short positions. If a required disclosure is not missing, but inaccurate, only the claim of compliance with the GIPS standards is considered material for the purposes of determining error correction procedures. This categorisation applies to all composites.

Procedures for recalculating errors

Errors are corrected retrospectively in the period where the error occurred. The actions taken will depend on the categorisation of the error which is determined for:

- Quantitative errors: after a recalculation of returns. The one-year composite return or benchmark return will be calculated for the year in which the error occurred in order to identify the materiality. For example, if today an error is discovered in the month of September 2010, the yearly composite or benchmark return for 2010 will be measured. The original composite or benchmark return will then be compared to the recalculated number. A correction will then be made accordingly in September 2010 and hence for 2010 in total. For potential systematic errors persisting over a year, yearly returns will be calculated for all years affected and the errors will be assessed on a per year basis. A systematic not material error across several years may be corrected as a material error.
- Qualitative errors: after an evaluation of the disclosures. For example, potential errors in regards to the calculation of standard deviation or information ratio are assessed as qualitative errors.

Recalculation of returns is performed within the performance calculation system in Norges Bank Investment Management.

Procedures for correcting and documenting errors

– **Immaterial error**

Whether the error is quantitative or qualitative, the presentation will be corrected. An incident describing the error will be formally recorded according to Norges Bank Investment Management's framework for operational risk. No further actions beyond this are required.

– **Not material error**

Whether the error is quantitative or qualitative, the presentation will be corrected. A note will be included in the disclosure section for the impacted composites stating the change. This note will be maintained for a 12-month period after the change has been made. An incident describing the error will be formally recorded according to

Norges Bank Investment Management's framework for operational risk and the Norges Bank Investment Management CEO, the Chief Risk Officer (CRO) and the Chief Compliance Officer (CCO) and the asset owner will be notified. Norges Bank Investment Management's third-party GIPS verifier will be informed and consulted.

– **Material error**

Whether the error is quantitative or qualitative, the presentation will be corrected. A note will be included in the disclosure section for the impacted composites stating the change. This note will be maintained for a 12-month period after the change has been made. Efforts to redistribute the presentation will be made by announcing on www.nbim.no that an updated GIPS presentation is available. An incident describing the error will be formally recorded according to Norges Bank Investment Management's framework for operational risk and the Norges Bank Investment Management CEO, CRO and CCO and the asset owner will be notified. Norges Bank Investment Management's third-party GIPS verifier will be informed and consulted.

7. Formulas

Absolute Performance (Portfolio Return)

Time Weighted Rate of Return (TWRR):

$$R_t = \frac{V_{E(t)} - V_{S(t)} - C_t}{V_{S(t)}}$$

Where: R_t = Percentage performance in period t

$V_{E(t)}$ = Value at the end of period t, fair value

$V_{S(t)}$ = Value at the start of period t, fair value

C_t = Total Net Cash flow within period t

t = period <1, 2>

Norges Bank Investment Management has the ability to value the portfolio at any day. Fair values are determined on the day of an external cash flow. Transfers to the funds and between portfolios are normally made on the last business day of each month but can also take place intra-month. When there is only one transfer done on the last business day of the month the period, denoted t above, is irrelevant. When there are two transfers in a month, period 1 becomes last month-end to first transfer while period 2 is first transfer to month-end (second transfer). V_E in period 1 ($V_{E(1)}$) is then the closing fair value on the first transfer day.

In earlier days (to and including 1999), the Modified Dietz return calculation was implemented.

Modified Dietz Method:

$$RMDietz_t = \frac{V_{Et} - V_{St} - C_t}{V_{St} - \sum C_i - W_i}$$

where: $RMDietz_t$ = Modified Dietz Return

V_{Et} = Value at the end of period t

V_{St} = Value at the start of period t

C_t = Cash flow in period t

C_i = Cash flow in period i

W_i = $\frac{\text{Calendar days in month} - \text{day of cash flow } i}{\text{Calendar days in month}}$

Monthly Return:

$$R_M = [(1 + R_{t1}) \times (1 + R_{t2}) \times \dots \times (1 + R_{ti})] - 1$$

where: R_M = Monthly percentage performance

R_t = Percentage performance in period t

t = period <1, ...i>

This is a geometric linking of the periodic returns in order to obtain the total return for the month. If there is only one transfer within the month this linking is irrelevant, and the monthly return becomes R.

Quarterly Return:

$$R_Q = [(1 + R_{M1}) \times (1 + R_{M2}) \times (1 + R_{M3})] - 1$$

where: R_Q = Quarterly percentage performance

R_{M1} = Percentage performance in month 1

R_{M2} = Percentage performance in month 2

R_{M3} = Percentage performance in month 3

This is a geometric linking of the monthly returns in the quarter in order to obtain the total return for the quarter. Geometrically linked returns are also known as cumulative returns.

Annual Return:

$$R_A = [(1 + R_{Q1}) \times (1 + R_{Q2}) \times (1 + R_{Q3}) \times (1 + R_{Q4})] - 1$$

where: R_A = Annual percentage performance

R_{Q1} = Percentage performance in Q1

R_{Q2} = Percentage performance in Q2

R_{Q3} = Percentage performance in Q3

R_{Q4} = Percentage performance in Q4

This is a geometric linking of the quarterly returns in the year in order to obtain the total return for the year. Alternatively and equivalently, one could geometrically link the twelve monthly returns. These formulas can be extended to longer periods as well.

Component Returns (Real Estate)

Component returns are calculated daily and geometrically linked. For 2011, however, component returns were calculated monthly in addition to each date where external cash flows occurred. Income returns measure the effect of rental income on the change in the real estate value (property value + cash position). Capital returns measure the effect of revaluations of the properties and the effect of transaction- and other operating costs. Furthermore, the capital return component includes the FX return between NOK and the currencies in the real estate composite.

The geometric linking of the individual time-weighted component returns creates interaction terms that result in annual income and capital returns that will not necessarily sum up to the total return.

Income Return:

$$RI_t = \frac{\sum RI_t}{V_{t-1} + \sum C_i \times W_i}$$

where: RI_t = Income return in %,

$\sum RI_t$ = Sum of rental income, in NOK

V_{t-1} = Real estate value at start of period, in NOK

C_i = Cash flow in period i

W_i = Weight of period i

This formula is applicable for the full history of the real estate investments. Since 2012 however, the fund has calculated the real estate value daily and used geometric linking over the measurement period. With the introduction of daily values, and the assumption of all external cash flows at end of business days, the above formula gets further simplified to:

$$RI_t = \frac{\sum RI_t}{V_{t-1}}$$

where: RI_t = Income return in %

$\sum RI_t$ = Sum of rental income, in NOK

V_{t-1} = Real estate value, in NOK

Capital Return:

$$RC_t = \frac{V_t - V_{t-1} - \sum RI_t - C_{(t)}}{V_{t-1} + \sum C_i \times W_i}$$

where: RC_t = Capital return in %

$\sum RI_t$ = Sum of rental income, in NOK

V_t = Real estate value, in NOK

V_{t-1} = Real estate value previous period, in NOK

$C_{(t)}$ = Total Net Cash flow within period t

C_i = Cash flow in period i

W_i = Weight of period i

This formula is applicable for the full history of the real estate investments. Since 2012 however, the fund has calculated the real estate value daily and used geometric linking over the measurement period. With the introduction of daily values, and the assumption of all external cash flows at end of business days, the above formula gets further simplified to:

$$RC_t = \frac{V_t - V_{t-1} - \sum RI_t - C_{(t)}}{V_{t-1}}$$

where: RC_t = Capital return in %

$\sum RI_t$ = Sum of rental income, in NOK

V_t = Real estate value, in NOK

V_{t-1} = Real estate value previous period, in NOK

$C_{(t)}$ = Total Net Cash flow within period t

Annualised Absolute Performance (Portfolio Return)

$$Return = (1 + R)^{\frac{1}{n}} - 1$$

where: R = Geometrically linked absolute return for a period exceeding 12 months

n = Number of periods, needs to be consistent with the linked return

For periods greater than 12 months absolute performance, benchmark performance and relative performance is annualised. For example, a cumulative return over exactly three years generates an n of 3. A cumulative return over 16 months should be scaled by $n = 12/16$. This formula is implemented for the benchmark performance as well.

Returns Measured in the international Currency Basket (in the following CCY for currency)

Absolute Return in CCY:

$$R_{Acc(Ccy)} = \frac{1 + R_{Acc(NOK)}}{1 + R_{CcyBasket}} - 1$$

where: $R_{Acc(Ccy)}$ = Absolute performance in CCY, any period

$R_{Acc(NOK)}$ = Absolute performance in NOK, any period

$R_{CcyBasket}$ = Absolute performance of currency basket, any period

This is a geometric difference. The currency basket corresponds to the currency weights in the benchmark portfolio, and the return on the currency basket indicates how much the NOK has appreciated/depreciated against the currencies in the benchmark portfolio. This formula is implemented for the benchmark performance in the currency basket as well.

Composite Performance

Composite Return:

$$R_{Composite} = \frac{\sum R_p - MV_p}{\sum MV_p}$$

where: $R_{Composite}$ = Portfolio return on Composite

R_p = Portfolio return on individual portfolio p

MV_p = Fair value of individual portfolio p

$$R_{Fund} = \frac{\sum R_{Composite} \times MV_{Composite}}{\sum MV_{Composite}}$$

Where: R_{Fund} = Portfolio return on Fund

$R_{Composite}$ = Portfolio return on composite

$MV_{Composite}$ = Fair value of composite

Each individual portfolio's return is weighted according to its ingoing fair value weight. The total return of composite is equal to the weighted sum of the individual portfolios returns. Each composite's return is weighted according to its ingoing fair value weight. The total return of the Fund is the weighted sum composite returns.

Benchmark Performance

Benchmark Return:

$$R_{BM} = \frac{IV_t}{IV_{t-1}} - 1$$

where: R_{BM} = Return on benchmark

IV_t = Benchmark value at time t

IV_{t-1} = Benchmark value at time t-1

Relative Performance (Relative Return)

Arithmetic Relative Return Methodology:

$$R_{Rel} = R_{Acc} - R_{BM}$$

where: R_{Rel} = Relative performance, any period

R_{Acc} = Absolute performance, any period

R_{BM} = Benchmark performance, any period

Risk Statistics & Risk-adjusted Performance

Sample Standard Deviation:

The standard deviation reflects the level of risk in the composite. This statistical measure shows how much the gross-of-fee return has varied during the measurement period. The larger the standard deviation, the larger the risk is estimated to be. The standard deviation is calculated using the following formula:

$$\sigma_r = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (r_i - \bar{r})^2}$$

Where: \bar{r} = $\frac{1}{n} \sum_{i=1}^n r_i$, the sample average of monthly returns

r_i = The return in month i

n = Number of months

The measure is annualised by multiplying by the square root of 12.

Tracking Error

Tracking error measures the variability in the deviations of the composite's gross-of-fee return from the benchmark's gross-of-fee return. The more variability, the larger is the tracking error (also called active risk). The monthly tracking error is the standard deviation of the difference between the monthly returns of a composite and its associated benchmark. The ex-post tracking error is calculated as follows:

$$\sigma_{rrel} = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (rrel_i - \overline{rrel})^2}$$

Where: $rrel = \frac{1}{n} \sum_{i=1}^n rrel_i$, the sample average of monthly relative returns

$rrel_i = r_i - b_i$, the monthly relative return

$b_i =$ Benchmark return in month i

The measure is annualised by multiplying with the square root of 12.

Information Ratio

The Information ratio is a risk-adjusted performance measure. It determines the average portfolio gross-of-fee return relative to the benchmark per unit of tracking error as measured by the standard deviation of relative returns. The higher the information ratio is, the greater is the relative return per unit of relative risk. The information ratio is calculated as follows¹:

$$Information\ ratio = \overline{rrel} / \sigma_{rrel}$$

The Information ratio is annualised by multiplying by the square root of 12.

Sharpe Ratio

The Sharpe ratio is a reward-to-variability ratio. Compared to the Information ratio, it substitutes the risk-free rate for the benchmark. It reports the average excess gross-of-fee return per unit of total risk as measured by the standard deviation of returns:

$$Sharpe\ ratio = \overline{rx} / \sigma_r$$

Where: $\overline{rx} = \frac{1}{n} \sum_{i=1}^n rx_i$, the sample average of monthly excess returns

$\overline{rx}_i = r_i - rf_i$, the monthly excess return

$rf_i =$ Risk-free return in month i

The 1-month US T-bill rate collected from Kenneth French's website is used as a proxy for the risk-free return. The Sharpe ratio is annualised by multiplying by the square root of 12.

¹ Previously, the numerator was calculated as the difference in annualised geometric means between the composite return and the benchmark return. Now, the difference in annualised arithmetic means between the composite return and the benchmark return is used.

Jensen's Alpha

Jensen's alpha is a risk-adjusted excess return measure, that adjusts the average relative return for beta as derived from CAPM. Beta captures systematic risk that cannot be diversified away. The formula is:

$$\alpha = \overline{r_X} - \beta \overline{b_X}$$

Where: α = Jensen's alpha

$$\beta = \sigma_{r_X, b_X} / \sigma_{b_X}^2 = \frac{\sum_{i=1}^n (r_{X_i} - \overline{r_X})(b_{X_i} - \overline{b_X})}{\sum_{i=1}^n (b_{X_i} - \overline{b_X})^2}, \text{ the CAPM beta}$$

$$\overline{b_X} = \frac{1}{n} \sum_{i=1}^n b_{X_i}, \text{ the sample average of monthly excess benchmark returns}$$

$$\overline{b_{X_i}} = b_i - r_f, \text{ the monthly excess benchmark return}$$

Jensen's alpha is annualised by multiplying by 12. The 1-month US T-bill rate collected from Kenneth French's [website](#) is used as a proxy for the risk-free return.

Appraisal Ratio

The Appraisal ratio is a reward-to-variability ratio similar to the Sharpe ratio but using investment specific gross-of-fee returns and risk. Instead of total return and risk, it uses the residual return and risk that is left after correcting for systematic risk using the CAPM. It divides Jensen's alpha by the standard deviation of residual returns from the CAPM equation. The formula is:

$$\text{Appraisal ratio} = \alpha / \sigma_{\varepsilon}$$

Where: $\sigma_{\varepsilon} = \sqrt{\frac{1}{n-2} \sum_{i=1}^n \varepsilon_i^2}$, the standard deviation of residual returns. The n-2

correction reflects that we have estimated two parameters: α and β .

$$\varepsilon_i = r_{X_i} - (\alpha + \beta b_{X_i}), \text{ the residual return}$$

The Appraisal ratio is annualised by multiplying by the square root of 12. The 1-month US T-bill rate collected from Kenneth French's [website](#) is used as a proxy for the risk-free return.

8. Prospective clients

Norges Bank Investment Management does not have prospective clients.

9. Claim of Compliance Registration

The claim of compliance with the GIPS standards shall be registered on the CFA Institute website, by 30 June each year. The GIPS Compliance Form is available at the following web link:

<http://www.gipsstandards.org/compliance/Pages/compliance.aspx>