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Date: 29.10.2018

Investments in unlisted renewable energy infrastructure in the Government Pension Fund Global

In Recommendation 370 S (2017-2018), the Standing Committee on Finance and Economic Affairs asks the Ministry of Finance to “provide the Storting, no later than in next year’s white paper, with concrete proposals for a mandate for investments in unlisted renewable energy infrastructure under the environment-related mandate, with the same transparency, risk and return requirements as for other investments.” The Ministry followed this up in its letter to Norges Bank of 22 June, stating that it will present proposed changes to the mandate based on the Bank’s assessment at a later date. The Bank’s assessment is provided in this letter and is based largely on the Bank’s previous assessments of the management framework and unlisted investments, cf. our letters of 25 November, 26 November and 2 December 2015, 20 December 2016 and 8 January 2018.

The fund’s investments in unlisted renewable energy infrastructure can be made within the framework for the environment-related mandates. The upper limit for these mandates should then be raised so that the Bank can make these investments with the same requirements for risk and return as the fund’s other investments. This letter begins with a brief presentation of the investment opportunity set. This is followed by a look at how unlisted investments can be regulated in the management mandate. Finally, we outline how the Bank can implement investments in unlisted renewable energy infrastructure.

The market for unlisted renewable energy infrastructure

In the following, we take renewable energy infrastructure to mean the various types of physical asset used for the production, transmission, distribution and storage of



renewable energy sources.¹ Due to limited access to information, the review of investment opportunities below is restricted to renewable energy production.

Investment opportunities

Reports from different sources indicate that the value of annual new investments in renewable energy production has been stable around 300 billion dollars since 2012.² Renewable energy production is nevertheless accounting for a growing share of total energy production. This is because costs for installation and operation have fallen sharply, and so capacity per dollar invested has increased considerably. More than half of the growth in new capacity has come from investments in emerging markets. We have noted increased activity in recent years when it comes to refinancing existing projects, i.e. acquisitions. This refinancing activity has been concentrated in developed markets, and some of these transactions have been very large.³

Political decisions, new technology and economic growth could have a big impact on developments in the market for investments in infrastructure for renewable energy production.⁴ Forecasts of future investment levels are uncertain and vary from source to source.⁵ Much of the growth in new capacity is expected to come from investments in emerging markets.⁶

An investor looking to invest in unlisted renewable energy infrastructure can do so in a number of ways. The main differences are between direct and indirect investment, and between debt and equity. Direct investments in unlisted infrastructure are large in size, and the assets normally have a long life. Institutional investors often choose to co-invest with players that have operational and technical expertise in the segment. Indirect investments in unlisted infrastructure are made primarily through private equity funds.⁷ There are a number of private equity funds that invest in unlisted infrastructure, but few currently specialise in renewable energy.⁸

¹ The Bank has worked on the basis that renewable energy sources include solar power, geothermal energy, wind power, hydropower, biomass and marine energy. Investments in solutions for the transmission, distribution and storage of energy will often be a requirement for, or directly linked to, investments in renewable energy production. In the UK, the authorities introduced a licensing regime for investments in offshore wind power in 2009 that makes transmission networks mandatory. For more information, see www.ofgem.gov.uk. Another example is Equinor, which announced in 2017 that the Hywind Scotland wind farm will be connected to a 1 MW battery to store power. For more information, see <https://www.equinor.com/no/news/28nov2017-batwind.html>. At the same time, competition law in some places imposes restrictions on investors' ability to have controlling holdings in both the production and distribution of energy.

² Sources: Bloomberg New Energy Finance (2018), UN (2018), IEA (2018) and IRENA (2018). See Tables 1, 2 and 3 in the enclosure showing developments in investments in renewable energy production over time.

³ One example is Ørsted's sale of 50 percent of the Hornsea 1 offshore wind farm to Global Infrastructure Partners (GIP) in September 2018. GIP is paying almost 50 billion kroner for this stake and future commitments relating to the completion of the project.

⁴ Most investment estimates are based on significant increases in cost efficiency and capacity utilisation in renewable technology.

⁵ IEA World Energy Outlook (2016), IRENA Global Energy Transformation (2018) and Bloomberg New Energy Outlook (2018) estimate new investments at between 250 and 320 billion dollars annually through to 2040. The IEA and IRENA have also produced estimates based on the goal of keeping global warming below two degrees. In these scenarios, annual investments are put at between 530 and 630 billion dollars.

⁶ Source: Bloomberg New Energy Finance (2018).

⁷ For more detailed information on private equity funds, see Norges Bank's letter on private equity of 8 January 2018.

⁸ Source: Preqin (2018).



Risk and return characteristics

The risk and return characteristics of investments in renewable energy infrastructure will generally vary with the type of asset, whether it is a greenfield or a brownfield project, the country or region in which the investment is made, the design of the contract, and the choice of financial instrument.

The market for renewable energy is also changing. Historical risk and return data for investments in renewable energy infrastructure do not necessarily give a good indication of what we can expect in the future. Renewable energy sources are now competitive with conventional energy sources in many markets.⁹ Some new renewable energy infrastructure projects are being launched without public subsidies. Profitability and risk in these projects will depend more than before on movements in power prices and the degree to which the developer hedges future revenue through long-term contracts with end-users. A number of countries have established regimes providing for such contracts.

Regulation in the management mandate

The operational management of investments in unlisted infrastructure has many similarities with investments in unlisted real estate. Each individual unlisted investment will be much more labour-intensive and less liquid than listed investments and come with higher transaction costs. The strategy for unlisted investments cannot be defined by a benchmark index.¹⁰ The regulation of the fund's unlisted real estate investments reflects this. So that the Bank can invest in unlisted renewable energy infrastructure in a way that improves the fund's risk and return characteristics, these investments should be regulated in the same way as the fund's unlisted real estate investments.

The Ministry has asked the Bank to assess how the investment universe for the environment-related mandates can be expanded to include investments in unlisted renewable energy infrastructure. The investment universe for the environment-related mandates is the same as for the rest of the fund. The fund's investment universe is defined in the management mandate on the basis of three portfolios: an equity portfolio, a bond portfolio and an unlisted real estate portfolio. Investments in unlisted renewable energy infrastructure might need to be assigned a separate portfolio.

To avoid ambiguity about how the concept of unlisted renewable energy infrastructure is to be understood, the Ministry should define the concept in the mandate.¹¹ One possible definition might be: "Renewable energy infrastructure is defined as land, real estate and physical assets on land or at sea that are primarily used for, or planned to be used for, the production, storage, transmission and distribution of energy based on renewable

⁹ See Table 4 in the enclosure.

¹⁰ This is in keeping with the Ministry's comment in Report to the Storting No. 13 (2017-2018) about the dearth of good benchmark indices for unlisted investments.

¹¹ For a more detailed discussion of the definition of renewable energy infrastructure, see NBIM Discussion Note 04/2015.



energy sources.”¹² The Ministry should also specify that the general prohibition on unlisted investments in infrastructure in section 3-1(2) of the mandate still applies, unless these investments can be classified as unlisted infrastructure for renewable energy.

In the management mandate, the Ministry permits the fund’s unlisted real estate portfolio to be invested via subsidiaries of Norges Bank, with higher ownership stakes, and in different types of financial instrument. These mandate provisions should also apply to the fund’s investments in unlisted renewable energy infrastructure. As with real estate, it may be appropriate for the Bank also to be permitted to hold more than 10 percent of the voting shares in listed renewable energy infrastructure companies.¹³ This provides necessary flexibility, for example following a change in portfolio companies’ ownership structure.

The fund’s investments in unlisted renewable energy infrastructure can be made within the framework for the environment-related mandates. For the Bank to be able to exploit the fund’s special characteristics and invest cost-efficiently in unlisted renewable energy infrastructure, the upper limit for the environment-related mandates in section 2-4 should be raised. This limit will then cover both listed and unlisted investments. In the longer term, a large part of this limit may come to be used for investments in unlisted renewable energy infrastructure.

The Ministry’s thinking is that the fund’s investments in unlisted renewable energy infrastructure should be made within the existing limit for deviation from the benchmark index of 1.25 percentage points. Deviation from the benchmark index is calculated on the basis of expected relative volatility (tracking error). The expected relative volatility of the fund’s unlisted real estate investments is calculated on the basis of a representative time series from an external service provider.¹⁴ There are not currently any equivalent time series for unlisted renewable energy infrastructure.¹⁵ The Bank will establish a method for calculating relative volatility for unlisted renewable energy infrastructure at a later date. The method for calculating relative volatility will need to be approved by the Ministry, cf. section 4-3 of the management mandate.

¹² A certain degree of judgement will be needed in the definition of renewable energy infrastructure in the mandate. Some projects may be dependent on other energy sources to supply electricity during periods of peak demand or restricted production capacity due to local weather conditions. Renewable energy sources will therefore be balanced with other power sources such as gas and other fossil fuels.

¹³ The number of listed pure-play renewable energy companies is currently limited. Our review of such companies in the US, Canada and Europe suggests a total free-float-adjusted market value of around 35 billion dollars at the end of September 2018, breaking down into 13 billion dollars for greenfield companies, 7 billion dollars for brownfield companies and 15 billion dollars for yieldcos.

¹⁴ See the Bank’s letters of 10 October 2016 and 15 December 2016.

¹⁵ EDHECinfra has built up the world’s largest database of unlisted infrastructure investments. It currently publishes two indices on its website, one for debt-financed and one for equity-financed unlisted infrastructure investments in Europe. EDHECinfra plans to launch further indices for different geographies, business models and sectors, including renewable energy. For more information, see <http://edhec.infrastructure.institute/pi-supplement-august-2018/>. EDHECinfra plans to publish its indices quarterly. Expected relative volatility in the GPFPG is currently calculated on the basis of weekly observations over a three-year period.



The Executive Board currently sets supplementary limits for risks that cannot normally be captured by the calculation of relative volatility. For the fund's investments in unlisted renewable energy infrastructure, it may, in the first instance, be appropriate for the Executive Board to set limits for how much may be invested in any one country, in emerging markets and in greenfield projects. The Executive Board currently sets equivalent limits for the fund's unlisted real estate investments. In addition, the Executive Board can, as today, set limits for leverage both overall and for individual investments, maximum ownership stake, and how much of the fund may be managed by any one external manager. The Executive Board can also set additional requirements in the strategic plans for Norges Bank Investment Management and in the investment mandate for the CEO of Norges Bank Investment Management.

Chapter 6 of the management mandate covers public reporting. It will be natural for the reporting requirements that currently apply to the fund's unlisted real estate investments also to apply to unlisted renewable energy infrastructure investments. We therefore assume that the special reporting requirement for renewable energy in section 6-2 will be removed.

Implementation

In its letter of 22 June, the Ministry asks how the Bank envisages implementing investments in renewable energy infrastructure. The following outlines how we can do so.

Co-investing

In the first instance, the Bank will consider direct investments together with partners. Potential partners might be listed companies in which the fund is already invested that wish to raise private capital to finance specific projects, other investors, financial institutions, or multilateral/regional development banks.

We will look for partners with relevant operational and technical expertise. It will be important to perform thorough due diligence of potential partners to obtain a broad understanding of their business, including their background, experience of responsible investment and risk management expertise. When entering into contracts, it will be important to ensure that the parties' interests are aligned.

The fund's unlisted investments will generally entail a higher ownership stake than the fund's listed investments. Higher ownership stakes mean increased visibility, but also more control and increased scope to impose demands. With co-investments, the fund's voting and other ownership rights will be regulated by shareholder agreements. We will endeavour to ensure that the fund's ownership interests are addressed as best possible through direct board participation and the contracts we sign. The contracts will not be standardised and will need to be tailored to each investment.



Responsible investment

Responsible investment is an integral part of our management of the fund. The Bank's principles for responsible investment are based in part on the UN Global Compact and the OECD's Principles of Corporate Governance and Guidelines for Multinational Enterprises. These guidelines have relevance for both listed and unlisted investments.

The Bank will attempt to identify all relevant risks ahead of each investment through thorough due diligence. These reviews will include regulatory risk, environmental risk, labour, health and safety standards, tax, corruption risk, IT security, and the project's sustainability in a broad sense. The Bank's review needs to cover major procurement processes and supply chains throughout the project's life, in line with relevant standards such as the Principles for Responsible Investment (PRI).¹⁶ For our unlisted real estate investments, we use the Global Real Estate Sustainability Benchmark (GRESB) framework to assess the sustainability of individual investments. This framework was expanded in 2016 to include unlisted infrastructure and could eventually be used by the Bank in its dialogue with companies and to assess the sustainability of all of our unlisted investments.¹⁷

Investing cost-effectively

The Bank manages the fund with a view to the highest possible return after costs, cf. section 1-3 of the management mandate. In Report to the Storting No. 13 (2017-2018), the Ministry stresses that it is the return after costs that is most important for achieving the fund's long-term objective. Management costs for the fund's unlisted real estate investments were estimated in the fund's annual report for 2017 at 0.23 percent, as opposed to 0.06 percent for the fund as a whole.¹⁸ It is reasonable to assume that internal management costs for unlisted infrastructure will be around the same level as management costs for the fund's unlisted real estate investments.¹⁹ The Bank will build up the resources needed to implement investments in unlisted renewable energy infrastructure, and assumes that the overall limit for management costs will be adjusted to reflect this new activity.

There will be a need for some new staff, but it will be possible to make these investments with far fewer employees than for the management of unlisted real estate investments. The Bank will prioritise cost-efficient solutions. We will build on existing investment management expertise. The operational implementation of unlisted infrastructure investments will be able to draw on experience from the fund's unlisted real estate investments. This will include the design of partnership agreements, due diligence, valuations, accounting, risk management, tax, compliance and reporting. It will be natural

¹⁶ For more information, see <https://www.unpri.org/investor-tools/infrastructure>.

¹⁷ For more information, see <https://gresb.com/infrastructure-asset-assessment>.

¹⁸ Measured, respectively, as a share of the unlisted real estate portfolio and the fund as a whole. Includes management costs reimbursed by the Ministry of Finance. For more information, see Table 30 in the GPF's annual report for 2017.

¹⁹ The report from CEM Benchmarking for 2016 shows that internal management costs for unlisted infrastructure investments are in line with unlisted real estate investments as a share of assets under management.



to use external experts for assessments of the technical and operational risks associated with individual investments.

Organisation of investments

It is important that these investments are made in a way that protects the fund's other investments. We therefore envisage investing in unlisted renewable energy infrastructure through subsidiaries of Norges Bank, as is already the case for the fund's investments in unlisted real estate. We will organise these investments in a way that ensures cost-efficiency, effective management and control. The most appropriate structure may vary from investment to investment. Norwegian tax and company law, as well as the special rules for limited companies wholly or partly owned by Norges Bank in section 2-40 of the Tax Act, means that in many situations it may be appropriate to form subsidiaries in Norway. This will need to be considered on a case-by-case basis.

Tax

Tax affects the fund's return, and more so for unlisted investments than for listed investments. The tax implications of unlisted renewable energy infrastructure investments will vary from investment to investment and must therefore be assessed on a case-by-case basis. This assessment will be based on our overall policy for managing tax risks, ensure that we comply with all relevant tax rules, and be based on broadly accepted international tax standards.²⁰

We assume that the Ministry will retain the mandate requirement that the fund may invest in unlisted companies and fund structures only in countries with which Norway has a tax treaty.²¹ As far as the Bank has been able to ascertain, investing in unlisted infrastructure will not give rise to any major new tax challenges beyond those familiar from unlisted real estate. These investments can be made in a way that has no tax implications for other investments.

Transparency

Our public reporting and our reporting direct to the Ministry are to provide a true and comprehensive overview of how we execute our management assignment. We will report on these investments in our quarterly and annual reports and publish press releases in connection with individual transactions.²² We will aim to provide the same detailed information as for our unlisted real estate investments. The annual report on the Bank's unlisted real estate investments provides a detailed review of results, individual investments, portfolio management, risk management and costs in this part of the fund. The right to disclose information on developments in the fund's unlisted renewable energy infrastructure investments will need to be regulated in private agreements. As with unlisted real estate, our agreements with partners and managers will set out

²⁰ For more information on our policy on tax management, see www.nbim.no.

²¹ Cf. section 3-1(2)(d) of the mandate.

²² The financial statements are prepared in accordance with International Financial Reporting Standards (IFRS).



reporting requirements that help us disclose information in accordance with the requirements in the management mandate.

In the public reports, we will compare the return on investments in unlisted renewable energy infrastructure with relevant yardsticks, including the return on the securities sold to finance their purchase.²³ We will employ a variety of metrics and methods to analyse and describe the risk in these investments, and this work will build on the detailed processes we have put in place for the fund's unlisted real estate investments.

Investment opportunities

The fund's size and limited liquidity needs may give the Bank an advantage when it comes to projects with substantial capital requirements. Solar and wind farms currently seem to be the most relevant investment candidates. Most large projects in these areas are in Europe and the US. More and more renewable energy projects in these regions are profitable without subsidies. In addition, regimes have been put in place to provide for long-term power contracts with fixed prices.²⁴ This translates into somewhat reduced regulatory and political risk, which are two types of risk that were given particular emphasis when the Ministry decided against permitting investment in unlisted infrastructure in 2016 and 2017. At the same time, market developments mean that the risk associated with investments in unlisted renewable energy infrastructure has shifted more towards the risk associated with movements in power prices and the risk associated with the end-users that have entered into contracts to purchase power.²⁵ Relative to regulatory and political risks, these are examples of types of risk that the fund is better suited to bear, and that the Bank has experience of assessing.

Gradual approach

The Bank will approach investment opportunities and build competence gradually. The strategy for the fund's investments in unlisted renewable energy infrastructure will be developed over time and adjusted in the light of experience. To begin with, it will be appropriate to consider projects with relatively low market risk and operational risk in developed markets.

Yours faithfully

²³ An investment in a wind farm in Germany can be financed through the sale of German corporate bonds or a combination of German equities and German government bonds. The Bank manages the market and currency risk for the fund's unlisted real estate investments along the same lines.

²⁴ Some of these contracts are now rated by the credit rating agencies. This is an indication that the market is becoming more standardised.

²⁵ An example of this is aluminium company Norsk Hydro ASA's wholly-owned subsidiary Hydro Energi AS, which in July 2018 signed a 29-year agreement with Green Investment Group for the purchase of wind power. For more information, see <https://www.hydro.com/no/hydro-i-norge/pressesenter/Nyheter/2018/hydro-inngar-ny-langsiktig-vindkraftavtale-for-norsk-aluminiumportefolje/>.



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Enc

Enclosure: Unlisted renewable energy infrastructure

Table 1: New investments in infrastructure for renewable energy production by source, billions of dollars

Source	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bloomberg NEF (2018)	182	205	207	276	324	291	269	321	360	325	334
IRENA (2018)	159	181	178	244	288	255	239	289	330	263	280
IEA (2018)	122	150	205	226	295	291	283	279	307	318	298
UNEP Centre (2018)	159	181	178	244	288	255	234	278	312	242	280

UNEP numbers for IRENA's reporting from 2007 to 2013, and in 2017.
The definition of renewable energy production varies by source.

Bloomberg = new investments
UNEP Centre (2018) based on UN Environment figures
IEA = World Energy Investment
IRENA bases estimates on UNEP from 2007 - 2013

Table 2: New investments and acquisitions by type of project, billions of dollars

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wind	94	114	113	131	125	119	121	165	181	192	169
Solar	50	73	79	116	183	163	140	172	214	177	204
Energy efficiency	23	21	27	32	37	34	34	39	38	53	59
Biomass and waste	25	20	17	21	23	20	18	15	12	10	10
Biofuel	33	23	20	21	17	10	8	8	5	3	3
Hydro (small-scale)	7	10	9	10	10	8	12	10	5	5	4
Other low-carbon	6	5	3	4	7	5	4	5	4	5	9
Geothermal	8	3	4	4	4	3	4	3	5	3	4
Marine	1	0	0	0	0	0	0	0	0	0	0
Total	248	269	274	340	405	361	341	416	464	448	461

Unlike Table 1, Table 2 includes acquisitions and is based on data from just one of the sources for Table 1.
Source: Bloomberg New Energy Finance

Table 3: New investments and acquisitions by region, billions of dollars

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Europe, Middle East and Asia	108	130	123	154	183	132	106	117	132	140	127
Asia (excl. Middle East)	50	58	74	90	107	115	137	169	210	186	201
Americas	90	81	77	96	115	114	97	130	123	122	133
Total	248	269	274	340	405	361	341	416	464	448	461

Unlike Table 1, Table 3 includes acquisitions and is based on data from just one of the sources for Table 1.
Source: Bloomberg New Energy Finance.



Table 4: Levelised cost of energy (LCOE)

Cost (dollars/MWh)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coal	111	111	111	102	105	109	108	102	102
Gas	83	82	83	75	74	74	65	63	60
Solar PV	359	248	157	125	98	79	64	55	50
Wind	135	124	71	72	70	59	55	47	45

The figures show movements in the average cost of energy production without subsidies, excluding additional costs for any production interruptions. The average cost is a global estimate with an overweight of prices from the North American market. The LCOE for gas is based on combined-cycle plants (gas-fired power stations with both a gas turbine and a steam turbine).

Source: Lazard Levelized Cost of Energy Analysis (2017).

Table 5: Institutional investors in infrastructure, billions of dollars

Investor	Country	Infrastructure assets	Total assets	% Infrastructure assets
China Investment Corporation	China	53	941	6%
Abu Dhabi Investment Authority	UAE	25	828	3%
Canada Pension Plan Investment Board	Canada	22	284	8%
Allianz	Germany	19	796	2%
National Pension Service	South Korea	17	516	3%
Ontario Teachers' Pension Plan	Canada	15	148	10%
APG	Netherlands	14	558	2%
OMERS	Canada	14	79	17%
CDPQ	Canada	13	238	5%
Legal & General	UK	12	682	2%
Total (10 biggest investors)		202	5069	4%

Based on IPE estimations and investors' annual reports.

Source: IPE Real Assets (2018).

Table 6: Private equity infrastructure funds – unlisted renewable energy infrastructure and unlisted infrastructure

Unlisted renewable energy infrastructure	2008	2009	2010	2011	2012	2013	2014	2015	2016
Funds									
No. of funds closed	26	19	22	21	31	34	21	22	26
Aggregate capital raised (billion dollars)	6	9	10	4	14	8	5	14	13
Average fund size (billion dollars)	0.23	0.46	0.46	0.20	0.44	0.24	0.24	0.63	0.48
Unlisted infrastructure	2008	2009	2010	2011	2012	2013	2014	2015	2016
Funds									
No. of funds closed	55	29	54	57	73	91	75	77	72
Aggregate capital raised (billion dollars)	40	10	30	26	29	46	42	43	65
Average fund size (billion dollars)	0.73	0.37	0.57	0.46	0.40	0.51	0.57	0.56	0.90

Average fund size refers to funds closed in each calendar year.

Source: Preqin (2017), Preqin (2018).