



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 GIPS

The Global Investment Performance Standards (GIPS®) is a global standard for the calculation and presentation of asset managers' investment results. GIPS was 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 January 2010, the 2010 edition of the GIPS standards was adopted with an effective date 1 January 2011.

GIPS is an ethical and voluntary standard to be used by investment managers for creating performance presentations that ensure fair representation and full disclosure. Global standardization of investment performance reporting will allow investors to compare investment managers and will allow managers to compete for new business.

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

Firms must follow the required elements of GIPS to claim compliance with GIPS. Firms are strongly encouraged to adopt and implement the recommendations to ensure that the firm fully adheres to the spirit and the intent of GIPS. To further increase the level of confidence of Norges Bank Investment Management's claim of compliance, a qualified, independent third party, The Spaulding Group, has performed an independent verification.

### **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 2016. 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 composite presentation.

## 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. Norges Bank Investment Management's firm assets include all mandates managed by Norges Bank Investment Management: "The Government Pension Fund Global", "The investment portfolio of Norges Bank's foreign exchange reserves" and "The Government Petroleum Insurance Fund". The performance results include the history as defined below:

- The Government Pension Fund Global:
  - Fund 31 December 1997
  - Fund excluding real estate 31 December 1997
  - Equity 31 December 1998
  - Fixed income 31 December 1997
  - Real estate 31 March 2011
  - Unlisted real estate 31 March 2011
- 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)
- The Government Petroleum Insurance Fund:
  - Fund 31 August 1998 (terminated 31 December, 2010)

## Definition of Firm Assets

Total firms 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 and Banking Services 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 and Banking services 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

### **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	Category	Benchmark	Composite inception and creation dates	Composite assets 31 December 2016 (NOKm)
<b>The Government Pension Fund Global</b>	Balanced	The composite is the aggregate of the Government Pension Fund Global Equity, Fixed Income and Real Estate composites. As no relevant benchmark is available for the Real Estate composite, no benchmark is presented for the aggregated fund.	31 December 1997	7,510,494
<b>The Government Pension Fund Global, excluding real estate</b>	Balanced	60% Equity - FTSE Global All Cap factor and market cap weighted tax-adjusted and 40% Fixed Income - of which, 70% government debt - Barclays Global Treasury (GDP weighted), Barclays Global inflation-linked index and subgroup supranational within Barclays Global Aggregate, and 30% corporate debt - the corporate bonds and subgroup covered bonds (USD, CAD, EUR, GBP, SEK, DKK, CHF) within the Barclays Global Aggregate.	31 December 1997	7,268,738
<b>The Government Pension Fund Global, equity</b>	Equity	FTSE Global All Cap factor and market cap weighted tax-adjusted.	31 December 1998	4,691,863
<b>The Government Pension Fund Global, fixed income</b>	Fixed Income	70% government debt - Barclays Global Treasury (GDP weighted), Barclays Global inflation-linked index and subgroup supranational within Barclays Global Aggregate, and 30% corporate debt - the corporate bonds and subgroup covered bonds (USD, CAD, EUR, GBP, SEK, DKK, CHF) within the Barclays Global Aggregate.	31 December 1997	2,576,875
<b>The Government Pension Fund Global, real estate</b>	Real Estate	No benchmark is presented for the real estate composite. The real estate portfolio is still under development and the composite has not yet been assigned a benchmark.	31 March 2011	241,756
<b>The Government Pension Fund Global, unlisted real estate</b>	Real Estate	No benchmark is presented for the unlisted real estate composite. The unlisted real estate portfolio is still under development and the composite has not yet been assigned a benchmark.	31 March 2011 (Creation date 31 December 2015)	190,670
<b>The investment portfolio of Norges Bank's foreign exchange reserves, equity</b>	Equity	FTSE Global All World Developed Market (Eurozone, USA, United Kingdom, Japan, Canada, Australia, Switzerland, Sweden and Denmark) tax-adjusted.	31 December 2001	177,217
<b>The investment portfolio of Norges Bank's foreign exchange reserves</b>	Balanced	40% Equity - FTSE Global All World Developed Market (Eurozone, USA, United Kingdom, Japan, Canada, Australia, Switzerland, Sweden and Denmark) tax-adjusted, and 60% Fixed Income - Barclays Global Aggregate, classification Treasuries only, of which 45 percent in USD, 35 percent in euros (issued by France and Germany), and 10 percent each in British pounds and Japanese yen.	31 December 1997 (Terminated 30 November 2016)	0
<b>The investment portfolio of Norges Bank's foreign exchange reserves, fixed income</b>	Fixed Income	Barclays Global Aggregate, classification Treasuries only, of which 45 percent in US dollars, 35 percent in euros (issued by France and Germany), and 10 percent each in British pounds and Japanese yen.	31 December 1997 (Terminated 30 November 2016)	0
<b>The Government Petroleum Insurance Fund</b>	Fixed Income	Barclays Global Aggregate Treasury and a money market deposit rate.	31-Aug-98 (Terminated 31 December 2010)	0

#### 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**

The asset class composites constitute carve-outs from the total portfolio. Cash is allocated to each carve-out separately. For each annual period presented in the equity and fixed income composites (applies to Pension Fund and Reserves Fund) and the real estate composite (applies to Pension Fund), the share of composite assets represented by carve-outs equals 100 percent. The new unlisted real estate composite can be seen as a carve-out of the Pension Fund's real estate portfolio.

**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 GIPS and establishes the foundation for full, fair, and comparable investment performance presentations. 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 performance presentation 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 monthly 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**

GIPS 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 Accounting and 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 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 investments (properties, financial assets real estate) shall at least annually be valued by an appointed and certified independent valuation firm. Property valuations are required to be prepared in compliance with internationally recognized 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 property 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.
- For conversion between currencies WM/Reuters Closing Spot Rates 16:00 GMT Dollar fix shall be applied.

*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 monthly reconciliation of the asset values with the custodian.*

### **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, GIPS requires 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' performance presentations 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, GIPS require firms to use a total rate of return. A total return includes income and realized and unrealized gains and losses.

*Norges Bank Investment Management includes income and realized and unrealized gains and losses when calculating performance.*

The GIPS standards require firms to use a time-weighted rate of return using a minimum of monthly valuations and adjusting for 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

GIPS recommends that firms present gross-of-fee performance. 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.

*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.*

### **Composites**

*The Norges Bank Investment Management composite structure is based on mandates and asset class carve-outs. The total number of composites is ten; however, the Government Petroleum Insurance Fund was terminated as of 31 December, 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 recognized when incurred.

*Norges Bank Investment Management recognizes 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**

*Norges Bank Investment Management measures the equity composites against custom benchmarks which are adjusted for tax on dividends according to the funds 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 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 Norges Bank Investment Management GIPS compliant presentations. 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 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 presentation and corrections need to be made. For GIPS compliant presentations, 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 minimize 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 consider 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 categorizations:

- **Immaterial error:  $\pm$  [ $\leq$  1 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 categorization applies to all composites.

- **Not material error:  $\pm$  [ $> 1$  basis point but  $\leq 5$  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 categorization 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 categorization 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 categorization 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](http://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:

$$RMDietz_t = \frac{V_{Et} - V_{St} - C_t}{V_{St} + \sum(C_i \times W_i)}$$

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

#### Monthly Return:

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

Where:

$R_M$	=	Monthly percentage performance
$R_t$	=	Percentage performance in period t
t	=	period <1, ..., l>



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 due to frequent funding of the portfolio. For 2011, component returns were calculated monthly. 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 costs and other operating costs. Further, the capital return component will include the FX return between the NOK and the currencies in the real estate composite.

Income Return:

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

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:

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

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

### Annualised Absolute Performance (Portfolio Return)

$$\text{Return} = [(1+R)^{(1/n)}] - 1$$

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:

$$R_{ACC(CC Y)} = [(1+R_{ACC(NOK)}) / (1+R_{CC YBASKET})] - 1$$

Where:  $R_{ACC(CC Y)}$  = Absolute performance in CCY, any period  
 $R_{ACC(NOK)}$  = Absolute performance in NOK, any period  
 $R_{CC YBASKET}$  = 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:

$$R_{Composite} = \frac{\sum [ \sum R_p \times MV_p ]}{\sum MV_p}$$

Where:  $R_{composite}$  = Portfolio return on Composite  
 $R_p$  = Portfolio return on individual portfolio  
 $MV_p$  = Fair value of individual portfolio

$$R_{\text{Fund}} = \frac{\sum [ R_{\text{composite}} \times MV_{\text{composite}} ]}{\sum MV_{\text{composite}}}$$

Where:  $R_{\text{Fund}}$  = Portfolio return on Fund  
 $R_p$  = Portfolio return on composite  
 $MV_p$  = Fair value of composite

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

### Benchmark Performance

Benchmark Return:

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

Where:  $R_{\text{BMK}}$  = 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:

$$R_{\text{REL}} = R_{\text{ACC}} - R_{\text{BMK}}$$

Where:  $R_{\text{REL}}$  = Relative performance, any period  
 $R_{\text{ACC}}$  = Absolute performance, any period  
 $R_{\text{BMK}}$  = 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 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 return from the benchmark's 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:  $\overline{rrel}$  =  $\frac{1}{n} \sum_{i=1}^n rrel_i$ , 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 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 follows<sup>1</sup>:

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

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

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<sup>1</sup> 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.

## 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 return per unit of total risk as measured by the standard deviation of returns:

$$\text{Sharpe ratio} = \bar{r}_x / \sigma_r$$

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

$r_{x_i}$  =  $r_i - r_{f_i}$ , the monthly excess return

$r_{f_i}$  = Risk-free return in month i

The 30-day US T-bill is used as the risk-free rate. The Sharpe ratio is annualised by multiplying by the square root of 12.

## Jensen's Alpha

Jensen's alpha is the average residual return after taking the level of systematic risk as measured by the CAPM into account. Compared to the Sharpe ratio, it only adjusts for the risk that cannot be diversified away instead of the total risk. The formula is:

$$\alpha = \bar{r}_x - \beta \bar{b}_x$$

Where:  $\alpha$  = Jensen's alpha

$\beta$  =  $\sigma_{r_x, b_x} / \sigma_{b_x}^2 = \frac{\sum_{i=1}^n (r_{x_i} - \bar{r}_x)(b_{x_i} - \bar{b}_x)}{\sum_{i=1}^n (b_{x_i} - \bar{b}_x)^2}$ , the CAPM beta

$\bar{b}_x$  =  $\frac{1}{n} \sum_{i=1}^n b_{x_i}$ , the sample average of monthly excess benchmark returns

$b_{x_i}$  =  $b_i - r_{f_i}$ , the monthly excess benchmark return

Jensen's alpha is annualised by multiplying by 12.

## Appraisal Ratio

The Appraisal ratio is a reward-to-variability ratio similar to the Sharpe ratio but using investment specific 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:  $\alpha$  and  $\beta$ .

$\varepsilon_i = rx_i - (\alpha + \beta x_i)$ , the residual return

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

## 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>

## 10. Asset Owner Guidance

Norges Bank Investment Management manages the Government Pension Fund Global based on a mandate issued by the Ministry of Finance, and the equity investments of Norges Bank's foreign exchange reserves on behalf of Norges Bank. Norges Bank Investment Management therefore considers that the guidance statement on the application of the GIPS standards to asset owners does not apply.