

**United Nations Environment Programme
Resources and Markets Branch**

**Financing sustainable development:
the role of sovereign wealth funds for
green investment**

Working paper

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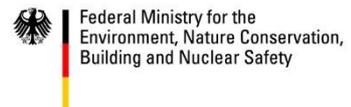
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Table of contents

LIST OF TABLES	5
LIST OF FIGURES	5
LIST OF ABBREVIATIONS	6
EXECUTIVE SUMMARY	8
1. INTRODUCTION	10
1.1. SUSTAINABLE DEVELOPMENT GOALS AND THE ROLE OF SOVEREIGN WEALTH FUNDS.....	10
1.2. OBJECTIVES OF THE STUDY AND APPROACH	11
PART I. SOVEREIGN WEALTH FUNDS: A HETEROGENEOUS SECTOR.....	13
2. SOVEREIGN WEALTH FUNDS: STYLISED FACTS.....	13
2.1. WHAT ARE SWFS AND WHAT DO WE KNOW ABOUT THEM?.....	13
Size, age and geographical distribution.....	14
Sources of wealth: from natural resources to fiscal policies.....	17
Types of sovereign wealth fund by mission	18
Developing and developed countries.....	20
2.2. INVESTMENT OBJECTIVES, TRENDS AND PERFORMANCE	22
What have SWFs been investing in since the 2008 global financial crisis?	22
The rapid growth of private markets: real estate and infrastructure.....	24
SWFs and start-ups: elephants and unicorns	27
Geographical distribution of SWFs' investments	28
Implications of the lower-for-longer scenario for SWFs and green investment.....	31
2.3. WHICH IS THE MOST COMMON INVESTMENT MODEL: DIRECT, CONSORTIUM OR PLATFORM?	31
3. PRINCIPLES AND STRATEGIC GOVERNANCE OF SOVEREIGN WEALTH FUNDS.....	36
3.1. THE SANTIAGO PRINCIPLES AND THE INTERNATIONAL FORUM OF SOVEREIGN WEALTH FUNDS	36
3.2. HOW IN-HOUSE CAPABILITIES AFFECT SWF GOVERNANCE AND SUSTAINABILITY.....	38
PART II. SOVEREIGN WEALTH FUNDS AND THE SUSTAINABLE DEVELOPMENT GOALS	42
4. WHERE DO INSTITUTIONAL INVESTORS STAND ON CLIMATE CHANGE TODAY?.....	42
5. SWFS INVESTING IN GREEN ASSETS AND SUPPORTING SDGS.....	46
5.1. TRENDS, DRIVERS AND STRATEGIES SUPPORTING SUSTAINABLE ECONOMIC DEVELOPMENT	46
5.2. SWFS' PORTFOLIO DECARBONISATION AND ENGAGEMENT STRATEGIES.....	51
New Zealand: a portfolio resilient to climate-related risks.....	53
Norway: the responsible investor and the exclusion strategy	54
France, decarbonisation and the new Energy Transition Law	55
5.3. INVESTMENT STRATEGIES IN LISTED AND PRIVATE GREEN ASSETS	56
Abu Dhabi: the emirate leading the way with a green SWF and a pioneering approach to infrastructure.....	56
Singapore: international deals, green technology, and meeting the nation's SDG commitments	58
The Saudi Arabian Monetary Authority (SAMA) and the Public Investment Fund.	60
Azerbaijan – old deals in need of a new green investment push.....	61
Korea Investment Corporation: the first Asian SWF applying SWF criteria to its allocations	62
Kazakhstan: the opportunity to play a leading green role in Malaysia and the region	62

Morocco, Nigeria and Senegal: African SWFs for sustainable development	63
5.4. GREEN INVESTMENT POLICIES, COUNTRY REGULATION AND ADVOCACY EFFORTS.....	67
Australia: the future steps of the Future Fund.....	67
China: the critical role of the world’s wealthiest group of SWFs in the world’s most polluting country	68
PART III. GUIDELINES AND CONSTRAINTS	70
6. GUIDELINES FOR DESIGNING SWFS TO SUPPORT THE SDGS.....	70
6.1 PRACTICAL GUIDELINES ON DESIGNING SWFS TO SUPPORT DELIVERY OF THE SDGs	70
Beliefs	70
Governance	71
Investment strategies and portfolio processes	72
6.2 POTENTIAL CHALLENGES AND CONSTRAINTS	73
7. CONCLUSION AND 10 KEY MESSAGES	75
10 key messages	75
8. REFERENCES	78
9. ANNEXES	83
Annex 1. Map of sovereign wealth funds (2017)	83
Annex 2. Green investments by SWFs (2015-2017)	834

List of tables

Table 1. The 10 largest sovereign wealth funds in terms of assets under management (AuM).....	15
Table 2. Sovereign wealth funds from the LDCs	21
Table 3. Sovereign wealth funds as responsible investors.....	48
Table 4. Allocation of SWFs' green investments (Jan 2015 to Nov 2017).....	49
Table 5. Selected green investments by SWFs (2015–2017).	50
Table 6. SWF divestments for portfolio decarbonisation	52

List of figures

Figure 1. Sovereign wealth funds by region	16
Figure 2. Sovereign wealth funds by source of wealth (% of total assets).....	18
Figure 3. Distribution of sovereign wealth funds by UN country classification	21
Figure 4. Sovereign wealth funds' asset allocation (2002–2015).....	25
Figure 5. The 10 highest-valued tech start-ups and the participation of SWFs.....	28
Figure 6. Average deal value (USD million) and co-investment deals (%)	33

List of abbreviations

ADIA	Abu Dhabi Investment Authority
AODP	Asset Owners Disclosure Project
AuM	Assets under management
CalPERS	California Public Employees' Retirement System
CalSTRS	California State Teachers' Retirement System
CDC	Caisse des Dépôts et Consignations
CDC-IC	CDC International Capital
CIC	China Investment Corporation
CO ₂	Carbon dioxide
CSP	Concentrated solar power
EDC	Energy Development Company
ESG	Environmental, social and governance
EUR	Euro
FDI	Foreign direct investment
FF	Future Fund
FONSIS	Fonds Souverain d'Investissements Stratégiques
GAPP	Generally Accepted Principles and Practices
GDP	Gross domestic product
GGIF	Green Growth Infrastructure Facility for Africa
GHG	Greenhouse gas
GIIF	Ghana Infrastructure Investment Fund
GPFG	Government Pension Fund Global
GPIF	Government Pension Investment Fund
GSIA	Global Sustainable Investment Alliance
GW	Gigawatt
HKMA	Hong Kong Monetary Authority
IFC	International Finance Corporation
IFSWF	International Forum of Sovereign Wealth Funds
IPCC	Intergovernmental Panel on Climate Change
ISIF	Ireland Strategic Investment Fund
JRE	Japan Renewable Energy Corporation
KIA	Kuwait Investment Authority
KIC	Korea Investment Corporation
LDC	Least developed country
MCPP	Managed Co-Lending Portfolio Program
MIRA	Macquarie Infrastructure and Real Assets
MSCI	Morgan Stanley Capital International
MW	Megawatt
N/A	Not applicable

NBIM	Norges Bank Investment Management
NIIF	National Investment and Infrastructure Fund
NPRF	National Pension Reserve Fund
NSIA	Nigeria Sovereign Investment Authority
NZSF	New Zealand Superannuation Fund
PDC	Portfolio Decarbonization Coalition
PIF	Public Investment Fund
PRI	Principles for Responsible Investment
QIA	Qatar Investment Authority
RDIF	Russian Direct Investment Fund
SAFE	State Administration of Foreign Exchange
SAMA	Saudi Arabian Monetary Authority
SDF	Sovereign development funds
SDG	Sustainable Development Goal
SOFAZ	State Oil Fund of the Republic of Azerbaijan
SWF	Sovereign wealth fund
TCFD	Task Force on Climate-related Financial Disclosures
UAE	United Arab Emirates
UN	United Nations
UNCTAD	United Nations Commission on Trade and Development
UNEP	United Nations Environment Programme
US	United States of America
USD	United States dollar
VC	Venture capital

Executive summary

Sovereign wealth funds (SWFs) hold total assets under management (AuM) worth USD 7.5 trillion, yet their indisputable potential role in financing and promoting green investments and the Sustainable Development Goals (SDGs) has hardly been explored. SWFs are government-owned investment funds with long-term investment strategies and without pension liabilities. The recent and significant growth of real assets in SWF portfolios has served to increase in-house investment capabilities and to more strongly align these portfolios with long-term investment horizons. These factors increase the likelihood of SWF involvement in green investments in the near future.

SWFs differ in size, have been operating for varying lengths of time and are located in diverse parts of the globe. The largest 20 SWFs control 90% of the total assets held by SWFs. These government-owned investors derive their wealth from natural resources (57%) and other non-commodity sources such as foreign exchange reserves and fiscal long-term rules (43%). Developing countries make up most of the SWF industry, holding 80% of the industry's total assets, six least developed countries (LDCs) have SWFs. The clear leaders in sovereign wealth by number and size of funds are China, the United Arab Emirates (UAE) and Norway.

To date, only a few SWFs have invested in renewable energy companies or projects, or have supported climate-oriented debt and credit platforms. In the last three years, the total value of these kinds of investments reached USD 11 billion, a tiny fraction of the total assets held by the world's SWFs.

The SWFs of developed countries such as Australia, France, Ireland, New Zealand and Norway are implementing climate-related investment strategies, but only Norway and New Zealand have integrated climate-risks into their investment processes. So far, the main strategy adopted by developed-country SWFs is portfolio decarbonisation.

SWFs from developing economies such as China, Morocco, Saudi Arabia, Singapore and the United Arab Emirates (UAE) are also investing in green infrastructure assets either directly or as limited partners of green infrastructure funds. However, their investment processes have yet to incorporate climate-specific strategies.

The UAE's Mubadala Development Company is a notable investor in renewable energy. Through its wholly owned subsidiary Masdar, it has invested more than USD 2.7 billion in clean energy projects totalling 1 GW of installed capacity, with another 0.7 GW under development. Masdar develops and operates not only utility-scale projects but also small-scale systems that provide off-grid communities in LDCs with access to electricity.

SWFs have taken on green assets by committing to green debt platforms (USD 4.3 billion), investing in renewable energy companies and projects (USD 3.5 billion) and participating in green infrastructure funds (USD 2.2 billion). The total value of the divestments made to decarbonise portfolios amounts to USD 2.9 billion.

SWFs have not yet integrated climate-related risks for a number of reasons:

- a. The apparent conflict between the fiduciary mandate of preserving and growing national wealth through financial returns and the consideration of climate change as a non-financial factor.

- b. The lack of consensus on the performance of greener portfolios, doubts about the performance of certain green indexes, and the idea of losing out financially as a result of divesting from oil and gas companies.
- c. The lack of sufficient national sustainable development policies, and the lack of pressure in society for greener portfolios.
- d. The costs of analysing the carbon footprint of portfolios, and the costs of being active owners (exercising voting rights and/or engaging with companies).

The best practices analysed in this study show that, to enhance the mobilisation of SWF resources for climate-related investments, the following considerations are key:

- a. **Incorporating climate risk as a long-term financial risk is critical**, and the best way to do this is to systematically include climate-related risks and opportunities in strategic asset allocation.
- b. To incorporate climate risk in this way also requires **revisiting beliefs about the long-term mission of the SWF** and promoting an understanding among top-level decision-makers of the need to reconcile a long-term investment horizon with long-term climate-related risks and opportunities. **The education of stakeholders** (government, regulators and citizenry) is a key part of this process.
- c. Governance plays a fundamental role. **The clearer the fiscal rule** governing flows in and out of the SWFs is, **the easier it will be to design a consistent sustainable-development strategy**. Clear fiscal rules ensure the sustainability of the SWF itself and its goals, which may include sustainable and green investment strategies. Transparency enhances accountability and increases stakeholder pressure for low-carbon investments.
- d. If the SWF has **stronger in-house investment capabilities**, sustainable investment strategies will be better understood, developed and implemented. Also, if **asset owners are more responsible (and active)**, they will, through engagement and by exercising their voting rights, **be more effective in ensuring that their portfolio companies adopt sustainability strategies**.

Around 70% of the world's SWFs are members of the International Forum of Sovereign Wealth Funds, an organisation that promotes the Santiago Principles, a voluntary code of good governance, transparency and accountability. This Forum has the potential to serve as the initial framework for supporting the incorporation of climate-related risks into long-term investment benchmarks.

SWFs would benefit from joining institutional investor groups such as Principles for Responsible Investment or from incorporating the disclosure approaches being developed by the Task Force on Climate-related Financial Disclosure and by the Portfolio Decarbonization Coalition.

1. Introduction

1.1. Sustainable Development Goals and the role of sovereign wealth funds

On 25 September 2015 the General Assembly of the United Nations signed the resolution adopting the 2030 Agenda for Sustainable Development. Over the next 15 years the Agenda, with its 17 Sustainable Development Goals (SDGs) and 169 targets, aims to stimulate action in the three dimensions of sustainable development – economic, social and environmental – and will guide the policies and funding of multiple agencies in the UN network (United Nations 2015b). Achieving the SDGs requires the mobilisation and effective use of all available sources of financing.

A number of resource-rich countries have established SWFs as savings vehicles to manage revenues. Typically, these funds are set up to enhance returns on international reserves while minimising risks over the long-term with the aim of providing for future generations, stabilising fiscal revenues, meeting future pension liabilities, promoting economic growth and supporting development objectives. Well-managed SWFs can support the delivery of the SDGs by helping to improve the quality of public spending, strengthening international competitiveness, supporting ethical investment, and earmarking spending for high-impact projects, development or green investments. However, using these funds to support long-term development objectives like the SDGs presents a number of challenges/constraints and requires careful management that is underpinned by substantive transparency requirements, adequate government capacities and a balanced growth strategy.

This study sheds much-needed light on countries' experiences of using SWFs to invest in green assets and to finance the SDGs, and it provides recommended guidelines for countries interested in designing SWFs to finance action on the SDGs. In so far as countries adopt these guidelines, this study will contribute to the mobilisation of resources aimed at supporting the delivery of the SDGs.

Sovereign wealth funds are the fourth largest institutional investor group by assets under management (AuM), with total assets amounting to USD 7.5 trillion. The SWF sector is a heterogeneous group of government-owned investment funds that, while found around the world, most commonly feature in developing economies. Half of SWFs are funded by natural resource revenues, while the other half is funded by fiscal rules, excess foreign-exchange reserves or the proceeds of privatisations.

On a number of occasions, parties have approached SWFs seeking to harness their capital potential to solve or help solve global or regional issues. Research by Sun and Hesse (2009) shows that the SWFs' long-term investment horizons have the capacity to stabilise the financial markets, and thus may counteract liquidity needs or overheating pressures. For example, during the recent global financial crisis SWFs from Abu Dhabi, China, Kuwait and Singapore invested USD 56.3 billion in the rescue of North American and European banking institutions such as Barclays, Citigroup, Credit Suisse, Merrill Lynch and Morgan Stanley. SWFs have also been asked to contribute to meeting long-term investment needs, such as plugging gaps in infrastructure investment. The global need for infrastructure investment is now greater than USD 93 billion per year. For this reason, in 2008 the then President of the World Bank, Robert Zoellick, devised the Bank's One Percent Solution initiative, which sought to draw on the SWFs' large capital base to invest in African infrastructure. In practice this would require the SWFs investing one percent of their total AuM in equity infrastructure projects. The initiative never took off.

As most SWFs are located in developing countries with severe social and economic needs, including least developed countries (LDCs) such as Angola, Rwanda, Senegal and Timor-Leste, the SWFs are, without doubt, well placed to play a central role in the achievement of the SDGs.

The UN Commission on Trade and Development (UNCTAD) has estimated that meeting developing countries' key SDG targets will require investment of USD 3.5–4.7 trillion each year from 2015 to 2030. However, the UN and its member countries cannot deliver on the SDGs alone. At present they collectively invest an estimated total of USD 1–1.7 trillion annually, which represents a shortfall of USD 2.5–3 trillion each year (UNCTAD 2014). SWFs could deploy their capital resources to address this shortfall and, in so doing, have a critical impact on the achievement of the SDGs. However, there is little evidence of SWFs investing in SDGs. As this study shows, SWFs have invested in green assets worth USD 11 billion over the last three years. Investments in green assets, green funds, green agriculture, and the decarbonisation strategies developed by SWFs collectively represent a mere 0.15% of the combined total of SWFs' equity portfolios.

A key challenge related to SWFs' financing of SDGs is the fact that domestic-focused SWFs have been shown to be riskier due to poorer governance and weaker performance (Megginson and Fotak 2015). SWFs that invest abroad tend to score better in terms of transparency, reporting and accountability. Conversely, the SWFs that only invest domestically tend to be more influenced by politicians, which affects the investment process and results in poorer financial returns (Bernstein, Lerner and Schoar 2013).

Nevertheless, SWFs do have the capacity to play a greater role and, in fact, are already acting as powerful agents of development in countries such as Bahrain and Singapore. Certain SWFs are, in different ways, already influencing the fulfilment of SDGs – from reducing the carbon exposure of their portfolios (New Zealand Superannuation Fund) and co-investing with foreign development institutions in sustainable infrastructure (Nigeria Sovereign Investment Authority), to investing alongside worldwide renewable energy leaders to develop a more diverse and greener energy mix (the UAE's Mubadala).

1.2. Objectives of the study and approach

This study has the following five objectives:

1. **To understand the particular nature of SWFs** and the heterogeneity of this specific institutional investor group. (addressed in Part I)
2. To detail the **investment strategies implemented by SWFs** since the global financial crisis. (Part I)
3. To provide evidence of the **potential role SWFs** might play in **financing and supporting SDGs**, with a focus on the SDGs aimed at protecting the planet's environment and ecosystems. (Part II)
4. To identify and explore **exemplary SWF strategies for investing in SDGs**. (Part II)
5. To set out **guidelines and recommendations that enable the SWFs** to successfully implement strategies supporting the achievement of the SDGs. (Part III)

The report is divided into three parts. The first part classifies, analyses and describes the SWF sector, reveals the heterogeneity of the sector and explores SWFs' main investment trends and objectives. It also looks at the role of governance principles and practices because, without strong and sound governance settings, SWFs are not successful. The second part details the SDG-related activities developed by SWFs and the investments made by SWFs in green assets. The third part collects the lessons of the report and sets out a list of recommendations and practical guidelines on designing SWFs to support the delivery of the SDGs. It also looks at potential challenges and offers approaches for overcoming them.

PART I. SOVEREIGN WEALTH FUNDS: A HETEROGENEOUS SECTOR

2. Sovereign wealth funds: stylised facts

This section looks at the heterogeneity of the sector: the different sizes, ages and geographical locations of the various SWFs. It covers SWFs' investment objectives, trends and performance, and it analyses their investment strategies. Finally, it discusses what can be achieved by enhancing in-house capabilities.

2.1. What are SWFs and what do we know about them?

- In aggregate, sovereign wealth funds manage USD 7.5 trillion.
- 92 SWFs have been established and 80 are operational.
- The SWF sector is dominated by developing-country SWFs.
- SWFs' size, age and location vary substantially.
- The top 10 SWFs by AuM control 74% of the sector's total combined assets. The top 20 control 90%.¹
- SWFs derive their wealth from natural resources (57% of total assets) and from the non-commodities of foreign exchange reserves and fiscal long-term rules (43%).
- Six LDCs have already set up SWFs. Four more LDCs are considering setting one up.

Sovereign wealth funds are government-owned investment funds without current pension liabilities that typically pursue long-term investment strategies (Aguilera, Capapé and Santiso 2016). It is difficult to define SWFs; rather, they should be understood as living creatures that evolve over time. Previous efforts to impose a strict SWF definition have ultimately failed due to the dynamism of the concept.

The International Forum of Sovereign Wealth Funds (IFSWF) is a voluntary organisation run for and by the SWFs and has the highest number of SWF members. This Forum offers its own definition, which is set out in the Generally Accepted Principles and Practices (GAPP), the so-called Santiago Principles (IWG-SWF 2008):

[SWFs are] special purpose investment funds or arrangements, owned by the general government. Created by the general government for macroeconomic purposes, SWFs hold, manage, or administer assets to achieve financial objectives, and employ a set of investment strategies which include investing in foreign financial assets. The SWFs are commonly established out of balance of payments surpluses, official foreign currency operations, the proceeds of privatizations, fiscal surpluses, and/or receipts resulting from commodity exports.²

Three aspects summarise SWFs: (1) They are **owned by the government** (at the state or federal/country level). (2) They operate as **investment funds** (some SWFs have a more hands-on investment approach and act as quasi-public private equity funds whereas others act as passive institutional investors). (3) They are established by the general government **for macroeconomic purposes** – i.e. SWFs are created to invest government funds in order to achieve set financial objectives, and they (may) have liabilities that are only broadly defined, which means they can employ a wide range of investment strategies with a medium- to long-term timescale.

¹ Table 1 lists the top 20 SWFs by AuM.

² See p. 27 of the Santiago Principles. Available here http://www.ifswf.org/sites/default/files/santiagoprinciples_0_0.pdf.

This emphasis on defining SWFs derives from the need to differentiate sovereign wealth funds from other institutional investors, namely private equity funds, hedge funds and pension funds. Collectively, institutional investors – including pension funds, mutual funds, insurance companies, and private equity and hedge funds – own the majority of shares listed globally. A conservative estimate is that these investors control 65% of all listed equities globally.

SWFs are, however, a particular class of institutional investor, as they are:

- **not private equity funds** – SWFs have longer time horizons and, different to closed-end funds like private equity funds, they are by nature open-end funds;
- **not hedge funds** because they do not typically employ leverage³ and do not articulate their investment strategies around niche market opportunities or against macro events;
- **neither private equity nor hedge funds** because they do not have limited partners – the sole owner of a SWF is the government or state;
- **not public pension funds** as they do not pay people’s pensions. Some SWFs, as described below in the classification of SWFs by mission (see p. 19), are named as pension reserve funds because they preserve wealth in order to meet future pension costs,⁴ but they are not currently paying pension schemes in the manner of the California Public Employees’ Retirement System (CalPERS) or the Canada Pension Plan Investment Board.

As Part II of this report shows, the fact that SWFs face no liabilities influences their investment strategies and allows them to hold riskier assets without liquidity constraints. Indeed, this lack of liquidity constraints gives SWFs the ‘freedom’ to deploy capital in complex, illiquid and long-term investment strategies – a feature that has the potential to facilitate the mobilisation of resources towards sustainable goals. Unlike pension funds, which do face liquidity constraints, SWFs can invest in less-liquid sustainable assets, and free of the limitations imposed on closed-end private equity funds, they can commit to very long-term projects and business ideas. All these features make SWFs strong candidates to support the transition towards low-carbon economic growth models.

Size, age and geographical distribution

SWFs hold USD 7.5 trillion globally, but the distribution of these assets is far from even. The world’s 10 largest SWFs by AuM hold USD 5.5 trillion, which means 74% of the total assets of the SWF sector is concentrated in these 10 funds. The 20 largest SWFs hold 90% of sector’s total assets (see Table 1). In short, the bulk of the assets managed by the SWF sector is in the hands of 10 funds, representing just six governments (China controls four and Saudi Arabia two, while the remainder pertain to Kuwait, Norway, Singapore and the UAE). All of the funds in the top 10 each manage over USD 200 billion of assets. By comparison, the average SWF manages assets of USD 92 billion and the majority of funds manage less than USD 20 billion.

³ Some SWFs use leverage for particular deals. As a result of its recent massive acquisition of Logikor, the China Investment Corporation was forced to take on loans worth USD 8 billion from two major Chinese banks. Other Asian SWFs such as Singapore’s Temasek and Malaysia’s Khazanah have also raised funds in the loan market. Conversely, in certain countries like Kuwait, national laws prohibit its fund, the Kuwait Investment Authority, from borrowing.

⁴ Due to its name, Norway’s Government Pension Fund Global (GPF) is commonly misclassified as a public pension fund. In fact, not a single krone held by the GPF is used to pay pensions. Instead, the Fund was established to build up sufficient wealth to help cover the pension burden of future generations. Its income is wholly derived from revenues obtained from natural resources (oil and natural gas) and its own investment income.

When classified by age, SWFs show a highly uneven distribution. Although the term ‘sovereign wealth fund’ was coined in 2005, the oldest such funds were actually established in the 1950s in Kiribati, Kuwait, New Mexico (US) and Saudi Arabia.⁵ Other of the larger SWFs, such as the Abu Dhabi Investment Authority (1976), Singapore’s GIC (1973) and Temasek (1981), and Norway’s GPF (1998) were established in three waves over the last quarter of the 20th century.

Table 1. The 20 largest sovereign wealth funds in terms of assets under management (AuM)

Rank	Sovereign wealth fund	AuM (USD billion)	Country	Est.	UN classification	Source of wealth
1	Government Pension Fund Global	977.8	Norway	1998	Developed	Hydrocarbon
2	China Investment Corporation	813.8	China	2007	Developing	Non-commodity
3	SAMA Foreign Holdings	633.5	Saudi Arabia	1952	Developing	Hydrocarbon
4	State Administration of Foreign Exchange	612.3	China	1997	Developing	Non-commodity
5	Abu Dhabi Investment Authority	589.8	UAE	1976	Developing	Hydrocarbon
6	Kuwait Investment Authority	515	Kuwait	1953	Developing	Hydrocarbon
7	Hong Kong Monetary Authority	500.4	Hong Kong (China)	1993	Developing	Non-commodity
8	GIC	353.6	Singapore	1981	Developing	Non-commodity
9	Public Investment Fund	250	Saudi Arabia	1971	Developing	Hydrocarbon
10	National Social Security Fund	247.4	China	2000	Developing	Non-commodity
11	Qatar Investment Authority	235	Qatar	2005	Developing	Hydrocarbon
12	Investment Corporation of Dubai	200.6	UAE	2006	Developing	Hydrocarbon
13	Temasek Holdings	175.2	Singapore	1974	Developing	Non-commodity
14	Mubadala Investment Company	122.4	UAE	2002	Developing	Hydrocarbon
15	Korea Investment Corporation	110.8	South Korea	2005	Developing	Non-commodity
16	Abu Dhabi Investment Council	110	UAE	1999	Developing	Hydrocarbon
17	Future Fund	98.29	Australia	2004	Developed	Non-commodity
18	National Wealth Fund	74.72	Russia	2008	Economies in transition	Hydrocarbon
19	National Development Fund of Iran	68	Iran	2011	Developing	Hydrocarbon
20	Libyan Investment Authority	67	Libya	2006	Developing	Hydrocarbon

Source: author’s own collation of data from SWF websites and estimates from the Sovereign Wealth Lab (IE Business School), Preqin and the Sovereign Wealth Center.

NB: Non-commodity SWFs include those that manage foreign exchange reserves and those funded through fiscal long-term rules. Hydrocarbon SWFs are funded from revenues obtained from natural gas or oil.

The third major factor differentiating the SWFs is their geographical distribution. Four different SWF poles can be identified: the Middle East, China, Norway and Southeast Asia (see Figure 1). The Middle East is the region with the largest concentration of SWFs in terms of both assets (totalling USD 2.9 trillion) and number of operational funds (22). In the Middle East, the countries of the Gulf Cooperation Council are pre-eminent, holding 97% of the region’s SWF

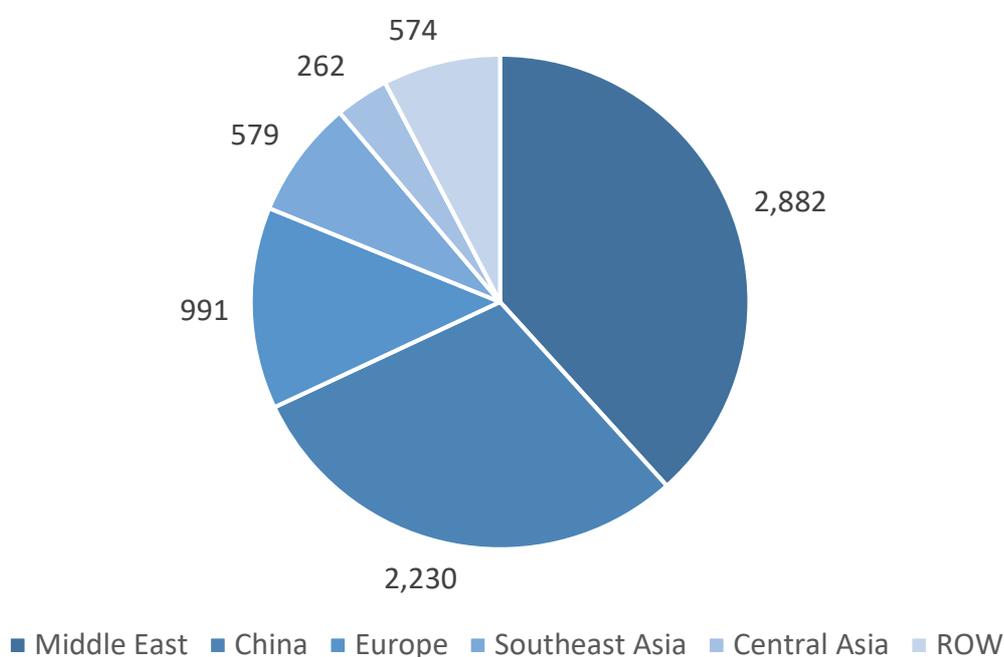
⁵ An even older fund, the Texas Permanent School Fund established in 1854, is today considered to be an SWF.

assets.⁶

China is the second largest pole, with USD 2.2 trillion of AuM and seven SWFs, and is the most important single country in the SWF sector by AuM. Even excluding the two quasi-SWFs – the State Administration of Foreign Exchange and the Hong Kong Monetary Authority – China’s SWFs manage a total of USD 1.1 trillion and are therefore still managing more assets than the second most important country, the United Arab Emirates. China’s largest SWF is the China Investment Corporation (USD 814 billion), which has a particular dual remit: on the one hand it invests excessive foreign exchange reserves abroad on a commercial basis in order to generate long-term returns, and on the other it guarantees the government’s controlling stake as a shareholder of China’s largest public banks including the Agricultural Bank of China, the Bank of China, the China Construction Bank and the Industrial and Commercial Bank of China.

Figure 1. Sovereign wealth funds by region

Assets under management (USD billion)



Source: author’s own work based on data from the Sovereign Wealth Lab of IE Business School.
ROW = rest of world

The third main pole is Norway, which, as a single country, controls nearly USD 1 trillion of sovereign wealth. Norway’s case differs to that of China or the UAE, because Norway operates a single SWF to manage all the revenue it obtains from natural resources. The Government Pension Fund Global (GPFG) is managed by Norges Bank Investment Management (NBIM), an asset manager within the country’s central bank (Norges Bank). GPFG is also the most transparent SWF on earth, providing detailed information about its portfolio and responsible investments.

The fourth pole of SWFs is Southeast Asia with six SWFs and near to USD 600 billion of total

⁶ Iran is the only country in the Middle East region with an operating SWF that is not part of the Council. Its National Development Fund manages assets worth USD 68 billion.

AuM. The region is home to two of the world's most active SWFs, Singapore's Temasek and GIC,⁷ and also to Malaysia's Khazanah, a USD 34 billion fund established in 1993 that, as a pillar of the country's economy, could play a major role in promoting progress on the SDGs.

Outside of the four main poles, the single countries managing the most sovereign assets are the United States⁸ (USD 130 billion), Kazakhstan (USD 129 billion), South Korea (USD 111 billion), Russia (USD 102 billion) and Australia (USD 99 billion).

Grouped together, the rest of the world has 32 SWFs, with combined assets amounting to USD 283 billion. North Africa, Latin America and Oceania lead this group. It is important to note the rise of SWFs in sub-Saharan Africa, which now has 14 SWFs. Currently their combined total AuM are still low (just USD 11 billion), but the potential remains high, particularly as some have just registered and have yet to commence operations following new oil and gas discoveries. Other countries are now considering establishing such vehicles too: Mozambique, Uganda and Zimbabwe have all passed laws establishing SWFs, but they are not yet operational.

Sources of wealth: from natural resources to fiscal policies

Another factor differentiating SWFs is the sources of their wealth. Typically, SWFs' sources of wealth divide them into three groups: hydrocarbon, non-commodity and other-commodity SWFs (See **Figure 2**).

In all, 36 SWFs are hydrocarbon-based, deriving their wealth mainly from oil and natural gas. As a group, the 36 manage a total of USD 4.3 trillion. The Middle East, North America and sub-Saharan SWFs dominate this group along with Central Asia, Russia, and Norway (which operates the single SWF with the most AuM).

A total of 34 non-commodity SWFs collectively manage USD 3.2 trillion, with the largest such funds belonging to China, Singapore and Australia. These 34 SWFs receive their funds from multiple sources, typically contributions from the government budget via fiscal rules or from the proceeds of sales of state-owned assets.

GIC manages Singapore's financial assets and derives its funds from the proceeds of securities issued and from government surpluses. Australia's Future Fund and the New Zealand Superannuation Fund (NZSF) were established using a combination of budget surpluses and contributions. The Future Fund also received the proceeds from the sale of Australian government holdings. In China, SWFs have been funded by foreign exchange holdings (China Investment Corporation – CIC) and by the central budget and state-owned capital transfers (National Social Security Fund). The foreign holdings of China's quasi-SWFs, the State Administration of Foreign Exchange and the Exchange Fund under the Hong Kong Monetary Authority, have been established within or are part of the central bank. The 'Holding SWF' model⁹ is employed by a subset of non-commodity SWFs comprising Khazanah (Malaysia), Mumtalakat (Bahrain), Samruk-Kazyna (Kazakhstan) and Temasek (Singapore). This group has also been recently joined by a clutch of new Holding SWFs, namely the Fonds Souverain

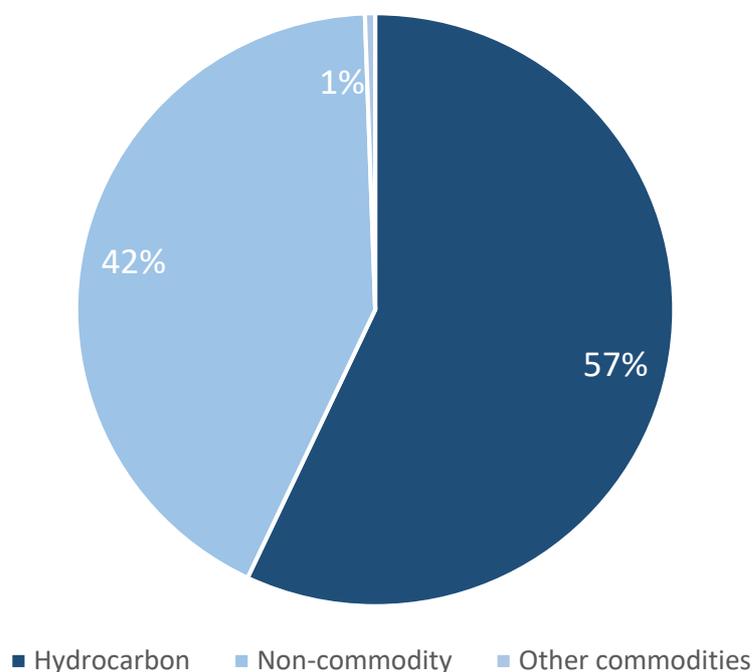
⁷ The Government of Singapore Investment Corporation changed its name to GIC in 2013.

⁸ Many SWF specialists do not consider eight of the nine state-owned SWFs in the United States to in fact be SWFs (recognising only the Alaska Permanent Fund). However, in this study SWFs are understood to be dynamic in nature, so all nine of the US funds are included.

⁹ SWFs established to control state shareholdings and normally to improve the governance and performance standards of state-owned enterprises in order to prepare the latter for eventual listing on a stock exchange or for sale to other investors.

d'Investissements Stratégiques (Senegal), the State Capital Investment Corporation (Viet Nam) and the Turkiye Wealth Fund (Turkey).

Figure 2. Sovereign wealth funds by source of wealth (% of total assets)



Source: author's own work based on data from the Sovereign Wealth Lab of IE Business School.

The remainder of the SWFs ('Other commodities' in Figure 2) accumulate their wealth from other non-hydrocarbon commodities and resources such as copper (Chile and Mongolia), water (Quebec, Canada), diamonds (Botswana), land (Idaho, US) or phosphates (Kiribati). Rwanda's Agaciro Development Fund is a unique case, as it was established using voluntary contributions from Rwandans at home and abroad as well as from friends of the country.

Types of sovereign wealth fund by mission

According to the IFSWF,¹⁰ SWFs have five different objectives. Each fund has its own mandate and its investment strategies are adjusted accordingly. While it is true that the nature of SWFs evolves and their missions may change, these funds can nevertheless be grouped into six different classes:

- **Fiscal stabilisation:** SWFs in this category have the mission of supporting macroeconomic stability by managing the fiscal impacts of resource price volatility. The SWFs of Algeria and Mexico and Russia's Reserve Fund¹¹ are fiscal stabilisation funds and, as such, face higher risks of their resources depleting during a continued period of low resource prices (e.g. for gas, oil, copper, etc.)

¹⁰ The categories should be applied flexibly in line with SWFs' evolution over time, which may see them adopting new roles and augmenting or reducing their scope of action.

¹¹ As of Jan 1, 2018, the Russia's Reserve Fund ceased to exist, exhausted after three years providing cash to support Russia's budget deficits after the crash of oil prices. Its remaining assets were transferred to the pension reserve fund known as the National Wealth Fund, which it will now fulfil the fiscal stabilisation goal.

- **Intergenerational savings:** SWFs in this category have the mandate to preserve and grow wealth for the benefit of ‘future generations’ – i.e. they have a long-term savings function. Notable examples are the Alaska Permanent Fund, the Abu Dhabi Investment Authority (ADIA), the Heritage Savings Trust Fund of Alberta, Canada, and Oman’s State General Reserve Fund.
- **Pension reserve:** Funds with pension reserve mandates are designed to fund future (and not current) retirement liabilities. Good examples of SWFs in this category are Australia’s Future Fund and the NZSF. Given its size and its strong focus on intergenerational savings, Norway’s GPF is a particularly prominent example of a pension reserve SWF.
- **Economic development:** Most sovereign wealth funds have financial objectives. However, some also promote economic development and diversification, which may include investment in local infrastructure, private equity or agriculture, and are therefore called sovereign development funds. Key SWFs with a clearly articulated economic development mandate include the Ireland Strategic Investment Fund (ISIF), Kazakhstan’s Samruk-Kazyna, Malaysia’s Khazanah, Morocco’s Ithmar Capital and Saudi Arabia’s Public Investment Fund (PIF). Samruk-Kazyna, Khazanah and also Singapore’s Temasek (a hybrid case) can be considered to be Holding SWFs as they hold controlling stakes in key national companies that have a direct impact on domestic economic development.
- **Reserve management:** Sovereign funds sometimes have the objective of reserve management. The Kazakh National Investment Corporation’s mandate involves managing the alternative assets held in Kazakhstan’s foreign reserves. Three SWFs falling into this category are the Hong Kong Monetary Authority (HKMA) and the State Administration of Foreign Exchange (SAFE) in China, and the Saudi Arabian Monetary Authority (SAMA). Some analysts do not consider these entities to be SWFs given the pre-eminence of their foreign exchange management mandate. However, in all three cases, forex management is executed using very particular risk models that make it possible to place large fractions of these funds’ portfolios into foreign equities worldwide. Both the HKMA and SAFE have backed initiatives promoting investment in sustainable infrastructure projects.
- **Hybrid mandates:** Several funds have multiple or hybrid mandates, the most common being a dual stabilisation and savings mandate like that of Angola’s Fundo Soberano, the State Oil Fund of the Republic of Azerbaijan (SOFAZ), Botswana’s Pula Fund, and Trinidad and Tobago’s Heritage and Stabilization Fund. Other SWFs isolate these mandates using discrete sub-funds. The Nigeria Sovereign Investment Authority (NSIA), for example, has three sub-funds: one focuses on stabilisation, one on savings and one on investment in local infrastructure. Chile has instead taken the approach of setting up two funds with distinct mandates: one for stabilisation and the other for the management of pension reserves. In general, a fiscal rule is applied to most SWFs that governs the resources they receive and how much the government is permitted to withdraw for fiscal stabilisation or economic development purposes. Such rules are applied to Norway’s GPF, the Kuwait Investment Authority (KIA), Singapore’s GIC and Temasek, etc.

Except for the stabilisation funds, all these kinds of SWF are well placed to invest in green assets and to include green investment criteria, and they have the potential to make a substantial contribution to the achievement of the SDGs. Stabilisation funds require very liquid portfolios

to combat unexpected resource price changes or unanticipated extreme currency situations. Nevertheless, it is possible for both intergenerational saving SWFs and pension reserve SWFs to align their long-term investment strategies with sustainable goals and green investments. Also, reserve management SWFs may be able to invest in green assets in cases where an excess of reserves enables them to adopt a long-term strategy of broadening their portfolio to include alternative asset classes such as real estate or infrastructure. This approach has been taken by both the SAFE and SAMA, as detailed in Part II.

The economic development SWFs, known as sovereign development funds (SDFs), play a central role in economic transformation and development and, as such, have the potential to align national economies with the SDGs. The case studies on the ISIF, Khazanah, Mubadala and the PIF presented in Part II show how governments can use these SDFs as tools to shape national policies and to transform and diversify the economy. Introducing sustainable development criteria would have an enormous impact and may encourage widespread replication by other investors and corporations in the SWF's home country.

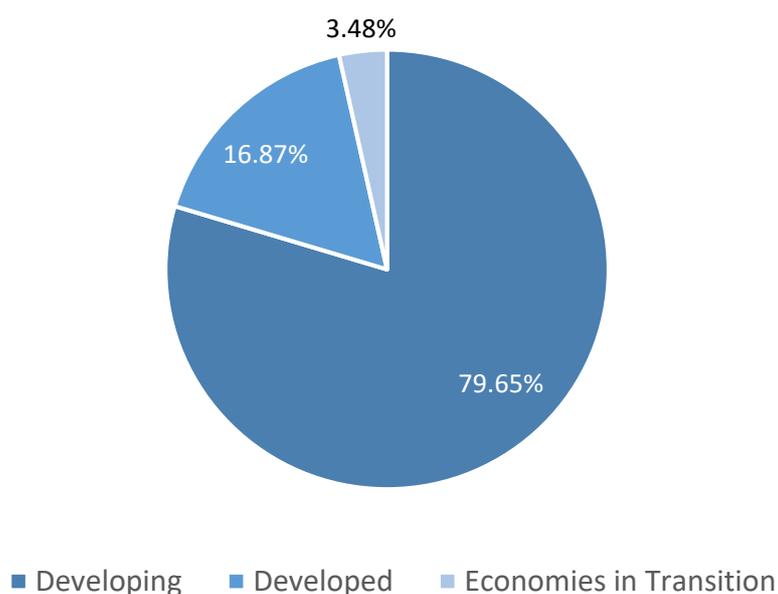
Developing and developed countries

If we group SWFs according to the United Nations country classification system (United Nations 2014), we find that developing economies hold 80% (USD 6 trillion) of all SWF assets. Developing economies – primarily China, the Middle East and Singapore – can therefore be said to be the protagonist of the SWF story so far. Conversely, developed countries hold only 17% (USD 1.3 trillion) of the sector's overall assets, and, except for Norway, no developed country has a fund managing more than USD 100 billion. The remaining 3% of total SWF assets is managed by economies in transition (Azerbaijan, Kazakhstan and Russia).

Six LDCs have an operating SWF: Angola, Equatorial Guinea, Kiribati, Rwanda, Senegal and Timor-Leste (see Table 2). Another four countries have already set up SWFs but either they have yet to receive funds and commence operations (Mozambique and Uganda) or information about the fund has not been publicly disclosed (Democratic Republic of the Congo, and Sao Tome and Principe). Section 5.3 looks at Senegal's SWF in more detail and discusses the risks and opportunities arising when LDCs set up and operate SWFs.

In total, LDCs manage sovereign wealth worth around USD 23 billion. Both Kiribati and Timor-Leste channel the government revenue they earn from their phosphate and hydrocarbon industries into their SWFs. The size of both these countries' funds is now around three times larger than their respective GDPs. In contrast, the assets managed by the SWFs of Angola and Senegal only represent 2% of the national economy, and in Equatorial Guinea and Rwanda this percentage is smaller still. In these latter four cases, however, there is plenty of room for SWFs to deliver sustainable development impacts.

Figure 3. Distribution of sovereign wealth funds by UN country classification



Source: author's own depiction of the share of total SWF assets under management (%).

Rwanda's Agaciro is particularly innovative, as it is the only SWF funded by voluntary contributions from citizens themselves, be they living at home or abroad (remittances). If SWFs are to achieve positive outcomes for the LDCs, the management of risks related to accountability and transparency and the setting of clear fiscal rules and mandates is critical.

Table 2. Sovereign wealth funds from the LDCs

Rank	Sovereign wealth fund	AuM (USD bn)	Country	Est.	SWF as % of GDP	Source of wealth
36	Timor-Leste Petroleum Fund	16.60	Timor-Leste	2005	361%	Hydrocarbon
54	Fundo Soberano de Angola	4.75	Angola	2012	2%	Hydrocarbon
65	Fonds Souverain d'Investissements Stratégiques (FONSIS)	1.00	Senegal	2012	2%	Holding SWF
68	Revenue Equalization Reserve Fund	0.68	Kiribati	1956	309%	Phosphates
77	Fund for Future Generations	0.08	Equatorial Guinea	2002	0.26%	Hydrocarbon
78	Agaciro Development Fund	0.05	Rwanda	2012	0.20%	Remittances

-	Fonds de Stabilisation des Recettes Budgétaires	N/A	Democratic Republic of the Congo	2005	-	Hydrocarbon
-	Permanent Fund for Future Generations	N/A	Sao Tome and Principe	2004	-	Hydrocarbon
-	Fundo Nacional de Desenvolvimento	N/A	Mozambique	2017	-	Hydrocarbon
-	Petroleum Revenue Investment Reserve	N/A	Uganda	2015	-	Hydrocarbon
TOTAL		23.16				

Source: author's own work.

2.2. Investment objectives, trends and performance

- SWFs invest in diversified global portfolios.
- SWFs are increasing their exposure to alternative asset classes.
- Infrastructure and real estate are SWFs' preferred asset classes for direct transactions.
- Large SWFs are sophisticated investors leading venture capital deals and complex infrastructure deals globally.
- SWFs prefer developed markets to developing economies.
- Professionalisation should facilitate increased exposure to long-term investments, including sustainable assets.

This section covers the main investment trends among SWFs. It analyses SWFs' growing exposure to real assets, technology and green investments, and describes the geographical distribution of SWFs' investments. It then looks at the co-investment and solo strategies adopted by SWFs, and finally concludes with a reflection on the risks and advantages of having stronger in-house investment capabilities.

What have SWFs been investing in since the 2008 global financial crisis?

The available datasets on SWF transactions show that the sector has made an impressive shift towards private markets. A collaboration between the IE Business School's Sovereign Wealth Lab and the Sovereign Wealth Center used the latter's transaction database to identify the most important and relevant trends in the SWF sector and revealed the following major change:

In 2002, SWFs managed less than USD 600 billion, with nearly 43% of these assets allocated as listed equities and 48% as cash and fixed-income securities (see *Figure 4*). The remaining 9% was invested in private markets. In 2007, at the dawn of the global financial crisis, the figures were still fairly similar, with listed equities (47%) and cash and fixed-income securities (41%) overshadowing private markets (12%). By the end of 2015, however, this picture had been partially reversed. For the first time, SWFs were shown to be investing more in private markets (29%) than in cash and fixed-income securities (28%). Listed equities, however, remained at the same levels (42%).

This change represents one of the sector's big investment trends, especially when we consider that the size of the sector has almost tripled since the global financial crisis. The 12% allocated to private markets in 2007 represented USD 288 billion. Eight years later, this sum had increased 460% to USD 1.6 trillion. In comparison, the increase in the total allocation to cash and fixed-income securities was only 66% and to listed equities was 113%. In 2015 a massive USD 1.3 trillion was injected into the global private markets, providing new sources of capital for areas such as real estate, infrastructure and venture capital.

In 2016 the same trends continued. SWFs, either directly or through wholly owned subsidiaries, completed 291 transactions, 248 of which were acquisitions. Temasek and its affiliates (including its venture capital holdings) were particularly active, completing 89 transactions that year, 38 of which were in the technology sector. SWFs participated in deals with an aggregate value totalling nearly USD 160 billion, with the three sectors of finance, infrastructure and real estate attracting the most capital.

In terms of the aggregate value of deals, China's CIC dwarfed other sovereign investors, closing deals totalling over USD 40 billion in 2016. Over half of this value involves very large infrastructure transactions made as part of three consortia deals: two in Australia (Asciano, a port and rail freight company, and the Port of Melbourne) and one in Brazil (the acquisition of Petrobras' natural gas pipelines unit). These three deals are each valued at over USD 5 billion.

Box 1. Data on sovereign wealth fund transactions: an important methodological caveat

Respected and mature data providers such as Bloomberg and Thomson Reuters often struggle to track SWF investment activities. One of the main issues causing these difficulties lies in precisely defining what constitutes an SWF. With the lines between sovereign funds, central banks, foreign exchange managers, pension funds and state-owned enterprises somewhat blurred, a lot of data is missed. Other key issues are that: SWFs are largely a feature of developing countries, and data providers often fail to provide accurate data on non-OECD countries; reporting requirements for stock exchanges in developing countries tend to be weaker than those set in developed economies; and many SWFs' investments are made in developing regions (South–South deals), which exacerbates the inaccuracy of databases. Geography is not, however, the only factor to consider.

As this part of the study will show, many SWF investments are conducted in concert with other investment peers. However, data providers are unable to split out the amount invested by the SWF from the sums contributed by co-investors (usually due to a lack of reporting requirements for private market deals). Probably the best example of how inaccurate the data providers can be is their treatment of investment rounds in venture capital deals, precisely because these private market deals tend to be opaque and generally include multiple investors. These deals are, however, usually below the USD 100–200 million mark. The problem is much greater when consortium investments are made in sectors such as real estate or infrastructure, as the lack of precise information on the weight of each investor can produce distortions in the data reaching into the billions of dollars.

Last but not least, many SWFs' investments cannot be traced because they are invested through third-party asset managers. All the investment positions of SWFs acting as limited partners in private equity, infrastructure or venture capital funds remain invisible unless the SWFs make efforts to detail such positions. Such efforts are not, however, usually made.

SWF specialists and researchers know that the lack of consistent databases is one of the main barriers to conducting good panel data analysis. In light of the above, three main reasons for this can be identified: (a) lower reporting requirements in developing countries, (b) consortia deals that make it difficult to isolate the weight of the SWF in each transaction, and (c) the lack of information about the SWFs' limited partner positions in *third-party funds*.

The rapid growth of private markets: real estate and infrastructure

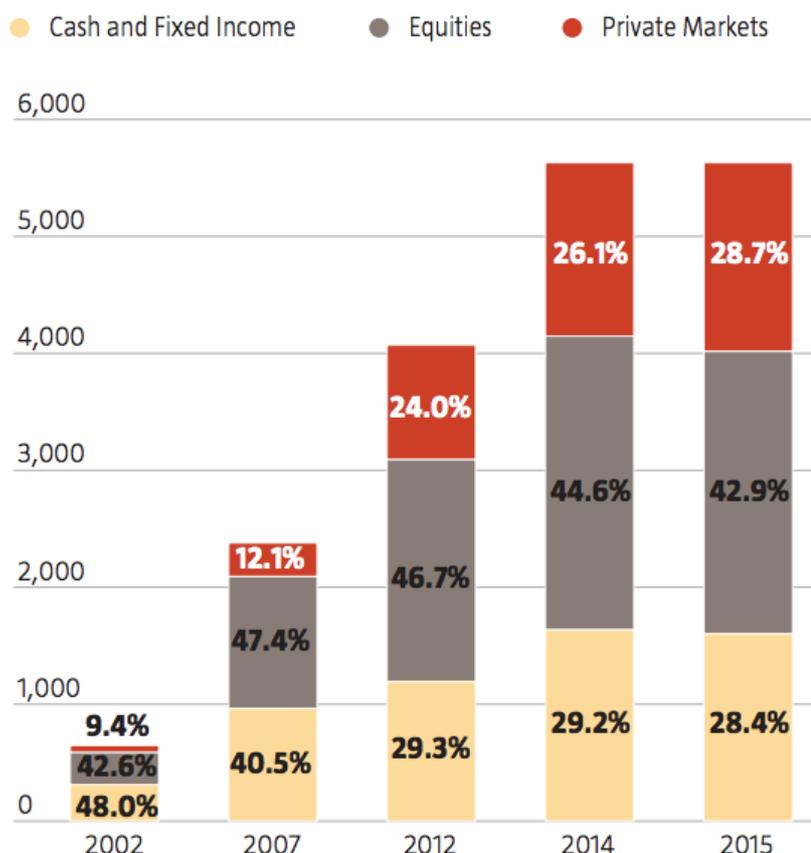
Alternative asset classes have become predominant in SWF strategies. In 2016, SWFs spent 62% of all foreign direct investments on real estate and infrastructure, whereas only four years earlier this figure averaged below 30%.

Given the uncertainty in the listed equity markets, the low yields on fixed-income securities and the sustained value of real assets, SWFs have begun opting for the latter as an alternative investment choice. These asset classes are attractive to long-term and large institutional investors because of their low volatility and the inflation-adjusted steady income streams they offer.

All SWFs with assets above USD 100 billion have invested in real estate, which reinforces the idea that real estate is needed to diversify large portfolios. In 2013 NBIM reached this very conclusion, deciding to include real estate in its portfolio. With a total of nearly USD 1 trillion of

AuM, NBIM planned to invest 3% of its asset base in real estate, which equates to an injection of USD 30 billion in global real estate markets. It is now one of the most important players in the real estate sector. If other SWFs also decide to enter into a new asset class, this may engender similar major distortion effects at the global level.

Figure 4. Sovereign wealth funds’ asset allocation (2002–2015)



Source: Sovereign Wealth Lab (2016), based on its own data and data from the Sovereign Wealth Center.
 Note: Millions of USD.

However, according to an analysis performed by the research company Preqin, many SWFs still have a long way to go to reach their own targets for real estate asset allocation and are still parking capital in other more liquid asset classes such as cash and fixed-income securities.

When the market conditions allow them to reallocate, SWFs deploy more capital in private markets. This tendency is evidenced in the lists of the largest transactions made by SWFs every year since the financial crisis, which always feature real estate transactions. For instance, of the ten largest deals of 2015, five were in real estate involving new real estate developments, hotels, offices and residential niches.

SWFs are investing heavily in logistics and industrial assets in particular. SWFs from China, Norway and Singapore have all invested in logistics companies in Europe and the United States, and in 2016 this sub-sector was the most popular real estate investment option (26.5% of all real estate investments). That same year, GIC acquired P3, a European warehouse owner and developer, for USD 2.5 billion. This was the single biggest real estate deal that year, outstripping other investments in luxury hotels and expensive office buildings. In the first six months of 2017, as a result of the CIC’s major acquisition of Logisor, logistics’ share of the overall real estate

assets held by SWPs grew exponentially to 76%. The CIC acquired Logikor from Blackstone for USD 13 billion, defeating a competing bid led by Temasek.

Interestingly, it is the SWFs' own long-term investment strategies that are prompting this major shift. The expected growth of retail and ecommerce sales has driven investments in logistics because, to run an effective delivery system, ecommerce giants like Amazon, Alibaba and Flipkart need proper warehouse and logistics networks. SWFs have identified this need and are positioning themselves to profit from the upside of a market that looks set to continue growing over the coming decades. The fact that SWFs are able to identify long-term changes in consumer behaviour reflects their ability to anticipate secular trends. This places sophisticated SWFs in a very strong position for investing in the green economy and, over the coming years, for taking a lead on sustainable investing.

Infrastructure has also become an increasingly important asset class for SWFs. Investments in infrastructure are additionally influenced by the wider trend towards increasing exposure to private markets because of the current low interest rate environment and the long-term and stable financial returns it offers. According to Preqin, 63% of SWFs invest in infrastructure. While there are obvious exceptions among the largest SWFs (GPF, for example, has no infrastructure exposure), the sector has attracted the attention of SWFs. The lion's share of infrastructure investments are, however, controlled by a handful of sophisticated large investors: from 2014 to 2016, Abu Dhabi, China, Kuwait, Qatar and Singapore accounted for 98% of all SWF infrastructure dollars spent (IE Sovereign Wealth Lab 2017).

The largest deals of 2015 and 2016 included infrastructure deals. The preferred destination for SWF dollars spent on infrastructure was Australia, as the country is running an AUD 100 billion privatisation programme to finance new infrastructure developments. For example, the privatisation of Australian TransGrid, a public electricity transmission company, attracted both the ADIA and Wren House Infrastructure (a wholly owned subsidiary of the KIA), which teamed up with local partners to acquire the 99-year lease. In 2016 the bid for the 50-year lease of the Port of Melbourne, the busiest cargo port in the country, attracted the interest of SWFs, which competed against another shortlisted investor consortium backed by two public pension funds. In the end, the consortium backed by Australia's Future Fund and China's CIC beat its competitors by a small margin, acquiring the port for USD 7.3 billion. In mid-May 2017, Endeavour Energy, one of Australia's largest power grid utilities, was partially acquired for USD 5.6 billion by a group that includes the Qatar Investment Authority (QIA). This huge privatisation programme will continue to attract SWF participation.¹²

European infrastructure has also received attention over recent years. In February 2016 Wren House Infrastructure, the KIA's specialised unit, joined a consortium of investors that bought London City Airport for USD 2.8 billion. In 2017 the CIC and QIA invested about USD 1 billion to buy a controlling stake in the gas distribution division of the UK's power network operator National Grid. The total cash deal was USD 4.55 billion, excluding debt.

The investment of SWF capital is not, of course, limited to mature markets and their attractive regulated utility markets. The CIC, for example, has also participated in deals in Latin America and Central Asia, and in 2016, as part of a consortium with the Canadian asset manager Brookfield, it acquired Petrobras' natural gas pipelines unit for a reported USD 5.2 billion. The ADIA also acquired a 20% minority stake in the Chilean arm of Abertis, the Spanish motorway developer and operator, for USD 554 million.

¹² This, in turn, highlights the paradoxical situation where countries privatise state-owned companies that end up being acquired by funds owned by foreign governments.

The presence of regulatory and foreign exchange risks still prevents SWFs from playing a larger role in Latin America's infrastructure space. The lack of risk-adjusted opportunities in sub-Saharan Africa deters SWFs from investing in that region too. Innovative solutions designed to overcome the risks and fears associated with investing in infrastructure in these regions would also facilitate investments in sustainable and eco-friendly infrastructure. Indeed, the traditional challenges that institutional investors face when investing in the infrastructure of emerging markets also apply to many green investments. These challenges include:

- regulatory uncertainty – critical in the case of power purchase agreements or transport;
- development risk – in developed markets most SWFs or institutional investors acquire existing infrastructure assets whereas projects in emerging markets more often than not involve greenfield sites, which adds challenging construction risks to the models;
- due diligence – performing due diligence on the deal and the partner can be more complicated and thus riskier in developing countries as the required information may be lacking;
- the size of equity deals – in emerging markets equity deals tend to be smaller, which provides the rationale for investing in platforms like IFC vehicles;
- other considerations – weak rule of law, currency risks and political uncertainty.

Investments in developing economies also present opportunities: they may provide attractive yields, portfolio diversification and impact. However, they require the adoption of a very different risk profile.

SWFs and start-ups: elephants and unicorns

In recent years, SWFs have been opting to invest in technology. Unicorns (tech-based companies backed by venture capital funds and valued at over USD 1 billion) are attracting the world's largest investors, the elephants among institutional investors that are the SWFs. So-called sovereign venture funds are taking large positions in the technology, digital and innovation sectors. While the logic underpinning these sectors is certainly coherent with sustainable investments, it is safe to say that only those who bet on the next market leaders will obtain long-term rewards. Investing in incumbents is another option, but this may be riskier for SWFs seeking a long-term return. Investing in any sector that can be rapidly disrupted is also a risk that any long-term investor should consider.

From health to software, fintech to artificial intelligence, semiconductors to ecommerce, SWFs are increasingly betting on innovation and technology as no one wants to miss out on the opportunities arising in the future's leading companies and economic sectors. For this reason, numerous SWFs have opened offices in the places where innovation flourishes. Malaysia's Khazanah, Singapore's GIC and Temasek, the QIA and the CIC have all opened offices in Palo Alto, California. The CIC's Silicon Valley office is the most recent to appear, opening in 2017. It is particularly telling that, of the 10 highest-valued tech start-ups, SWFs have invested in seven of them (see Figure 5). Temasek and GIC are the largest SWF investors in these sectors, followed by the QIA and CIC. Others will certainly follow suit.

Figure 5. The 10 highest-valued tech start-ups and the participation of SWFs



Source: author's own work based on information gathered from crunchbase.com and SWF websites.

For many SWFs, investing in start-ups and high-tech companies was, even recently, an impossibility. For others, it has been an everyday, commonplace activity. The same can be said of green investments, as many SWFs consider investing in green assets to be a new frontier. The different degrees of sophistication and in-house capabilities found from one SWF to another once again reflect the heterogeneity of the sector. Later on, particularly in sections 4 and 5, we will look at current trends in green investing and discuss how and why SWFs are well equipped to exploit these often unexplored opportunities.

While SWFs regularly compete against each other on specific deals, the same SWFs may choose to cooperate with each other on certain deals. Such cooperation can happen in large-scale real estate and infrastructure deals, but it is more common in the venture capital space. A famous case of SWFs supporting rivals involves the growing niche of ride-hailing platforms. California-based Uber, the world's highest-valued start-up, has been supported by Saudi Arabia's PIF and Qatar's QIA, whereas Didi Chuxing, Uber's rival in China, is supported by Temasek and the CIC. In China, the home-grown ride-hailing app won the day, prompting Uber to sell its Chinese operations to Didi Chuxing, which were paid for in shares in the latter. In Singapore, Uber's local rival Grab is also supported by the CIC and Vertex (which is wholly owned by Temasek). In India, Ola Cabs is backed by GIC and the PIF, which also support Uber.

Geographical distribution of SWFs' investments

An analysis of the geographical distribution of SWFs' investments reveals that, since the global financial crisis, the majority of these investments have been made in developed economies. The United States and Europe are the traditional destinations of SWF equity investments, and the geopolitical concerns in the United States and the United Kingdom appear to have impacted little on the SWFs' investment choices. China's mega deal to invest in Logicor, a logistics company whose largest warehouse portfolio is based in the United Kingdom, and the acquisitions of New York real estate and technology companies by Middle East funds confirm that the SWFs involved do not fear these particular risks and that they are taking a longer view with regard to these geopolitical issues.

In 2016, SWFs concentrated their investments in six countries: Australia, China, India, Singapore, the United States and – most significantly – the United Kingdom. Developed markets have therefore remained key destinations for SWF investment.

Another interesting trend that can be discerned from the geographical distribution of investments is the increasing share taken by domestic deals: in 2016, 40 deals were home-country transactions, most of which took place in Ireland (ISIF), Singapore (Temasek) and Russia (RDIF). When investing at home, SWFs prefer to invest in the finance, technology and infrastructure sectors.

As previously mentioned, nearly half of all foreign acquisition transactions were in the technology and real estate sectors, which shows just how important the shift towards alternative assets actually is.

Box 2. The impact of the recent low-for-longer scenario

The low-for-longer scenario (low oil prices in tandem with low interest rates) that has unfolded since the global financial crisis, and especially since the collapse of oil prices, has had been a determining factor in the SWFs' investment strategy decision-making. On the one hand, the low interest rates maintained by the Federal Reserve, European Central Bank and Bank of Japan have strongly influenced SWFs' strategic asset allocation. They have also stimulated the shift towards private markets, as shown in Figure 4, which has seen SWFs taking on larger exposures to infrastructure, real estate and other private alternatives like venture capital and potentially green investments. On the other hand, the low oil prices have had their own impact, in particular on hydrocarbon-based SWFs, which mainly derive their funds from oil and/or natural gas.

The question therefore is: how are these two mid-run scenarios – lower interest rates and low oil prices – actually affecting the way SWFs invest?

First, to address low returns on fixed-income assets, the SWFs have moved towards private markets. As indicated in Figure 4, SWFs are now investing more in private markets than in cash-related instruments and fixed-income assets. Low interest yields have forced SWFs to enter and explore new investment frontiers. The development of stronger in-house capabilities is a key consequence of entering complex private markets, and one that has the potential to impact on green investment strategies too.

While persistent low oil prices have certainly affected hydrocarbon-based SWFs, it has not been the apocalyptic scenario that some have suggested. Indeed, the data on the billions of dollars that SWFs have supposedly withdrawn from asset managers is far from clear and consistent. It is true that many oil-based economies have suffered the effects of continued low oil prices, reporting record fiscal deficits. It is also true that weaker inflows are making it more difficult to rebalance SWFs' portfolios. However, by over extrapolating from particular cases, the media has reached conclusions on the overall industry that are exaggerated.

Middle Eastern countries, for instance, have witnessed substantial shortfalls in their public finances. In 2016 Saudi Arabia raised USD 17.5 billion from a sovereign bond sale, setting a new record for emerging-market sovereign bonds. The data captured from the beginning of 2017 up to the time of writing shows that the same trend is continuing at record high levels: Saudi Arabia is again at the forefront with a debt issuance of USD 9 billion (a new record for *sukuk* Islamic bonds), followed by Kuwait with USD 8 billion. However, the reason most Middle Eastern countries issued debt last year is due to the low absolute and relative levels of debt (to GDP), and to the moderate costs of accessing the international markets during this period. The analysis of the trade-off between selling assets, including divesting SWF portfolios, and tapping international markets favoured the latter option (see Box 4 for details about the sovereign asset-liability rule). The capital of the Middle Eastern SWFs has therefore not been touched.

The low oil prices have forced certain countries, such as Algeria, Kazakhstan and Russia, to draw heavily on their stabilisation funds because of the higher costs of accessing international debt markets and the modest returns of their sovereign vehicles. However, the 'fire sale' of SWF assets affecting asset managers and global prices that has been reported in the media has yet to materialise. Even the cases of Algeria, Kazakhstan and Russia can be seen as positive in that the SWFs have served to counterbalance the sharp declines in oil price affecting these countries' national fiscal balances – this is precisely why SWFs were set up. Of course, each government will respond differently but, overall, the SWFs are fulfilling their remit as rainy-day funds.

Implications of the low-for-longer scenario for SWFs and green investment

The low-for-longer scenario described in Box 2 has direct implications for SWFs and provides a better framework for these funds to invest in green assets such as clean energy and transport, and to promote funds on green infrastructure. The main four implications are as follows:

1. In response to weak fixed-income returns and the need to diversify larger portfolios, SWFs are moving towards private markets. These changes in asset allocation strategy are not exclusive to SWFs but are a feature of the institutional investor sector as a whole (mainly pension funds). Owning real assets, such as offices, airports or toll roads, provides investors with the potential to earn return premiums on illiquid assets, protects against inflation, and makes it possible to diversify portfolios.
2. The impact of low oil prices has forced some countries, particularly Algeria, Kazakhstan and Russia, to draw on their stabilisation funds. This is to be expected as the very purpose of stabilisation funds is to accumulate wealth, normally from natural resources such as oil and natural gas, and then use these funds in periods of low resource prices to fund national budgets.
3. SWFs are not doomed. The annual investment income of Norway's SWF is higher than the total amount withdrawn by the Norwegian Government each year. Moreover, despite the significant fiscal imbalance in Kuwait, its SWF is continuing to receive the proceeds of oil in accordance with the fiscal rule. So, the low oil price may have impacted on long-term strategies but it has not consumed sovereign fund capital.
4. Despite facing growing fiscal imbalances, Middle Eastern countries have been able to issue sovereign bonds because of the low debt burden and low cost of accessing international debt markets. For the first time in years, Middle Eastern countries have issued debt, which has removed the need to draw money out of their SWF capital.

The SWFs are moving towards private markets because they need to diversify their larger portfolios and address the weak returns provided by fixed-income securities. Also, private markets and the access they provide to real assets like infrastructure and real estate fit with the long-term investment strategies typical of SWFs. A consequence of this move to private markets is the strengthening and sophistication of SWF workforces; enhancements that may have a direct effect on SWFs' capacity to establish specific and focused investment teams for green investments or to develop comprehensive green criteria when contracting external asset managers. Drawing on their experience in real estate (Norway, ADIA), infrastructure (KIA, CIC, PIF) and venture capital (Temasek, GIC), the SWFs are better placed to build green investment teams. This move to private markets, which has enhanced investment capabilities, may be expanded to the green asset teams of SWFs with large and expert asset-class investment managers. As a minimum, these enhanced capabilities will facilitate the inclusion of environment-related investments or the integration of climate-related criteria in infrastructure, real estate or venture capital operations.

2.3. Which is the most common investment model: direct, consortium or platform?

- SWFs are increasingly opting to co-invest rather than invest alone.
- Consortia deals have increased mainly in response to the nature of investments in the venture capital space, which involve more frequent and smaller deals.

- Asset-based and location-based co-investment platforms have proliferated in recent years. These platforms may ease some of the issues SWFs face when investing in green assets in developing markets.

Traditionally, SWFs mainly invested alone. However, in the last two years, more capital has been deployed in co-investment or consortia deals than in solo-investor deals. SWFs are joining forces on several fronts and building up different kinds of co-investment platforms.

While this trend once again reflects the way in which the SWFs themselves are changing, it also can be seen as a reaction to market conditions. In 2008, during the global financial crisis, the SWFs injected large sums of capital into some of the most important financial institutions in the US and Europe. The average value of these deals was over USD 600 million and the SWFs mainly invested alone (see Figure 6). Only 27% of the total value of these deals was the result of co-investment with other partners (sovereign and private). Over the intervening years, this ratio has changed. Having lost their appetite for financial investments, the SWFs are now making their largest transactions in infrastructure and real estate. Also, given the need to obtain higher risk-adjusted returns, SWFs have partnered with each other or with sector and geographic-area specialists to enter into niche markets.

Figure 6 below, which describes average deal values and co-investment deals, displays a negative correlation: the co-investment deals' share of total deals runs contrary to the average deal size. Investments in venture capital¹³ give rise to two effects that may partially explain this divergence. First, venture capital (VC) deals reduced the average value of the deal size because, on average, investments in VC have a range of USD 5–40 million, whereas large real estate and infrastructure deals are worth hundreds of millions or billions of dollars. The average deal size has therefore declined because of the increasing number of deals being made in the venture capital space. Second, the vast majority of venture capital rounds are made in consortia with other investors, which drives up the share of co-investment deals. In short, SWFs' entry into VC deals seems to have had the dual effect of lowering the average deal value and increasing the share of co-investment deals. Lastly, it should be noted that, while the venture capital exposure of SWFs has been largely driven by Singapore's two SWFs, Temasek and GIC, other SWFs from China, Kuwait and Malaysia are already following suit.

Beyond venture capital, SWFs are joining with other institutional investors such as public pension funds and experienced infrastructure and real estate asset managers to compete for large infrastructure deals. Joining consortia to bid in auctions for public infrastructure is more common today and, given SWFs' investment horizons match those of infrastructure deals, an increase in these kinds of deals has been witnessed in recent years. As mentioned previously, there is still room for more deals in this space because: (a) more SWFs may start making infrastructure deals (if Norway were to begin investing in this asset class, it would be a game-changer), (b) multilateral organisations continue to call for the mobilisation of capital for infrastructure, especially in developing countries, (c) the work of the growing number of strategic development SWFs that invest at home and have an economic development mission typically involves the creation of investment units focused on infrastructure, and (d) the establishment of institutional investment platforms will also intensify collaboration and co-investment deals. These four factors may help SWFs to increase their exposure to infrastructure, which implies that more co-investment and consortia deals will be struck in future. This expertise developed in-house as a result of co-investment in alternative assets will help SWFs to

¹³ Investments in private equity funds may have similar effects, but the quantities involved in private equity are larger than those in venture capital. The lack of data on private equity commitments does, however, mean they cannot be included in the analysis.

make green infrastructure deals either through direct investment or by committing to green-aligned funds on energy, agriculture, transport, etc. Data on SWFs' exposure to these green assets is presented in Part II.

Figure 6. Average deal value (USD million) and co-investment deals (%)



Source: author's own work based on data provided by Sovereign Investment Lab (2016).

A growing number of institutional investors are joining investment platforms, of which there are two main types: geographic and asset-based platforms. The former describes platforms that are set up by a country or regional specialist for investing in domestic or regional companies. In the SWF sphere, these platforms can be classified as foreign direct investment SWFs (FDI-SWFs). The mission of these FDI-SWFs is to encourage the investment of foreign capital in domestic companies. The SWFs of France, Italy and, to a certain extent, Ireland operate in this way. The Russian Direct Investment Fund (RDIF) is a very good example of an FDI-SWF; it has entered into co-investment project agreements with 25 other institutional investors. For investors, and often for other SWFs, investing in such platforms is an attractive way to gain exposure to specific markets and to reduce the various risks associated with developing-market investments such as regulatory and country risks (FDI-SWFs tend to be well connected to government and thus have access to critical information) or deal size risks (platforms make it possible to pool deals, and they are open to larger equity commitments). When capital from large foreign institutional investors is paired with the FDI-SWF's country expertise, it becomes easier to unlock otherwise blocked deals.

An asset-based investment platform is a globally-oriented platform led by an experienced asset-class investor. Asset-based platforms focus on specific asset classes such as clean energy, green infrastructure, power projects, farmland, and even start-ups and high-tech companies. One example of this kind of platform is the Aligned Intermediary (AI) platform, an advisory platform for long-term investors (SWFs, pension funds, endowments, family offices, foundations) that helps to identify and accelerate the flow of private capital into climate infrastructure projects. The AI platform also drives investments towards clean-energy, water-infrastructure and waste-to-value organisations. To date, nine long-term investors have joined the platform and have committed to invest USD 1.4 billion in low-carbon infrastructure projects identified by the AI. The list of AI members includes the Leonardo DiCaprio Foundation, the New Zealand Superannuation Fund (SWF), the Ontario Public Service Employees Union Trust (pension fund), the Regents of the University of California (university endowment), TIAA Global Asset

Management (financial services group) and Wafra Investment Advisory Group (services group linked to Kuwait national security funds). The AI platform shows how different investors sharing a long-term and sustainable vision can work together to generate long-term benefits in terms of returns and environmental and social impacts.

Another example is the Green Growth Infrastructure Facility for Africa (GGIF Africa), which is led by Morocco's Ithmar Capital and supported by the World Bank. GGIF Africa is a combination of the two types of platform: it has an African focus and seeks to bring in foreign capital (geographic platform), and it centres on green infrastructure (asset-based platform). Indeed, GGIF Africa exemplifies how these platforms can play both roles simultaneously. The plan now is for GGIF Africa to close an initial USD 1–2 billion fund by attracting other global infrastructure investors and SWFs.¹⁴ More information on GGIF Africa is provided in section 5.3.

Another interesting project, funded in this case by SWFs, is the Innovation Alliance. Established in 2012, this platform comprises two SWFs (NZSF and ADIA) and a pension fund manager (Alberta Investment Management Corporation). The focus of the investment is on late-stage start-ups, and the idea is to provide expansion capital to innovative companies once VC rounds are completed (engaging as early-stage private equity providers well before the prospect of an IPO arises).

¹⁴ Ithmar Capital is still in the fundraising stage for GGIF Africa. No investment has been made yet.

Box 3. SWFs and financial needs: sovereign asset-liability management

Countries sponsoring SWFs should take into account that they own assets but also face liabilities with respect to national and international security holders. It is therefore essential for these two sides to have a complete view of both the sovereign asset and liability positions. One of the main concepts supporting the establishment of sustainable financial architecture is the implementation of sovereign asset-liability management rules.

The exploration of natural resources may result in providing a government with a new source of assets. However, these assets need to be properly balanced with government liabilities. Is it better to draw resources from the asset side (natural resource funds or SWFs) or to resort to liabilities (issue new debt)? The following simple rule of thumb can help in answering this question:

- A. If the risk-adjusted cost of debt is higher than the return on assets: withdraw assets.
- B. If the risk-adjusted cost of debt is lower than the return on assets: issue new debt.

For many developing countries, the costs of debt are so high that governments in most cases draw on their SWF's assets to address budget imbalances and shortfalls. More worryingly, when developing countries have no access to debt markets, or this access is extremely expensive, they have no alternative but to tap existing resources. Governments withdraw from SWFs irrespective of the fund's investment horizon or mission, which problematises the implementation of mid- and long-term investment strategies. Opening up access to debt markets is one of the hidden advantages of successful SWFs.

At present, SWFs determine their returns on assets using narrow financial measures, which would be more useful if they were expanded to include social, economic and environmental factors. This would help to ensure better outcomes when tapping SWFs and would enhance the role of alternative debt issuance. Ireland's long-term and sustainable strategy for sovereign wealth, which incorporates a double bottom line, exemplifies such an approach. When the return on assets includes social, economic and environmental factors (e.g. economic activity support or job creation), the returns can be measured more accurately (see Box 5), which provides greater clarity when deciding whether to issue debt or draw on assets.

The Middle Eastern SWFs' recent accessing of debt markets offers a good example of how to properly manage the sovereign asset-liability issue. Most of the Middle Eastern countries with SWFs had insignificant debt burdens in 2015 and 2016, following the collapse in oil prices from their 2014 peak. With the debt-to-GDP ratio minimal in many countries, the Middle Eastern states with SWFs opted to access debt markets as doing so was cheaper than the opportunity cost of tapping profitable SWFs.

3. Principles and strategic governance of sovereign wealth funds

3.1. The Santiago Principles and the International Forum of Sovereign Wealth Funds

- Launched by the IFSWF in 2008, the Santiago Principles (SP) are guidelines that promote good governance and accountability among SWFs.
- The main goal of the SP was to ease recipient countries' fears about SWF investments, in particular assuring them that SWF investments were made on a commercial basis and were not politically influenced.
- Today the IFSWF focuses on three C's: compare, collaborate, co-invest.
- When SWFs are more transparent and accountable, they are more open to incorporating sustainable investment policies.

The Generally Accepted Principles and Practices (GAPP), known as the Santiago Principles, is a set of 24 voluntary principles designed to promote 'good governance, accountability, transparency and prudent investment practices' among SWFs. The Santiago Principles were introduced in October 2008 by the predecessor to the International Forum of Sovereign Wealth Funds (IFSWF). The latter is a global voluntary organisation for sovereign wealth funds that currently comprises 32 members. The IFSWF is the largest and most important association of SWFs globally – its 32 members collectively represent around 70% of all SWF assets under management – and it remains the driving force behind the Santiago Principles.

The Santiago Principles are a 'code of good conduct' that opens up a space for dialogue and for deepening our understanding of SWF activities. The four main objectives of the Santiago Principles are:

1. To help maintain a stable global financial system and free flow of capital and investment.
2. To comply with all applicable regulatory and disclosure requirements in the countries in which SWFs invest.
3. To ensure that SWFs invest on the basis of economic and financial risk and return-related considerations.
4. To ensure that SWFs have in place a transparent and sound governance structure that provides adequate operational controls, risk management, and accountability.

The main requirement for those joining the IFSWF is that they voluntarily endorse the Principles.

The Santiago Principles have helped SWFs to increase transparency and disclosure. However, the pace of change towards more transparent and consistent governance schemes is slow and challenging. One of the main setbacks occurring in the short history of the IFSWF was the departure of one of its most influential members: Norway's GPF. Adrian Orr, Chair of the IFSWF, noted the Forum's members were not making sufficient progress, stating that the pace 'on this front [transparency, accountability, good governance] has not been fast enough, and IFSWF's relevance as a Forum of sovereign peers is threatened' (IFSWF 2016).¹⁵

The IFSWF has encouraged its members to redouble their efforts to improve transparency, reporting and the general quality of governance. In 2017, 29 of the 32 IFSWF members

¹⁵ While one may surmise that this is the reason the GPF left the group, the reasons for its exit have not been publicly disclosed.

submitted self-assessments of their compliance with the SP. For the IFSWF, the purpose is clear: compare investment practices, collaborate by, for example, establishing long-term risk and performance metrics, and foster co-investments. The impact of technology and the growing acceptance of responsible investment (active ownership and sustainable investment) represent new governance-related challenges for SWFs.

However, while these efforts to promote transparency have delivered important improvements, they now seem to be running out of steam. This may explain why the IFSWF, in addition to fostering transparency and accountability, is emphasising new messages such as compare, collaborate and co-invest. On the one hand, the reputation of the largest SWFs among their institutional-investor peers¹⁶ would seem to indicate that these funds have achieved a sufficient level of transparency. The ADIA GIC, KIA and QIA, which rank in the lower half of the transparency ratings (Behrendt 2016), fall into this category. On the other hand, the renewed interest of IFSWF members in serving as development SWFs is potentially detrimental to accountability and transparency, because domestic investments increase the likelihood of political interference (Bauer 2017). The main reason the Santiago Principles were established was to avoid such political interference in investment decisions and, instead, to ensure that SWFs invest on the basis of economic and financial risk and return-related considerations.

The topic of transparency and accountability therefore remains one of the most controversial issues in the SWF sphere, and its implications for sustainable investments remain unclear. What is clear is that only well-governed SWFs are able to endure in the face of complex macroeconomic conditions, periods of domestic economic stress, and political interference. Note that SWFs may establish strong accountable processes for their sole shareholders (i.e. governments) but remain fairly opaque according to the measures of transparency indexes. Therefore, well-functioning does not necessarily imply public disclosure. The fact that key investors in green assets such as the SAFE and ADIA rank low when it comes to disclosure raises questions about what the most effective strategies might be for increasing SWF investment in sustainable assets.

In principle, transparent operations should encourage imitation among institutional investors both at home and abroad. Transparency also facilitates the development of responsible investment strategies (a subject that is developed in Part II's discussion of engagement with management and boards) and active ownership in portfolio companies. As interest in transparency and accountability grows, so does interest in the monitoring role played by SWFs. SWFs' traditionally passive and low-profile shareholder role is being replaced with more active shareholder strategies. There are already cases of SWFs from different regions and backgrounds blocking the board decisions of companies in which they own an influential stake and voting in favour of climate-related policies.

Membership of the IFSWF may therefore serve to reinforce the message of responsible investment strategies. Peer pressure within the Forum and collaboration and comparison between its members may encourage SWFs to align with greener initiatives. The IFSWF adopted climate change as the main theme for its 2016 Annual Meeting, at which the Forum agreed to explore the investment implications for SWFs of the global commitment to curb greenhouse gas emissions. Getting Forum members and observers to share and exchange best practices would promote the implementation of green criteria in the investment process, educate and build the capacity of internal and external managers on climate-related topics, and help members to identify low-carbon investment opportunities.

¹⁶ The IFSWF faces 'the risk that the implementation of the Santiago Principles remains unfinished business. A substantial number of SWFs still have not reached satisfactory levels of disclosure' (Behrendt 2016).

Moreover, of the 1,800 signatories of the Principles of Responsible Investment (PRI), only five are SWFs, four of which are members of the IFSWF (the fifth being the former member Norway). The more SWFs achieve in terms of transparency, reporting and good governance, the more they are likely to participate in initiatives that engage institutional investors in carbon footprint transparency or to invest in low-carbon initiatives and platforms.

For its part, the link between governance and sustainable investments is clearer: when SWFs are well governed, they are better able to diversify their investment teams, hire national and international talent, and successfully enter into complex asset classes (e.g. infrastructure and agriculture). This professionalisation can be repurposed to support low-carbon initiatives both at home and abroad.

3.2. How in-house capabilities affect SWF governance and sustainability

- SWFs with higher in-house capabilities benefit from lower management fees and fewer agency issues.
- Insourcing should be undertaken with care, as it may result in worse deal sourcing and higher costs in the mid and long term.
- With insourcing it is possible to develop long-term strategies and, in so doing, facilitate access to sustainable investment strategies.
- Ireland's SWF is a particularly good example of a fund that focuses on domestic economic development, and one that may provide a blueprint for other SWFs. The fund's performance is evaluated using two criteria: financial and economic returns.

While the SWFs' move towards a greater reliance on in-house capabilities has positive consequences, it also increases risk in several areas. In the following, we will look in more detail at this change and its associated outcomes and risks and see how it directly impacts on the development of sustainable investment strategies.

SWFs are both hiring external talent and developing their own pool of national talent. The agreements that the SWFs of Abu Dhabi, China and Kuwait have signed with international education partners demonstrate their intentions to professionalise and develop their workforce, and thus reduce their reliance on external managers. This shift has three main consequences for SWF governance:

- (a) Direct investments reduce intermediation costs and have the potential to increase net-of-fees returns. Instead of using external managers, SWFs carry out their own direct investment and thus avoid having to pay the fees charged by these managers. The result is improved net-of-fees returns.
- (b) Investing directly reduces agent costs and increases bargaining power when negotiating with third-party managers. Developing stronger internal investment teams helps in setting internal benchmarks as well as criteria for peer-to-peer comparison. As a result, the SWFs have more bargaining power when negotiating the fees to be paid to external managers.
- (c) Developing stronger internal teams facilitates direct investments in more complex or niche sectors. Venture capital investments are a case in point. To access venture capital, both Temasek and GIC have developed strong in-house capabilities and reconfigured their organisations, setting up specialised teams or subsidiaries. These funds are now much more highly active in the VC sphere than are other SWFs, which have not undertaken the same kind of organisational and developmental change process.

However, insourcing also has drawbacks. Investing directly implies increased salary costs (due to workforce expansion) and/or training costs, which smaller SWFs in particular may not be able to afford. It also involves dispensing with the services of asset managers who have global experience and deal-making expertise. If the process to bring this function in-house is poorly executed, SWFs may struggle to identify appropriate deals, especially in non-regulated private markets. Furthermore, while investing in niche markets maybe attractive in terms of potential returns, funds lacking sufficient experience that do so face higher risks. It is therefore crucial to understand how mature the SWF is before encouraging it to enter unaided into complex investments.

If investments are to be sustainable, insourcing must be carefully designed. Only SWFs with strong in-house teams will be able to implement climate change investment strategies because of the complex nature of these strategies and the need to evaluate and include climate risks in the risk matrix. SWFs that have already designed their own internal benchmarks, and are thus better equipped to incorporate climate issues in the investment process, would also benefit from having stronger in-house capabilities. Furthermore, SWFs that have established low-carbon strategies and also invest directly will be able to avoid any potential misalignment between external portfolio managers' operations and the SWFs' green goals. As discussed in Part II, misalignment between asset owners and asset managers in part explains why so few resources are allocated to low-carbon investments. SWFs that invest directly and have established internal teams are better equipped to demand low-carbon investment strategies from their asset managers or to draw up these strategies in-house. Smaller SWFs that lack sufficient scale would need to acquire climate expertise before issuing climate-oriented mandates to their external asset managers.

Insourcing and sustainable investments are also related in a different way. Accurately defining the mission is one of the most important governance practices of an institutional long-term investor. The cases of Brazil and Venezuela show how inconsistencies between the mission and actual operations represent a hard hurdle that may damage the whole project. However, when the SWF's mission is well defined and reflects the importance of long-term goals, the push towards insourcing and sustainable growth strategies is stronger.

Insourcing mitigates the conflicts that arise when co-investing or delegating to third-parties that have no long-term missions. Insourcing and developing internal capabilities can also support the introduction of investment criteria and benchmarks that are tailored to the particular characteristics of individual SWFs. By nature, SWFs look to consider long-term trends, which implies that the inclusion of Sustainable Development Goals would be desirable. Also, those SWFs already investing in long-term assets should find it easier to transition to green investments because they will have insourced many investment processes and are investing independently or in partnership with other institutional investors. Conversely, funds that have less experience of investing in long-term assets may face difficulties when entering into green asset classes, as they tend to involve a longer time frame and more complex assets. The case of the transformation of the ISIF exemplifies how a clear mission and beliefs, the alignment of governance and operations, and the availability of internal capabilities can support the development of sustainable methodologies to measure returns not only on financial grounds but also in terms of their impact on economic development (see Box 4 for more details).

The main lesson to derive from Box 4 below is that Ireland has developed a particular model that would be of benefit to sovereign development funds (SWFs with economic development missions) were they to adopt it. Of course, only time will tell whether this model has been fully effective in Ireland and whether it can be implemented in other settings. However, the model has the potential to achieve big gains in terms of sustainable policies and economic and social

development, and those replicating this model could have a huge impact on the sustainable development of their domestic economies. Other development SWFs may choose to adopt similar approaches, measuring returns on investments using economic impact criteria. However, there is a danger that loose definitions of 'economic development' may be employed that could hide inefficient or politically driven domestic investments. The risk of this happening is higher in countries with fewer talented individuals, weaker regulations and accountability, and poorer investment opportunities. One way to overcome this issue is to set up FDI-SWFs to attract other SWFs and institutional investors (pension funds, the IFC, financial development institutions), which would act as a counterweight, helping to prevent potential deviations from economic and sustainable development.

Box 4. A change of mission: transforming the NPRF into the ISIF

In 2014 the National Pension Reserve Fund (NPRF) of Ireland changed its mission and investment scope. Similar to Australia's Future Fund and the NZSF, the NPRF's role was to generate financial returns from an international portfolio to help reduce the country's future pensions bill. However, following the global financial crisis, it was decided to transform the NPRF into a sovereign development fund. In 2014 the National Treasury Management Agency Act kick-started the legislative process that changed the NPRF into the Ireland Strategic Investment Fund (ISIF). In the following year, the ISIF's investment strategy was published, a new investment committee was set up and a team of 35 professionals began working on the Fund's new objectives. To date, the Fund has committed EUR 2.2 billion and has attracted EUR 5.4 billion via co-investments. So, for every euro that the ISIF has invested in Irish projects, it has attracted more than 1.5 euros, thus more than doubling the impact of its investments.

The main transformation has, however, been in the Irish SWF's mission, which now provides the Fund with a unique and challenging mandate and sets a double bottom line to 'invest on a commercial basis to support economic activity and employment in Ireland'. The concept of investing on a commercial basis is familiar to IFSWF members, who are encouraged to invest 'to maximize risk-adjusted financial returns'. Supporting economic activity and employment, however, represents a new role: the 'development SWF'. Taking on this new role has required the introduction of new and updated economic conceptual frameworks. To make sure that ISIF's investments deliver substantial economic benefits (increased economic activity and employment), the SWF's investment decisions are assessed using the following criteria:

Additionality, which refers to the economic benefits additional to gross value added/gross domestic product that are likely to result from the investment in question, over and above what would have occurred anyway.

Displacement, which refers to instances whereby the additionality created from an investment is reduced or made smaller at the level of the overall economy due a reduction in economic benefits elsewhere in the economy.

Deadweight, which refers to instances whereby the economic benefits created from an investment would have been achieved in any event in the absence of intervention.

In general, the ISIF looks to support Ireland's economic activity and employment, while generating commercial returns. It looks for additionality that avoids or limits displacement and deadweight. What exactly is the economic impact? The economic additionality refers to an increase in output (turnover), profits (operating surplus), employment, net exports and capital expenditure.

The ISIF evaluates each deal using the double bottom-line. For commercial returns, it looks at factors including the characteristics of the company managers, the co-investment partners and the particularities of the sector in question. For economic benefits, it evaluates capital expenditure, job creation, research and development, international expansion, etc. As a long-term investor, the ISIF is seeking to achieve sustainable additionality, as this will have 'a more prolonged effect on economic activity and will result in a greater impact than one-off, short-term gains'.

PART II. SOVEREIGN WEALTH FUNDS AND THE SUSTAINABLE DEVELOPMENT GOALS

4. Where do institutional investors stand on climate change today?

- To bend the emissions curve by 2020 would require the investment of at least USD 800 billion of private resources in climate action each year.
- The main challenges involved with climate change assets are the lack of transparency, risk measurement, and fears of losing out on returns as a result of investing responsibly.
- Companies' and investors' disclosure efforts should help to achieve standardisation of the financial disclosure of climate-related risks.

According to the most recent report by Principles for Responsible Investment (PRI) and Novethic (2017), which analysed the findings of a review of 1,200 investors, asset owners and managers are now moving forward on climate action. However, to ensure a consistent impact over the coming years, climate change needs to be incorporated in investment strategies.

The PRI-Novethic report reveals that, in 2017, 74% of asset owners who responded to the above-mentioned survey were taking action on climate change (of any kind) and see low-carbon investment as one of the most important long-term investment trends, ahead of technology developments and demographic changes. In 2016 this percentage had been similar.

The report also shows that 60% of asset owners worldwide look to exert an influence in their portfolio companies with regard to climate change issues. Asset owners are establishing different engagement strategies with their portfolio companies to increase transparency and reporting and also to reduce the carbon impact of these companies' operations. While it is not yet clear how to do this consistently and efficiently, Norway's engagement strategy, discussed later on in section 5.2, offers an example. The first step in taking active ownership is to harness shareholder voting rights, aligning voting to green attitudes directly or through proxy advisors.

Looking forward, the only way to limit global warming by 2030 is to bend the emissions curve by 2020. This requires the investment of at least USD 800 billion from private sources and USD 200 billion from public finances in climate action each year in areas including energy, infrastructure, transport, land use, heavy industry and finance (PRI-Novethic 2017). However, this mobilisation of resources remains a huge challenge. Even though asset owners and managers are targeting low-carbon or climate-resilient investments or are using emissions data to inform investment decision-making, only 17% of asset owners have established a climate-change-sensitive or climate-change-integrated asset allocation.

Many of the challenges institutional investors,¹⁷ and SWFs in particular, face when increasing their allocation of climate smart investments can be grouped into three categories:

- Lack of transparency and the difficulty of risk measurement and management.
- Fears that an environmental, social and governance (ESG) focus will be detrimental to overall performance in terms of financial returns.
- Lack of clear national roadmaps on and societal demand for climate action.

¹⁷ Part III specifically focuses on the challenges SWFs face when making green investments.

The lack of information and proper risk management tools is a key hurdle for institutional investors, making it difficult to access green opportunities directly. Investing through funds and developing and implementing green criteria in-house are also costly undertakings. Even though new tools like Sustainalytics or MSCI are now available, institutional investors tend to think that green investment opportunities are scarce and difficult to integrate in their asset allocation strategy. Other factors that limit investors' use of climate information are its lack of comparability across firms, the lack of appropriate quantitative environmental information and the lack of sufficient material information. Also, the cost of data gathering and analysis may be too high (CFA Institute 2017).

Many institutional investors still think that green investments provide lower returns than traditional benchmarks or that climate risks will not generate material differences, thus the focus on green investments adds no value. The most recent studies providing evidence that greener strategies yield as good returns as general strategies have not reached most institutional investors. Yet, in its most recent New Energy Finance Report (BNEF 2017), Bloomberg analysed clean energy index funds with a focus on companies active in renewable and low-carbon energy, and which stand to benefit from responses to climate change and energy security concerns. The performance of these specific funds was shown to be slightly worse than that of the general Nasdaq index and of Standard and Poor's (S&P) 500 indexes when analysed over 3-, 5- and 14-year time horizons. A comparison of the MSCI World ESG Leaders index against its parent, the MSCI World index, also reached the same conclusions. Conversely, evidence provided by BlackRock, the world's largest asset manager, shows that its low-carbon fund performs slightly better than its parent, BlackRock's most global passive index fund.

These mixed results continue to influence many asset owners' decision-making processes and result in substantial inaction: according to a Schroders' survey of 400 major institutional investors, at least 20% of institutional investors in both North America and Asia do not allocate to sustainable investments. This number drops to 10% in Europe, which suggests that the awareness-raising efforts will need to be focused on asset owners in North America and Asia.

What the above tells us is that there is insufficient debate in society on climate change. SWFs are tasked with preserving and growing wealth for their nation's future generations, and they have a main focus on financial returns. SWFs are therefore normally exposed to domestic public opinion. Countries where climate change is not a political or social priority tend to be less inclined to implement climate-related strategies. The key issue, as observed in the case of New Zealand (see section 5.2), is that many SWFs still see climate risk as a non-financial risk and still see climate change policies as costly and unnecessary for the fulfilment of their long-term mission. However, SWFs that do decide to implement climate-related strategies, even in the face of adverse public opinion, would be able to make a powerful impact, influence other national institutional investors and potentially frame government policies.

The future is looking brighter: Another recent survey conducted by the French bank BNP Paribas found that asset managers and asset owners plan to double their investment in ESG strategies over the next two years (PRI-MSCI-UNEP Inquiry 2016). Although demand in the United States for ESG-related investments is lagging behind, it is growing three times faster than demand in Europe. According to the Schroders' survey, more than two-thirds of big investors believe sustainable investing will grow in significance by 2022. California has recently enacted legislation forcing CalPERS and CalSTRS, two of the world's largest pension funds,¹⁸ to divest their coal assets (Scott 2015).

¹⁸ New York State is planning to follow suit.

The awareness-raising and visibility efforts of groups such as PRI and the Global Sustainable Investment Alliance (GSIA) have a common goal: forging the crucial link between sustainable development, government policy and the finance industry. The sustainable investment community is gathering momentum. Two years after COP21 and the launch of the SDGs, the world has witnessed the achievement of important regulatory and reporting milestones, with national policies updated (e.g. France's Energy Transition Law) and guidelines issued (e.g. China's Guidelines for Establishing the Green Financial System), all of which have required political will and the support of institutional investment. Sustainable investing is now a growing segment for institutional investors, almost doubling in size from USD 14 trillion in 2012 to USD 22 trillion in 2016 (Institutional Investor 2017).¹⁹

To facilitate the consolidation of these positive trends, it is critical to incorporate climate change considerations (a) into manager contracts and (b) into asset allocation.

There is a consistent gap between asset owners and financial advisers. Asset owners tend to care more about climate change issues than their financial advisers. For example, only 19% of advisers stated that they would consider pulling money out of companies whose activities were damaging to the environment, whereas 38% of asset owners said they would consider doing so (Schroders 2016). This indicates how the external management of funds can result in agency issues and asymmetric information. When funds put sufficient in-house capabilities in place and set clear investment policy rules, the risks of conflicting goals are mitigated and it becomes easier to implement more effective climate-related divestment and engagement strategies (see section 3.2 above).

According to a recent survey of members of the CFA Institute, a global association of investment professionals, client demand is the main driver for ESG investments (CFA Institute 2017). Overall, 73% of the survey respondents take ESG considerations into account in their investment analysis and decisions. Specifically, 54% of investors take into account environmental issues. Broken down by investor type, the survey results show that institutional investors are more likely than private investors to take climate change issues into consideration. Interestingly, geographical and generational differences regarding environmental issues have been identified. For example, 66% of investors in Europe take into account environmental factors compared with 58% in the Asia-Pacific region and 49% in the Americas. Also, the younger a professional is, the more likely she or he is to consider climate issues, with 78% of millennials considering these issues, 74% of generation Xers and 66% of baby boomers (68%). Extrapolating from the latter, one can therefore assume that the younger the workforce of investment professionals is in an institutional investor, the more inclined this investor will be to adopting climate investment criteria. Major gender differences have also been identified. Even though the data describing gender differences is not disaggregated between the three areas of environmental, social and governance, the data remains relevant. Women systematically consider ESG issues in their investment analysis (62%) much more frequently than men (49%). Also, only 18% of women say ESG issues are immaterial or add no value to investment analysis or decisions, compared to 46% of men.

In conclusion, it seems that younger workforces with more women are more likely to adopt climate change investment criteria. To increase the likelihood that institutional investors adopt climate change criteria, it might therefore be beneficial to educate older generations and male staff members, and increase the numbers of younger and female staff. Today, American and Asian institutional investors are less inclined than European investors to move in this direction.

¹⁹ Very recent initiatives such as Climate Action 100+, which are supported at the highest level, are now building upon the solid initiatives launched more than five years ago like the PRI or the Global Investor Coalition on Climate Change.

Different groups and experts advocate for other measures and actions, such as the need to focus on the following sets of actions:²⁰

- Align policy and regulations with the SDGs and introduce the global investor voice into policy-making. This should include the promotion of: green finance, disclosure and carbon pricing; collaboration; and policy-maker capacity-building.
- Advocate for reporting reforms and the standardisation of global corporate disclosures to make them comparable between regions and stock markets. Enable collaborative investor engagement with companies in order to address the adoption of the recommendations of the Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD), to manage transition risk and to undertake scenario analyses.²¹
- Direct patient capital towards infrastructure development, promoting the creation of long-term pools of risk capital. Promote investment practices that involve the assessment and management of climate-related risks and opportunities, such as the sharing of good practice.
- Support investor disclosure by aligning the PRI Reporting Framework with the TCFD guidance for asset owners and managers.

²⁰ This list is a combination of the conclusions of the PRI report (PRI-Novethic 2017) and the challenges identified by the Business and Sustainable Development Commission (BSDC 2017), a pressure group comprising financial leaders from the public and private sectors.

²¹ The TCFD's website (<https://www.fsb-tcfid.org/>) details the Task Force's actions and its mission to develop voluntary and consistent climate-related financial risk disclosures, which companies can use to inform investors, lenders, insurers and other stakeholders. The TCFD is chaired by Michael Bloomberg.

5. SWFs investing in green assets and supporting SDGs

There is no agreement on the definition of ‘green investment’, which differs from country to country. Some definitions may, for example, include investments in renewable energy sources like hydro, solar, wind, tidal or geothermal power, whereas others include investments in clean energy solutions, waste management, forestry, pollution control, environmental protection, etc. The fact that the term is quite loose makes the analysis of SWF-supported green investments more difficult. This study considers six types of green actions (which are also analysed in Table 4 below):

- Green debt funds and platforms: commitments to green-certified platforms such as the IFC’s Managed Co-Lending Portfolio Program (MCPPI).
- Renewable energy: direct investments in renewable energy companies and projects.
- Green infrastructure: commitments to and limited partnerships on green infrastructure investment funds or companies.
- Green start-ups: investments in the fundraising rounds of innovative privately owned green companies.
- Green agriculture funds: investments in and commitments to green-labelled agri-funds.
- Decarbonisation: the total value of divestments from highly polluting industries and/or companies with high carbon exposure.

For the purposes of this study, the term ‘green investment’ is considered broadly. Green investing is therefore deemed to include investments in companies and securities that are considered to be positive for the environment, such as those with a track record of reducing their environmental impact, or companies and technologies offering alternative sources of energy. Also, green investing includes allocations to green-labelled funds in various asset classes, normally infrastructure and agriculture, and commitments to green-labelled funds that have not necessarily been realised yet. While this study does consider portfolio decarbonisation strategies, they have not been included in the sum of total investments because they mainly involve divestments. Herein, the term ‘sustainable investments’ refers exclusively to the environmental aspect of sustainability, unless otherwise indicated by explicit references to governance or social issues.

5.1. Trends, drivers and strategies supporting sustainable economic development

- The total value of SWFs’ green investments and strategies for the period 2015–17 was USD 11 billion. Given this represents just 0.15% of all SWF assets under management, there is plenty of room for improvement.
- Green debt funds and platforms have received commitments from SWFs amounting to USD 4.3 billion.
- Investments in renewable energy projects received equity funds estimated at USD 3.5 billion. Investments in green infrastructure projects, both directly or via green funds, received USD 2.2 billion from SWFs.

The total value of SWFs’ green investments reached USD 11 billion in 2015–17. SWFs have invested in renewable energy companies, developed portfolio decarbonisation strategies (divestments from heavy greenhouse emitters) and funded green infrastructure and agriculture funds. There is still, however, much room for improvement. Few SWFs are participating in green investments; a situation that might be significantly improved if, inspired by the example set by green investment pioneers, other large SWFs decide to follow suit, or if those already investing increase their exposure to green assets. As with venture capital and private markets, SWFs

follow long-term trends, which may prompt them to imitate the SWFs pioneering green investments. Demographic pressures (such as investment teams led by and comprising higher numbers of millennials and women), government policies (including regulations on energy or transparency requirements) and changes in the perception of sustainability and climate risk as a financial risk are all factors that may help SWFs to expand their allocations to green assets.

The total value of SWFs' green investments and strategies to date represents a mere 0.19% of total SWF assets under management. The calculation of this figure is based on an analysis of the deals and strategies described in Annex 2 and Table 5 below. The estimated total value of SWFs' green investments and strategies over the last three years is USD 11 billion, representing 0.15% of total SWF assets under management. The World Bank Group has estimated that between 2006 and 2016 green investments represented 0.7% of the value of all reported SWF deals. While the estimated share for 2016 is higher, at 3.5%, this recent rise has been driven by a small number of large deals and could therefore just be temporary (Halland 2017).²² In both studies, the conclusion remains the same: SWFs' involvement in green finance remains low when compared with both total deal values and total assets under management.

This section looks at the main sustainability-related initiatives undertaken by SWFs. Three criteria were used to identify the SWFs' major sustainable investment deals and strategies: (a) News media searches were conducted using Factiva and Google News to identify the 30 largest SWFs by AuM (representing 96% of the total sector) and also pioneer SWFs currently investing in green assets. (b) The 15 largest SWFs by AuM and their policies, annual reports and news releases were studied in depth to gather information on their green investments, long-term sustainability-related strategies, and advocacy efforts. (c) The results of the first two stages were then compared with the findings of two third-party information providers on responsible ownership, namely the Bretton Woods II Leaders List and the Asset Owners Disclosure Project (AODP). In this last stage, smaller SWFs with limited exposure to green investments, such as Azerbaijan's SOFAZ and Kazakhstan's Samruk-Kazyna, were included in the analysis.²³ These initiatives' efforts for transparency and disclosure, while relevant, are not a focal point of this study. The research presented here identifies the green trends occurring in both transparent and opaque SWFs. In so doing, this report has been able to include deals concluded by Saudi Arabia's SAMA and PIF and by SAFE and HKMA in China and Hong Kong that, although hidden, have important sustainability impacts.

According to the AODP, only eight SWFs publicly disclose their strategies on climate change. Of these, only three are based in developing countries: one in Azerbaijan (SOFAZ) and two in the United Arab Emirates (Mubadala and ADIA). Drawing on direct disclosures and publicly available information, the AODP data show that some of the world's largest SWFs rank very low when it comes to successfully managing climate risk within their portfolios (AODP 2017).

The Bretton Woods II Responsible Asset Allocator Initiative²⁴ classifies public pension funds and SWFs according to its own set of responsible and sustainable investment criteria and principles. Table 3 below shows that the majority of SWFs (78%) are ranked in the medium, low or lowest

²² The World Bank research only considers three sectors (infrastructure, energy and utilities) and spans 10 years (2006–2016). A comparable figure for the last three years of green investments is USD 4.2 billion. Set against total assets under management of USD 7.5 trillion, the share of green investments is 0.06%. In this study, a comparison is made between the value of last three years' actions (covering all green sectors and both investments and commitments) and total SWF assets under management.

²³ While Trinidad and Tobago's Heritage and Stabilization Fund is included in the AODP initiative, the analysis of its annual report yielded no information in terms of sustainability-related activity, so it has not been analysed separately.

²⁴ This initiative is backed by New America and led by Scott Kalb, the former Chief Investment Officer of the Korea Investment Corporation.

quintiles. Only 12 SWFs, representing 21% of the total assets under management, belong to the group of asset owners deemed to be highly responsible investors.

Table 3. Sovereign wealth funds as responsible investors

Quintile	AuM (USD bn)	AuM (%)	No of SWFs	% of SWFs
Highest	1,257	18%	5	9%
High	217	3%	7	13%
Medium	3,779	54%	16	30%
Low	832	12%	18	33%
Lowest	871	13%	8	15%
Total	6,956	100%	54	100%

Source: author's own work based on Bretton Woods II (2017).

However, the picture looks set to improve in the near future. Climate change was made the central theme of the 2016 IFSWF Annual Meeting, since which time a group of SWFs led by Australia, Ireland, Morocco and New Zealand have been debating climate change and the fossil fuel transition economy.

The NZSF has taken the lead in promoting these changes among IFSWF members. Outside of the IFSWF, Norway has been making a very strong case in favour of divestment from fossil fuels and engagement with companies to support green investment strategies. Australia's Future Fund has also developed an ESG policy on hiring and contracting external asset managers. As the consensus grows, more and more funds are considering environmental criteria when hiring external managers. Furthermore, to acknowledge these new investment criteria, SWFs may introduce changes to their performance benchmarks. So far, only a few SWFs (with the exception of the NZSF and the GPF) have integrated climate change in their performance benchmarks or systematically control climate risks using a reference portfolio. Currently, only financial risks are considered, and climate change is still viewed as a non-financial risk by the large majority of SWFs.

Recently, the world's largest pension fund, Japan's Government Pension Investment Fund (GPIF), allocated an initial 3% of its domestic equity portfolio, or USD 8.9 billion, to three ESG-focused indexes, and promised to boost its passive exposure. In future, the Fund is planning to apply ESG-related criteria to its active investments as well. A short time ago, the GPIF partnered with the World Bank to research the best ways to extend ESG criteria to fixed-income investments. It is also planning to draw resources from its partners in the Global Asset Owners Forum, a GPIF-led Forum comprising 12 pension and sovereign funds that first met in November 2016. The summary of this first meeting describes climate risk as 'the most significant topic in the global market', and goes on to state that '[i]t would benefit asset owners to continue to share experiences and known best practices on how to deal with latest trends in global ESG issues' (GPIF 2017). The Forum members will also work on improving their relationship with external managers and their engagement with portfolio companies on ESG issues, which will include looking at the role of passive investments and indexes, active ownership, and disclosure.

The analysis below provides a good benchmark for classifying the policies and strategies developed by SWFs to address climate change. SWFs' actions can be categorised in three ways:

- Investments in green listed and private companies.

- Investment policies, country regulation and advocacy efforts.
- Portfolio decarbonisation and engagement strategies.

This study explores SWFs' roles in each of these areas and tracks the deals and investment strategies developed in each case. As discussed in Box 1, it is difficult to track individual investments and to split out the amounts invested by each SWF in a consortium deal. Moreover, no dataset is already available for tracking SWFs' green investments.²⁵ Herein, the data tracking has focused on the last three years: 2015–17.

Table 4 below summarises the main categories of green investment. The preferred destination of SWFs' green investments are commitments to green debt platforms, which attracted USD 4.3 billion in 2015–17. SWFs have also directly supported solar, wind and geothermal power projects with up to USD 3.5 billion over the same period. SWFs are investing in green infrastructure projects and funds globally with a total gross investment value of USD 2.2 billion. Beyond the broad categories listed in Table 4, green technologies and green agriculture funds to a lesser extent also attracted the attention of SWFs (USD 641 million). Other investments include the Korea Investment Corporation's (South Korea) allocation of USD 300 million to an ESG fund.

Table 4. Allocations of SWFs' green investments (Jan 2015 to Oct 2017)

Investments	USD million
Green debt fund and platform	4,300
Renewable energy	3,465
Green infrastructure	2,237
Green start-ups	375
Green agriculture fund	266
Others	460
Total	11,103

Sources: SWF websites, news media searches and third-party information providers.

Table 5 and Annex 2 details all the green investments pursued by SWFs from January 2015 to October 2017. Investments in renewable energy companies or projects, and funding or commitments for green infrastructure or agricultural funds have been considered in the analysis. In total, 21 different SWFs have developed green strategies with a total gross value of USD 11 billion. China is the world's number country for green investments, investing USD 4.6 billion over the three-year period (although roughly USD 4 billion represents commitments to support green debt and investment platforms rather than realised investments). The UAE ranks second with estimated green investments totalling USD 2.7 billion (in the main realised by Mubadala, which has developed a reputation as a keen and canny green investor). Third place goes to Norway, with a decarbonisation strategy estimated to be worth USD 2.1 billion, and fourth to Singapore, with total green investments valued at USD 1.3 billion. Developing countries' dominance of the SWF sector is reflected in the fact that developing-country SWFs (including economies in transition) accumulated 75% of green investments in the three-year period, compared to developed-country SWFs with 25%.

²⁵ While the data presented herein have been drawn from public sources, the figures contained in this study are the author's best estimates and should not be considered to exhaustively cover all green transactions by SWFs.

Table 5. Selected green investments by SWFs (2015–17)

Time frame	SWF	Deal	Target	Sub-sector or type	Value (USD mn)
2015–19	State Administration of Foreign Exchange	Commitment to the IFC's Managed Co-lending Portfolio Program (MCP)	Emerging markets	Green debt fund and platform	3,000
2017–19	Mubadala	Wind and solar plants with total energy output of 810 MW	Global	Renewable energy	1,300*
2015–16	Hong Kong Monetary Authority – Exchange Fund	Commitment to the IFC's Managed Co-lending Portfolio Program (MCP)	Emerging markets	Green debt fund and platform	1,000
Oct 17	Abu Dhabi Investment Authority	Fundraising in the National Investment and Infrastructure Fund	India	Green infrastructure	1,000
Aug 17	GIC	Significant equity stake in the Energy Development Corporation	The Philippines	Renewable energy	650**
Oct 17	China Investment Corporation	Significant equity stake in Equis	Singapore	Renewable energy	550**
Dec 17	Ithmar Capital	Green Growth Infrastructure Facility for Africa, with the IFC and others	Africa	Green infrastructure	500**
Jul 16	Future Fund	Fundraising in Powering Australian Renewables Fund (PARF)	Australia	Green infrastructure	400
Sep 17	Korea Investment Corporation	ESG fund commitment	Global	Passive ESG portfolio	300
Dec 17	Several SWFs	Fundraising in Amundi and IFC's Green Cornerstone Bond Fund	Emerging markets	Green debt fund and platform	300
Sep 17	Temasek	Gogoro	Global	Green start-up	300*
2016–17	Nigeria Strategic Investment Authority	Fundraising in green agriculture funds (FAFIN and Old Mutual)	Nigeria	Green agriculture fund	266*
Apr 15	Several SWFs	Fundraising in the UK Green Investment Bank's offshore wind fund	United Kingdom	Green infrastructure	250
2016–17	GIC	Fundraising in Greenko	India	Renewable energy	202
Oct 15	Abu Dhabi Investment Authority	Fundraising in ReNew Power	India	Renewable energy	200
Oct 17	Alaska Permanent Fund Corporation	Fundraising in Generate Capital	United States	Renewable energy	200*
2016–17	Abu Dhabi Investment Authority	Fundraising in Greenko	India	Renewable energy	181
Jun 17	FONSIS	Solar farms, agribusiness, healthcare	Senegal	Several projects	160
Dec 16	Russian Direct Investment Fund	Joint venture to build offshore wind plant with Sinomec	Russia	Renewable energy	142
Jul 17	Ireland Strategic Investment Fund	IPO of Greencoat Renewables	Ireland	Green infrastructure	87
Aug 17	Temasek	Impossible Foods	United States	Green start-up	75*

Jun 15	Future Fund	Fundraising in applied solar technologies	India	Renewable energy	40*
Oct 17	GIC	Japan Renewable Energy Corporation	Japan	Renewable energy	N/A
Aug 16	Mumtalakat	Significant equity stake in Envirogen	United Kingdom	Renewable energy	N/A
Sep 17	Samruk-Kazyna	MoU with the World Bank for analytical work on green investments	Central Asia	Research agreement	N/A
Dec 18	Public Investment Fund	Solar energy plants with total output above 3 GW	Saudi Arabia	Renewable energy	N/A
Sep 17	New Zealand Superannuation Fund	Aligned Intermediary	Global	Green infrastructure	N/A
TOTAL					USD 11.1 billion

Source: Author's own work.

* Total deal value including contributions of other co-investors. ** Author's estimate.

5.2. SWFs' portfolio decarbonisation and engagement strategies

- In the SWF sector, the funds of France, New Zealand and Norway are making the largest efforts to decarbonise their portfolios.
- SWFs' portfolio decarbonisation and engagement strategies have focused on reducing coal reserves and the emissions associated with their portfolios.
- So far, decarbonisation efforts have been focused towards listed companies.
- It remains to be determined whether it is better to (a) divest from polluting companies and, in so doing, make a clear statement about the threat of climate change or (b) stay and engage with these companies to promote positive changes.
- Recent evidence shows that Norges Bank Investment Management (NBIM) has had a positive impact on the governance of its portfolio companies: Will it be able to obtain similar results on environmental issues?

To date, three large SWFs – those of France,²⁶ New Zealand and Norway – have initiated strategies for reducing their exposure to fossil fuel reserves and carbon emissions. According to the UN Portfolio Decarbonisation Coalition (PDC), 'portfolio decarbonisation' refers to systematic efforts by investors to align their investment portfolios with the goals of a low-carbon economy. It includes, but is not limited to, efforts to reduce the carbon footprint of investment portfolios, increase investment in areas such as renewable energy, withdraw capital from high-energy consumption activities, and encourage companies and other entities to reduce their emissions and support the transition to a low-carbon economy (PDC 2017). The PDC is action-oriented, and it promotes openness and transparency to support and catalyse the transition to a low-carbon economy by encouraging and mobilising institutional investors to decarbonise their investment portfolios (PDC 2017). So far, the only SWF that has joined the PDC is France's Caisse des Dépôts et Consignations (CDC).

Most of the available data on decarbonisation is related to NBIM's thermal coal divestments and the NZSF's low-carbon portfolio strategy. Together, both countries have divested high-emitting companies with a total value of USD 2.8 billion. NBIM has divested 52 thermal-coal-based

²⁶ Some researchers do not consider France's CDC to be an SWF. The CDC is a public financial group with multiple subsidiaries that are aligned to support state policies. One of these subsidiaries is the actual SWF, CDC International Capital. In this study, however, the CDC group is understood to be a public investor and therefore included in the analysis.

companies, including bonds issued by these companies or their subsidiaries. The total value of these divestments is estimated at USD 2.1 billion. For its part, the NZSF has divested passive holdings in almost 300 companies. These holdings have a combined value of USD 693 million. Other large SWFs, such as Australia’s Future Fund, the Singaporean funds and some of the Chinese giants, may follow suit.

The total value of the divestments made by these three SWFs amounts to USD 2.9 billion (see Table 6). The NZSF’s portfolio decarbonisation strategy affected 3.15% of its total assets and the GPF’s thermal coal exclusions represented 0.21% of its total portfolio, which amounts to close to USD 1 trillion.

Table 6. SWF divestments for portfolio decarbonisation

Time frame	SWF	Deal	Value of divestments (USD million)
2016–17	Government Pension Fund Global	Divesting thermal coal companies	2,100*
Aug 17	New Zealand Superannuation Fund	Carbon reduction strategy in passive portfolio	693
Nov 15	Caisse des Dépôts et Consignations	Divesting coal companies	108

Source: author’s own work.

*Author’s estimate.

The PDC is agnostic regarding both the methodology for measuring carbon footprints and the asset classes eligible for decarbonisation. PDC members present their decarbonisation outcomes using measurements such as comparisons of the carbon intensity to the reference benchmark, CO₂ equivalent emissions per unit invested, or changes in portfolio emissions year on year. This study uses such figures when describing each fund’s individual strategy. However, calculating the total value of the equities divested – the measurement used in this study – describes the fraction of the portfolio affected by decarbonisation strategies and, in so doing, reveals how limited this fraction still is. SWFs joining the PDC or similar initiatives may find it easier to identify ways of increasing their impact on the SDGs too.

Sovereign wealth funds from France, New Zealand and Norway have implemented strategies to reduce the share of their portfolios exposed to companies with high carbon emissions. Norway’s strategy applies to both active and passive portfolios,²⁷ whereas the strategies of New Zealand and France only apply to passive portfolios, even though they could be extended to the whole portfolio. Norway’s approach for applying its strategy to its active portfolio involved the definition of ethical rules that exclude companies with higher exposure to carbon or which pose clear risks to the environment.

One of the main reasons for divesting is to draw the attention of government and policy-makers towards the urgent need to enact policies that decrease demand for fossil fuels (PDC 2017). Divestment is also a way to reduce exposure to declining secular industries that increase portfolio risks in the mid and long terms. However, divestment is also about sending a political message and signalling that climate change is a genuine threat to the long-term returns of

²⁷ Active portfolio management focuses on outperforming the market compared to a specific benchmark, while passive portfolio management aims to mimic the investment holdings of a particular index.

institutional investors. Because the cost of the capital of polluting companies does not change in the short term (plenty of low-cost, environmentally insensitive capital is still available for non-sustainable companies), the impact of divestment is hard to determine. Yet, even though short-term results are hard to achieve, SWFs have not been deterred from taking up divestment strategies. In the end, the best way to find a balance between hedging the risks of climate change, which are long-term, and avoiding the loss of financial returns, which is a short-term issue, is still up for debate.

In addition to the above issue of the immediate results of divestment strategies, another question remains open for debate: whether to exit and divest from or whether to stay and engage with decarbonising companies in order to support and enhance the positive changes they are making. So far, SWFs have been exercising both options, on the one hand divesting from heavy polluters, and on the other engaging with companies developing strong decarbonisation strategies. According to the PDC, both strategies are highly effective because ‘when large institutional investors start to engage and/or reallocate capital on the basis of companies’ greenhouse gas (GHG) emissions, it provides a strong incentive for those companies to re-channel their own investments from carbon-intensive to low-carbon activities, assets and technologies’ (PDC 2017).

New Zealand: a portfolio resilient to climate-related risks

Of all the members of the IFSWF, the New Zealand Superannuation Fund (NZSF) is the most active with regard to climate change. In 2016 the Fund designed an effective and comprehensive strategy to transition its passive portfolio to low carbon exposure. In August 2017 the NZSF announced a climate change strategy that focuses on its passive portfolio and represents 40% of its total portfolio. Prior to this date, the NZSF had sold passive holdings in almost 300 companies. These holdings were valued at USD 693 million, which represents 3.1% of the Fund’s pre-decarbonisation portfolio. The NZSF retains holdings in companies listed in the top quartile of the MSCI ESG Research’s Carbonmetrics, because these companies carry less risk and manage climate issues better than their peers. The NZSF divested from companies in all the remaining quintiles. The immediate impact on the Fund’s carbon footprint was a reduction in carbon emissions intensity (19.6% lower than the pre-decarbonised portfolio) and in exposure to carbon reserves (21.5% lower).

The NZSF will reapply the above methodology each year in the hope that, as carbon measurement tools and data reporting are refined, it will be able to fine-tune its divestment decisions. The NZSF’s climate change strategy (NZSF 2017a) has the goal of making the Fund more resilient to climate-related risk and comprises four parts:

- **Reduce:** The NZSF works to significantly reduce its exposure to both fossil fuel reserves and carbon emissions. These reductions will be achieved through ongoing engagement with companies, building carbon measures into the investment model, targeted divestment of high-risk companies and the reduction of other relevant portfolio exposures.
- **Analyse:** Climate change considerations will be incorporated in investment analysis and decisions – e.g. in valuation models, risk allocation and manager selection.
- **Engage:** The NZSF will continue to manage climate risks by being an active owner, which includes prioritising climate change engagements, developing its voting policy, and directing investment managers to vote according to its instructions on climate change resolutions.

- **Search:** The NZSF is intensifying its efforts to actively seek new investment opportunities in the areas of alternative energy, energy efficiency and transformational infrastructure.

The NZSF, which intends to gradually apply this carbon methodology to its whole portfolio, has already incorporated the methodology in its reference portfolio and will use the TCFD's guidelines for reporting. The most important lesson to draw from the NZSF's approach is that climate change risks that most investors, and especially SWFs, consider to be non-financial are now included in the matrix of financial risks. Environmental (as well as social and governance) factors are material to achieving long-term returns, so they are integrated in all investment decision processes and also feature in the active ownership activities (engagement with the boards and executives of portfolio companies). The NZSF climate change strategy also covers the selection and monitoring of external asset managers and the exercise of voting rights during annual meetings.

Norway: the responsible investor and the exclusion strategy

NBIM, the investment manager of the GPF, has operated a responsible investor strategy since 2004, when it established its Council on Ethics and agreed a set of ethical guidelines that include criteria for product- and conduct-based violations. Over time, specific new climate criteria have been incorporated in this set of guidelines. In 2015 the guidelines added a new criterion excluding companies responsible for 'acts or omissions that on an aggregate company level lead to unacceptable greenhouse gas emissions'. In 2016 the Norges Bank introduced a new carbon criterion that precludes NBIM from investing in coal-based power companies and coal mining companies that either themselves or through the subsidiaries they control derive 30% or more of their income from thermal coal or base 30% or more of their operations on thermal coal. Interestingly, these exclusions must take into account not only the current share of income or activity derived from thermal coal, but also acknowledge any plans for increasing the share of renewable energy sources. The exclusion does not apply to green bonds issued by excluded companies.

Since April 2016, NBIM has divested from 69 coal-based power or coal mining companies. One third of these companies are headquartered in the United States (21), which reflects the impact these decisions have had on a single economy. The second most impacted country was China (including Hong Kong), with 14 divestments, followed by India (7) and Japan (6) in third and fourth places. Another 13 companies also remain under observation as a result of the application of the coal criterion. The estimated total value of the stakes that NBIM has divested from the excluded companies is USD 2.1 billion, making this the largest SWF decarbonisation strategy undertaken to date.

The standard methodology for measuring the effects of a portfolio decarbonisation strategy looks at the strategy's impact on carbon footprints (i.e. the reduction in carbon intensity or carbon exposure). Since 2014, NBIM has published the carbon footprint of its equity portfolio. In 2015 the carbon footprint of NBIM's listed equities portfolio showed a 12% reduction against the reference portfolio. In 2016 this figure grew to 16%, implying an improvement of 4% year on year. The bulk of this improvement resulted from reducing carbon emissions in the portfolio, which in turn derived from the application of the coal criterion that, in particular, excluded companies in the utilities and basic materials sectors (NBIM 2015; NBIM 2016).

Apart from product-based exclusions, NBIM has also divested from companies whose conduct causes severe environmental damage. In 2016 NBIM divested four companies involved in deforestation activities, and from pulp and paper companies whose operations failed to meet

the required standards of responsible practice. Since May 2006, 19 companies have been divested due to the severe environment damage they have caused. They range from the UK-based mining giant Rio Tinto to Freeport, which manages one of the world's largest copper mines in New Guinea.

This divestment strategy is one of best known channels that NBIM uses to apply its responsible investment strategy. So far, NBIM has divested 135 companies that do not comply with its ethical guidelines. From 2005 NBIM's divestment decisions were led by Norway's Ministry of Finance. However, in January 2015 this responsibility was handed to Norges Bank, which now makes its own divestment decisions. While Norges Bank adheres to the Council on Ethics' guidelines, it can develop its own recommendations. For example, it integrated the above-mentioned thermal coal exclusions in the guidelines, which became effective in February 2016. This new governance framework has provided Norges Bank with the direct capacity to continue and advance its responsible investment strategies.

Beyond divestment strategies, NBIM operates a strong active ownership strategy and uses its voting rights to safeguard the GPF's assets. The NBIM responsible ownership strategy involves exercising voting rights, interacting with companies and engaging with boards. In 2016 alone, NBIM voted at 11,294 shareholder meetings, and representatives of NBIM held 3,790 meetings with company managements. Moreover, NBIM publishes research documents that set out what it expects of companies in areas such as governance, children's rights, climate change and water management. Preliminary results show that this strategy is yielding positive results and NBIM is managing to improve the corporate governance provisions of its portfolio companies (Aguilera, Bermejo, Capapé and Cuñat 2017). However, when addressing sustainability, will it be able to draw similar positive outcomes from its portfolio companies? NBIM's equity portfolio is worth USD 660 billion, so if its sustainability efforts are successful, the impacts could be huge.

France, decarbonisation and the new Energy Transition Law

- The Caisse des Dépôts et Consignations (CDC), the parent institution of France's SWF, is committed to portfolio decarbonisation and to actively engaging with portfolio companies on climate issues.
- The CDC is also promoting standardisation in the green bond market.
- France is leading on regulation, requiring greater transparency on carbon emissions for both corporates and investors.
- The CDC applies three layers of responsible investment: ESG integration, shareholder engagement and exclusion.

The CDC, the French public investment group that owns CDC International Capital (France's co-investment SWF), plans to reduce the carbon footprint of its listed equity portfolio (which has an aggregate value of EUR 55 billion) by 20% by 2020. The CDC is divesting from companies that obtain more than 20% of their revenue from coal. It has also committed EUR 15 billion to the financing of green energy projects and is engaging with listed firms to support climate resolutions in annual shareholder meetings. Moreover, the carbon footprint of the portfolio of listed equities held directly by the CDC fell from 0.45 tonnes of CO₂ equivalent per thousand euros invested at 31 December 2014 to 0.33 tonnes of CO₂ equivalent per thousand euros invested at 31 December 2016, representing a 27% decline in two years (CDC 2017).

If CDC International Capital (CDC-IC) includes ESG criteria when co-investing with its foreign SWF partners, it could play a significant role. As a co-investment fund, CDC-IC has signed co-

investment agreements with SWFs from Abu Dhabi, China, Korea, Qatar, Russia and Saudi Arabia. CDC-IC is therefore well placed to exert a positive influence, sharing its expertise in building sustainability issues into investment criteria, and supporting its partners to develop their own decarbonisation programmes. Working with SWFs that have yet to deploy major green strategies, such as those of China, Qatar and Russia, and helping them get their strategies off the ground offers enormous potential for CDC-IC to encourage these large SWFs to develop sustainability strategies. A similar ‘positive influence’ could also be applied by other co-investment funds such as those of Ireland and Italy.

For its part, France has been at the heart of the regulatory push towards emissions reporting. In 2015 a new regulation passed in France reinforced GHG emission reporting requirements. One facet of this regulation, which is directed at listed and large private sector companies, requires boards to report on the indirect emissions occurring along their supply chains. This factor usually goes unreported, despite the fact that such emissions on average represent three quarters of a company’s overall GHG emissions.

Another facet of the regulation, this time targeted at institutional investors, makes it mandatory for investors to carry out carbon reporting. All institutional investors with assets above EUR 500 million will be required to report climate change risks, capital expenditure for the development of fossil fuels, carbon footprints, etc. If expanded globally, this measure could have a huge impact on transparency and disclosure.

According to the PDC, the fact that not only companies and recipients of capital, but also investors (as providers of capital) must now disclose their own climate-related risks is a ‘game-changer’ (PDC 2017). Indeed, as investors gradually become required to disclose their climate-related risks and opportunities, ‘they will be more determined to obtain climate-related data from the companies in their portfolios, in the format and to the quality that they require for their own disclosure. The resulting effect will be to improve and refine the practice of corporate climate-related disclosure, and the availability of corporate data’ (PDC 2017, p.4).

Nevertheless, there is still an urgent need to standardise the reporting and disclosure processes. The Task Force on Climate-related Financial Disclosures (TCFD), the Low Carbon Investment Registry (a self-reporting database compiled by the Global Investor Coalition on Climate Change) and the UN-backed PRI have each developed a different methodology for disclosing environmental risk. Standardising these different methodologies is key to ensure comparable data over regions and time frames, and to expand the universe of investable projects and companies based on their environmental impact.

The consolidation of standards would benefit SWFs in two ways. First, as investors, SWFs would be able to efficiently design active and passive ESG portfolio strategies and to develop engagement tools on ESG issues. Second, as asset owners, standardisation would facilitate SWFs’ self-assessment and thus reporting of their carbon footprints and the identification of comparable benchmarks and exemplars. Given the scale of total SWF assets under management, the dissemination effect of these funds and its potential impact on the financial industry cannot be underestimated.

5.3. Investment strategies in listed and private green assets

Abu Dhabi: the emirate leading the way with a green SWF and a pioneering approach to infrastructure

- Mubadala, 'the green SWF', is a pioneer of green and sustainable investments.
- Mubadala supports large-scale solar and wind energy projects in developing and developed markets through its wholly owned subsidiary Masdar.
- Masdar's Special Projects division develops small-scale green energy plants in least developed countries, such as Afghanistan, Mauritania and the Pacific island states.
- The ADIA is the first foreign institutional investor supporting the National Investment and Infrastructure Fund of India, which has a focus on developing infrastructure that meets high ESG standards.

It is impossible to discuss green SWFs without mentioning Mubadala. This government-owned investment company from Abu Dhabi, which recently merged with the International Petroleum Investment Company to form Mubadala Investment Company, is a pioneering global investor. As a strategic investment company, Mubadala has invested in aggregate USD 127 billion in 13 sectors in 30 countries. An analysis of Mubadala's portfolio reveals two main themes: economic diversification towards new sectors, and a focus on green investments. Mubadala's activities in both these areas contribute to the sustainable development of the United Arab Emirates.

Environmental sustainability is one of the pillars of the SDGs and understanding the need to transition towards low-carbon economic models is a key step for resource-based SWFs which obtain their wealth from highly polluting resources such as oil. One of Mubadala's distinguishing features has been its early commitment to renewable energy. This distinctive SWF, established with the wealth issuing from the UAE's non-renewable resources, has invested in cutting-edge technological green solutions and projects. Mubadala invests in and co-develops large-scale wind and solar energy projects. It also set up Masdar, a renewable energy and sustainability company that, among other things, develops projects on urban sustainable development and on carbon capture, utilisation and storage.

Over the last decade, Mubadala has backed some of the world's largest wind and solar energy projects and today it leads the investment landscape in renewable energy in the Middle East and North Africa region. Masdar has invested a total of USD 2.7 billion in renewable energy projects with a combined value of USD 8.5 billion, and it is developing at least four large international energy projects (in England, Jordan, Scotland and Serbia) with a combined capacity of 790 MW. Masdar's participation in these four projects and in the development of Phase 3 of the Dubai Solar Park (800 MW) in the UAE has an estimated total value of USD 1.3 billion.

Masdar has participated in some of the largest renewable energy infrastructure projects developed in recent history. A major example is the London Array, which, when it was built, was the world's largest offshore wind farm project. Backed by Masdar and a Canadian pension fund, the Array comprises 175 turbines with a combined capacity of 630 MW, which is fed directly into the London grid. Shams 1, one of the world's largest concentrated solar power (CSP) plants, has been developed and is owned and operated by a joint venture between Masdar (80%) and the French energy giant Total (20%). The Shams 1 plant produces energy for 20,000 homes in the UAE and was designed to displace 175,000 tonnes of CO₂ every year, equivalent to planting 1.5 million trees or taking approximately 15,000 cars off the road. Another of Masdar's joint ventures in renewables, Torresol Energy, is with Sener, a leading Spanish engineering company. So far, Torresol has built three solar power plants in the Spanish 'sunbelt' with a combined operating capacity of 120 MW. The first project, Gemasolar, diverts roughly 30,000 tonnes of CO₂ emissions from the atmosphere each year (Torresol Energy 2017).

Interestingly, Mubadala is investing in renewable energy sectors in developing countries. In 2015 it inaugurated a 117 MW wind farm in Jordan. The project generates enough electricity to power

83,000 homes and was the first commercial utility-scale wind power project in the Middle East. Currently Mubadala, through Masdar Clean Energy, is developing five solar and wind facility projects with a combined energy output of 840 MW. Its projects located outside mature markets, such as England and Scotland, are in Oman and Serbia. Mubadala's investment in Jordan, Oman and Serbia is important in three ways: (a) The power capacity installed represents a significant share of each of these countries' total energy output. (b) Mubadala-backed projects represent these inexperienced countries' first forays into large-scale green energy projects. (c) Combined, these projects displace 1.2 million tonnes of CO₂ emissions each year (Masdar 2017).

Beyond these large-scale international projects, Masdar deploys renewable energy and clean-technology solutions in remote, rural communities around the world. Its Special Projects division has installed solar and wind power plants in Afghanistan, Egypt, Mauritania and Seychelles, with 70 MW of capacity either already in place or under development. In collaboration with a range of partners, Masdar has also installed green energy plants on 11 Pacific islands.

The UAE's ADIA, the largest SWF in the Middle East, plays a leading role as one of the world's oldest and most active SWFs. A pioneer in global infrastructure investments, the ADIA has participated in large-scale green energy deals as a long-term minority shareholder. In contrast to Mubadala, the ADIA does not seek to control or operate the assets in which it invests.

So far, the ADIA's involvement in green investment represents only a minute share of its total assets under management, with only two such deals identified in the last three years: The ADIA controls a 15% stake in Hyderabad-based Greenko Energy Holdings, India's leading clean energy company. In addition, it has invested USD 200 million to cover the capital expenditure associated with solar and wind power projects being developed by ReNew Power, another Indian green energy developer. The ADIA is a respected SWF and, without doubt, could play a major role in supporting the development of large-scale renewable energy projects in the UAE.

Prudent estimates value the ADIA's assets at around USD 600 billion, which means it has the potential to provide considerable support for the development of sustainable energy strategies in India. The ADIA has committed USD 1 billion to India's newly established National Investment and Infrastructure Fund (NIIF), making it the first foreign institutional investor to join this government-led initiative. This agreement paves the way for creating significant economic impact through investment in commercially viable infrastructure development projects in the world's second most populous country. The NIIF has made the commitment to solely invest in projects that strongly comply with ESG principles. ESG diligence is therefore an integral part of the investment process (NIIF 2017). Other SWFs may join the NIIF in the coming months.

Singapore: international deals, green technology, and meeting the nation's SDG commitments

- Temasek is the world's leading SWF with regard to investment in green technologies.
- Temasek's investments are not confined to environment-related assets. They also target specific social and community-building goals.
- GIC is supporting green energy companies in Japan, the Philippines and, most importantly, India, which is a critical market for the SDGs.

Singapore's two SWFs are among the world's most sophisticated institutional investors. Temasek still owns a large domestic and regional portfolio (54% of its assets are invested in Singapore and China). Temasek is a savvy venture capital investor, with 23% of its portfolio invested in telecoms, the media and technology. For its part, GIC is a respected long-term investor that regularly partners with the most highly regarded asset managers in the domains

of real estate, infrastructure and private equity. Temasek and GIC's combined wealth, estimated at USD 350 billion, has the potential to promote the adoption of a more sustainable approach to investment in the region. There is, however, still some way to go. While Temasek features in the top quintile of the most responsible investors,²⁸ there is still room for it to expand its decarbonisation activity and climate change advocacy role. GIC did, however, recently begin taking on more exposure to renewable energy projects. These SWFs' combined role of fostering low-carbon initiatives in India is also of the utmost importance.

Recently, GIC announced that it is entering into a strategic alliance with a Goldman Sachs subsidiary devoted to developing green energy, the Japan Renewable Energy Corporation (JRE). The announcement was made in October 2017, following GIC's investment of an undisclosed sum in the JRE, which develops and operates solar, wind, biomass and other clean energy projects in Japan. The JRE currently operates 34 power plants with a combined capacity of around 210 MW, and it is in the process of installing another 170 MW. This is the first time GIC has invested in Japan's infrastructure and renewable energy sector.

In August 2017 the GIC, together with Macquarie Infrastructure and Real Assets, acquired 31.7% of the Philippines-based Energy Development Corporation (EDC) for USD 1.3 billion. The EDC is a world leader in the geothermal industry and its majority shareholder is the First Gen Corporation, the Philippines' leading clean energy provider. GIC is planning to make further commitments and to grow the company's share of this vibrant energy sector (GIC 2017).

GIC has partnered with the UAE's ADIA to tap into India's vast renewable energy markets. GIC and the ADIA have funded Greenko Energy Holdings, the leading Indian clean energy company based in Hyderabad. Since 2013 both SWFs have invested more than USD 500 million in three equity rounds of the green energy company. GIC is Greenko's majority shareholder, with a stake of between 60% and 65%, while the ADIA holds around 15%. The remaining shares are held by the company's two Indian founders. It took Greenko Group a decade to add a gigawatt of capacity to India's renewable energy sector and then a mere 12 months to add its second gigawatt (GW). Listed on the London Stock Exchange's Alternative Investment Market, this 10-year-old green energy start-up now has 2.7 GW of operating capacity and, divided between 60 projects, another 800 MW under construction (Tyagi 2017). Greenko expects to reach 3 GW of operating capacity by the end of 2017.

Investments in green energy assets are not the only way to support sustainable development. Investments in green technology and innovation may also serve to support the transition towards low-carbon economies. Temasek is a venture capital investor with substantial exposure to green innovative solutions. For example, in August 2017 Temasek invested in Impossible Foods, a company that develops plant-based burger patties with the look, taste and texture of meat. Compared to making burgers from animal sources, the production of plant-based burgers requires less land and water, and emits a lower amount of greenhouse gases. Temasek led the investment round of USD 75 million in the California-based company. This is not the first time Temasek has invested in start-ups that avoid the use of animals for food or materials. Last year, it invested in Modern Meadow, a New York-based developer of lab-grown biofabricated leather. In September 2017 Temasek led a 300-million-dollar (US) round in Gogoro, a technology leader that builds electric scooters and develops solutions that bridge sustainable energy and urban transportation.

Other Temasek subsidiaries have developed strategies to reduce greenhouse gas emissions (Singapore Airlines) and invest in renewable businesses (Sembcorp Green Infra), and its

²⁸ It features in the top quintile of the Bretton Woods II Leaders List (2017).

subsidiary CapitaLand has also been included in the RobecoSAM Sustainability Yearbook, which details the world's most sustainable companies (Temasek 2017). Temasek has hosted global and regional Business for a Better World conferences and has financed multiple projects dedicated to finding solutions for a clean and cool Earth. It has financed air cooling systems that use 80% less energy than conventional air conditioners, and it has developed face masks specifically for children that protect them from severe air pollution and haze. Temasek invests 4% of its portfolio (USD 8 billion) in three life sciences businesses.

Through six linked foundations, Temasek focuses on different aspects of building people, building communities, building capabilities and rebuilding lives. To date, these endowments have benefited over 500,000 lives across Asia and within Singapore. In this work, Temasek is addressing the challenges and opportunities arising from issues such as aging populations, climate change, poverty and resource scarcity.

The Saudi Arabian Monetary Authority (SAMA) and the Public Investment Fund (PIF)

- The SAMA plays a central role in developing new financial sector regulations and in supporting International Finance Corporation (IFC) sustainable debt and investment platforms.
- The PIF plays critical role in catalysing the Kingdom's transition to a low-carbon economy.
- The alignment of the PIF's and government's goals may be fruitful returns-wise, but it also exposes the Fund's investment decisions to a higher level of political interference.

The SAMA, which is the central bank of the Kingdom of Saudi Arabia, is responsible for managing the Kingdom's foreign exchange reserves. The unit responsible for the management of Saudi Arabian foreign exchange reserves is considered by some to be a 'quasi SWF' (Alsweilem 2015) and, for this reason, the SAMA has been included in this analysis.²⁹ The unit has total reserves of USD 500 billion, 67% of which is invested in international securities (largely US sovereign debt securities and international listed equities) and 31% of which is held in foreign deposits and currency. One of the SAMA's functions is to promote the growth of the domestic financial system and ensure that it remains sound. In this regard, the SAMA has limited scope for investing in green private market assets, but its leading role may support the establishment of rigorous financial sector regulations and improve transparency in the sector. The SAMA may also apply some of the China Green Finance Task Force's recommendations for the banking and financial system. Moreover, similar to China's SAFE, it might also end up supporting the IFC platform.

The revamped Public Investment Fund (PIF), on the other hand, seems to have a much more directly relevant role (PIF 2017). In 2015 the Fund redefined its strategic mission, fully aligning its vision, objectives and strategy with the Saudi Vision 2030 plan. Today, it is the Kingdom's investment arm and is tasked with leading the economic transformation of the country. Saudi Vision 2030 envisages reducing the country's dependence on oil revenues through the development of new non-oil sectors. Among these sectors, renewable energy has a priority position in the future Saudi Arabian energy mix.

The Vision includes plans to strongly promote the domestic renewable energy industry. The Government of Saudi Arabia is planning to generate 9.5 GW of electricity from renewable sources (wind and solar power projects) each year by 2023, which will involve up to USD 50 billion of investments. This target, which equates to the current renewable energy capacity of

²⁹ The SAMA features in the lists of SWFs drawn up by IE Business School's Sovereign Wealth Lab, PwC (Sovereign Investors), and Thomson Reuters.

countries like Malaysia and Serbia, may well be exceeded, given the country's energy needs and the enormous surface area available in the country for the development of new solar and wind power plants. As of yet, there are no solar power plants in the Kingdom, although its first solar project (a 300 MW solar photovoltaic scheme in the north of the kingdom) has now gone out to tender. As of October 2017, the shortlist of the lowest-cost bidders included Masdar, the wholly owned subsidiary of the UAE's green SWF, Mubadala.

Different to the SAMA, the PIF is set to play a critical role in the development of green infrastructure in the Kingdom. In October 2017 the Fund announced that it will participate in one of the largest solar photovoltaic energy projects ever developed: The SoftBank Vision Fund, backed by the PIF (which has committed up to USD 45 billion) and Mubadala (USD 15 billion), announced a strategic partnership with Saudi Electric, the national utility that is majority-owned by the PIF. The memorandum of understanding includes plans to install 3 GW of solar energy in 2018, which, if completed, will deliver one third of the renewable energy targeted in the country's 2023 National Renewable Energy Program (Clover 2017).

Following a highly competitive tender process launched in January 2017, the Dubai authorities awarded Saudi Arabia's ACWA Power the contract to install 700 MW of concentrated solar power. ACWA Power, which is owned by a number of international and Saudi conglomerates including the PIF, is a regional and global leader in solar energy.

The PIF and ACWA Power are both central to the Kingdom's efforts to overcome its dependence on oil. ACWA Power is also critical to the Kingdom's energy matrix transition given its expertise, its experience of building and operating solar power plants and its potential to attract talent into Saudi Arabia's nascent solar industry. Meanwhile the PIF, which is strongly aligned with government goals and has strong capital muscle, may facilitate the transition towards a low-carbon economy by investing in new sustainable sectors.

However, other studies (Bauer 2017; Bernstein, Lerner and Schoar 2013) warn that domestic SWFs are more exposed to political interference. These funds should therefore be strongly encouraged to establish sound governance policies with clear investment mandates and objectives, to abide by transparency and accountability rules (such as the Santiago Principles), to develop a consistent legal framework, and to ensure the independence of investment decisions from the discretionary influence of government (Das et al. 2009).

It is clear that, when SWFs are well-governed and have a clear and transparent domestic mission, they are better able to contribute to the achievement of the environmental SDGs. The model developed for Ireland's SWF, with its dual mission of achieving financial returns and having an economic impact, could be adapted to multiple settings.

Azerbaijan – old deals in need of a new green investment push

The State Oil Fund of the Republic of Azerbaijan (SOFAZ) is a member of the IFSWF and the only Central Asian sovereign fund included in the Asset Owners Disclosure Project's list of responsible owners. The main reason the SOFAZ has been included is its high levels of disclosure, its partnerships with green-related initiatives and its support of foreign frontier market development projects. The SOFAZ also publishes ethical guidelines but, so far, they only govern employee responsibilities and do not address responsible investment. The SOFAZ's annual report does not mention any green investment strategy (SOFAZ 2016).

In 2013 the SOFAZ was one of the first investors to join the IFC Catalyst Fund, committing USD 50 million to support sustainable development and efforts to tackle climate change. The Catalyst Fund was designed to stimulate the development of funds and projects focused on renewable energy and climate-friendly solutions in emerging markets. Some years previously, in 2010, the SOFAZ made an investment of USD 100 million in the IFC African, Latin American and Caribbean Fund.

Korea Investment Corporation: the first Asian SWF applying ESG criteria to its allocations

At a presentation in August 2017, the Korea Investment Corporation (KIC) announced the allocation of USD 300 million to an ESG fund (Jeong 2017). These resources will be gradually deployed once a global specialised asset management firm has been recruited and its initial performance evaluated. This allocation represents 0.56% of the KIC's overall equity portfolio of USD 53 billion, which shows that there is ample room for expanding its investments based on ESG criteria.

During the same presentation, the KIC's CEO also confirmed the Corporation's intention to embrace stewardship responsibilities and thus responsible investment from January 2018. In South Korea the responsible investment movement has been gaining momentum since the introduction of the Stewardship Code. The KIC is ready to join the global movement of institutional investors that are actively exercising shareholder rights to enhance the interests of clients and beneficiaries. Building ESG investment and engagement criteria into this active shareholding strategy would deliver broader impacts on climate change and sustainable development goals.

Khazanah: the opportunity to play a leading green role in Malaysia and the region

Another SWF that is active in sustainable development is Khazanah Nasional,³⁰ Malaysia's sovereign wealth fund. Khazanah is a Holding SWF, which controls stakes in key national telecoms, airline, electricity and other companies. It is also a highly transparent SWF that fully discloses its sustainable development exposure. Khazanah's investments in this particular sector align the SWF with the country's efforts to capitalise on opportunities arising from global environmental and climate change initiatives. Khazanah has invested in an integrated environmental waste management solutions provider and in an investment company that develops and invests in clean energy projects, focusing in particular on biogas, biomass and energy-efficiency projects in Malaysia and Southeast Asia. The SWF also holds shares in RedT Energy, a company listed on the London Stock Exchange's Alternative Investment Market that develops and supplies energy storage systems.

Khazanah has also invested in agrifood, supporting the development of core components of the industry. A key focus is on improving supply chain management from production to markets in order to enhance productivity and quality while applying sustainable farming practices.

In total, the agrifood and sustainable development sectors account for 1.7% of Khazanah's investment portfolio, representing USD 646 million. Through its subsidiaries, Khazanah also co-invested along with Saudi Arabia's PIF in a desalination plant in Saudi Arabia, the largest of its kind in the world (Shuaibah 2013).

³⁰ Khazanah is ranked in the first quintile of the Bretton Woods II Leaders List, which ranks government funds according to their action on responsible investment.

In December 2013 Khazanah incorporated a sister entity, Yayasan Hasanah (hereinafter Hasanah), which offers the SWF an enhanced and more strategic approach to value distribution. Hasanah's remit is consistent with Khazanah's capacity-building agenda for Malaysia, and it also supports the national transformation agenda. As part of its mission, Hasanah aims to strengthen Malaysia's ability to move towards climate-resilience and low carbon emission pathways. To do this, it works to promote environmental consciousness and conserve natural heritage using innovative media and environmental education approaches. Beyond the environment, Hasanah supports community-led and sustainable social and economic development activities that strengthen social cohesion, inclusion and equity. As part of this social mission, Hasanah addresses the socio-economic needs of the country's bottom 40% by household income, addressing poverty from a multidimensional perspective that considers multiple segments of communities. In its work to break the cycle of poverty, vulnerable heads of households, women, young people and children are provided with the skills, education, services and resources they need to build their resilience and livelihood capabilities. Hasanah also promotes children's rights and child protection.

Morocco, Nigeria and Senegal: African SWFs for sustainable development

- Three SWFs are particularly prominent when it comes to green African investments: Ithmar Capital, the Nigeria Sovereign Investment Authority and the Fonds Souverain d'Investissements Stratégiques (FONSIS).
- Ithmar Capital has launched an innovative green investment fund jointly with the World Bank to invest in the African continent.
- Nigeria is supporting two green agriculture funds that have food security objectives, and its infrastructure-focused fund has the potential to play an important role in delivering sustainable infrastructure.
- Senegal's FONSIS is successfully encouraging foreign funds to invest in the country's green energy assets.

In 2016 the remit of **Morocco's** Fonds Marocain de Développement Touristique was expanded to include all productive sectors of the country's economy and its name was changed to **Ithmar Capital**. During the COP22 meetings in Marrakech that same year, Ithmar announced that it had signed a memorandum of understanding with the World Bank to launch the Green Growth Infrastructure Facility for Africa (GGIF), the first green infrastructure fund dedicated to the African continent. Structured as a private equity fund, the GGIF for Africa will aim to attract private investors seeking responsible and green investments. The GGIF's main goal is to direct the flow of private capital towards responsible infrastructure investments, focusing in particular on clean energy and water projects. Ithmar is therefore seeking to raise USD 1–2 billion from infrastructure investment specialists and other sovereign funds. The IFSWF has endorsed the GGIF, and other SWFs are expected to join the Facility as limited partners (Ithmar Capital 2017).

Recently, Ithmar Capital and the Ghana Infrastructure Investment Fund (GIIF) signed a strategic partnership to explore co-investment opportunities in several African countries. As part of the agreement, the GIIF will contribute to the GGIF for Africa. This deal provides evidence of institutional investors' growing interest in green investment opportunities. Morocco has also signed a number of public-private and private-private partnerships with Senegalese institutions, FONSIS (see below) included. These collaborations are focused on the development of large-scale solar power projects and the sharing of renewable energy expertise.

Such multi-country green co-investments are becoming increasingly common in West Africa and have the potential to plug some of the region's large infrastructure gaps, especially its energy shortages, which remain key obstacles to sustainable economic development.

Nigeria is supporting several initiatives with clear sustainable development impacts. The Nigeria Sovereign Investment Authority (NSIA), which was established in 2011, has a tripartite mission: (a) develop domestic infrastructure, (b) stabilise government budgets and (c) save for future generations. Three funds have been set up to support these missions: the Nigeria Infrastructure Fund (NIF), the Stabilisation Fund (SF) and the Future Generations Fund (FGF). So far, all the capital allocated to the SF (USD 300 million) and the FGF (USD 600 million) has been deployed. However, the NIF (capitalised with USD 600 million) has only made a few investments. One investment involved backing a real-estate-sector financial institution to help unlock demand in the sector. Another supported the Fund for Agricultural Finance in Nigeria (FAFIN), which is particularly interesting because of FAFIN's commitment to sustainability. The NSIA has backed the establishment of this 10-year Fund with a final close of USD 66 million. The asset manager has drawn up its own ESG guidelines, putting in place a 'robust framework' for assessing the operations of potential target companies prior to investing. This particular foreign-government-backed fund only invests in those Nigerian companies that meet (or can meet) the manager's ESG guidelines (NSIA 2017).

The NSIA also partnered with Old Mutual to set up a USD 200 million agriculture fund, with each partner providing USD 50 million of seed capital. The agriculture fund focuses on integrated commercial farming and agrifood processing projects in Nigeria. Its main investment objectives include food security, import substitution and commercial returns. A good example of the fund's work is its take-over of a 450-hectare farm, which it then expanded to 2,000 hectares and used to grow maize and soya for the production of high-quality chicken feed. Another major project under consideration is the building of the Second Niger Bridge, which has the potential to vastly improve movement between the southern and western regions of Nigeria.

Explorations undertaken since 2014 in **Senegalese** waters have revealed major offshore oil and gas reserves, estimated at up to one billion barrels of recoverable hydrocarbons. In this period leading up to the start of pumping in 2021, Senegal's Fonds Souverain d'Investissements Stratégiques (FONSIS) looks more like a development SWF than a saving SWF. Currently, its main objective is to source and facilitate deals that the Government of Senegal considers 'strategic', involving capital investments, partnerships and the design of vehicles to reduce funding risks. The FONSIS has already participated in eight investment projects. In three years, the Fund has closed these eight transactions worth over USD 160 million by investing and attracting co-investments and debt with a multiplier (leverage ratio) of 12 to 1.

The FONSIS has shown a high level of commitment to renewable energies. For example, it partnered with French investors to build West Africa's largest solar farm, a 30 MW facility that was inaugurated in June 2017. The FONSIS invested USD 15 million in this project, which has an overall value of USD 47 million. It is also backing another 20 MW project in northern Senegal, investing USD 1 million of its own funds and attracting a further USD 46 million of equity and bank debt. This demonstrates that the FONSIS has the capacity to develop and structure strategic and bankable greenfield and brownfield projects in sustainable business areas that are capable of attracting foreign capital. Other green investments currently being developed by the FONSIS include a greenfield project to export organic products, a fund focused on agribusinesses and a health-care infrastructure project related to medical diagnosis.

In January 2016 Senegal joined the International Finance Corporation's Scaling Solar programme. Under this initiative, the IFC is organising auctions of solar power assets, and is providing financing and guarantees for investors to reduce funding risks. The FONSI's role in the Scaling Solar initiative is to act as the financial arm of the government. Currently, the country is preparing invitations to tender for three projects totalling 100 MW.

Box 5. SWFs in the energy sector: lessons learned and the dilemma of GHG emitters

Sovereign wealth funds are heavily exposed to the energy sector. This is not just due to the fact that hydrocarbons constitute the main source of wealth for most SWFs; some of these funds' largest stakes still involve traditional energy companies. In the 2007–2015 period, 11 SWFs invested a total of USD 64 billion in 23 energy companies. Europe is the main destination market (USD 46 billion), followed by Central Asia (USD 6 billion) and North America (USD 5 billion).

Another salient fact is that some of these 23 energy companies are among the world's largest greenhouse gas emitters (Lubin, Moorhead and Nixon 2017). For example, SWFs have invested very heavily in companies such as Royal Dutch Shell (ranked the world's 9th largest GHG emitter), Total (13th), BP (16th) and Engie (29th). The CIC, QIA and SAFE have invested USD 12 billion in these four companies. Moreover, NBIM, which makes huge efforts to combat climate change, holds USD 5.3 billion in Royal Dutch Shell, USD 2 billion in BP and in Total, and USD 400 million in Engie (former GDF Suez). In total, Norway holds stakes worth USD 9.3 billion in four companies included in the list of the world's 30 largest GHG emitters.

This prompts the question as to whether it is better for institutional investors to divest a polluting company or whether they should stay and engage in order to reduce the company's emissions. According to Thomson Reuters, companies such as Total and Iberdrola are credited for their vision of a new clean-energy future and for the progress they are making on adapting their large, complex businesses for that future. Total's emissions performance over the last three years shows reductions well ahead of the Intergovernmental Panel on Climate Change guidance, with an aggregate decline in total GHG emissions across all areas of its business of approximately 20%. Iberdrola, the Spanish utility company and top renewable energy producer in Europe and the USA, has managed to reduce its emissions in Europe by 75% since 2000. However, the amount that SWFs have invested in high-emitting companies far outweighs the aggregate value of their green investments. Engaging with high-emitting companies and replicating successful decarbonisation efforts can be powerful, but doing so usually means diverting funds that would have been invested in greener companies and projects.

One factor that connects traditional energy investments with sustainability investments is capacity development. As observed in the cases of infrastructure and venture capital, the concentration of the largest deal-makers underlines the importance of developing specialised skills to explore vertical sectors such as energy sub-industries. The International Petroleum Investment Company is an investment company that focuses solely on global oil and gas industry leaders. The CIC has also developed a specialisation in infrastructure and oil and gas companies, which has allowed the Corporation to participate in multiple consortium deals with global industry leaders in developing and developed markets. Similarly, the QIA via Qatar Holding has been able to take on large and complicated deals like the Rosneft and National Grid transactions. The Kuwait Investment Authority has established a dedicated subsidiary for infrastructure, Wren House Infrastructure, which has successfully bid for large-scale utility deals in partnership with global infrastructure managers and funds.

Lastly, the analysis interestingly reveals that, in the ranking of sub-industries, water and wastewater service providers are listed as the third highest emitters of GHGs. Two major deals in the United Kingdom – the acquisition of Kelda Group (GIC is a consortium member) and Kemble Water Holdings (which owns holdings in Thames Water) by a group of investors that includes the ADIA and CIC – show that developing-country SWFs have a continued interest in European regulated utilities.

5.4 Green investment policies, country regulation and advocacy efforts

This section looks at how Australia's Future Fund applies ESG criteria when contracting external managers³¹ and, in so doing, reveals the importance of integrating environmental criteria into the investment process. It also examines the situation in China, which, as the country with the highest CO₂ emissions in the world, has a particularly important role to play in addressing global environmental issues and achieving the SDGs. New potential national regulations, such as those promoting a green financial system led by the People's Bank of China and UNEP Inquiry, may contribute substantially to efforts to curb global emissions. The example set by Chinese SWFs adopting these new rules may be a powerful way to promote replication by other Chinese organisations. Also, even though Chinese funds have not implemented specific green investment policies, they have already participated in major green deals.

Australia: the future steps of the Future Fund

Australia's Future Fund (FF) has developed its own policies for integrating ESG criteria into its investment strategies. The starting point was its mandated objective to maximise the returns earned from its investment portfolio while appropriately managing risk. Inherent to the FF's approach is the belief that the effective management of ESG factors, including climate change, can contribute to the long-term risk-adjusted returns of the portfolio.

The FF integrates ESG factors into its process for selecting the external investment managers responsible for individual investment decisions. The Fund assesses investments for which climate change could pose a material risk to investment performance, and it incorporates these risks into the investment valuation process. This process ensures that risks and opportunities associated with climate change are evaluated in the same fashion as all other relevant risk considerations.

To date, the FF has excluded tobacco companies and arms manufacturers, but it has yet to exclude companies for environmental reasons (Future Fund 2017). The FF considers climate risk and opportunities as part of a larger set of set of risks, and it has not adopted a specific strategy for environmental issues, opting instead to integrate these issues in its more general approach involving ESG criteria.

The FF exercises the ownership rights associated with its investments and, to this end, has defined corporate governance voting principles. The Fund also engages with key investee entities, either directly or in partnership with its investment managers, to promote enhanced ESG performance and foster a climate of long-term asset stewardship.

In the investment sphere, in July 2016 the FF joined a partnership that develops, owns and manages large-scale renewable energy infrastructure assets and projects. The partnership, known as the Powering Australian Renewables Fund, has already acquired two solar power plants as well as two wind farms, one of which will be the largest in Australia when it is completed. While the FF's equity commitment was not disclosed, it is estimated to be in the

³¹ All the SWFs described in section 5.2 above have also implemented green investment policies, but their focus has been on decarbonisation strategies. The reason for focusing, here, on the FF's use of ESG criteria is that SWFs can draw on this example to guide their relations with external investment managers.

region of USD 400 million. These investments by FF will help in meeting the targets set by the Government of the Commonwealth of Australia, and they will stimulate investment and development that supports Australia's transition to a low-carbon economy.

China: the critical role of the world's wealthiest group of SWFs in the world's most polluting country

- China has more sovereign wealth in terms of assets under management than any other country, and many of these assets generate considerable carbon emissions. Curbing emissions in China would therefore have major implications for the achievement of the SDGs.
- The SAFE and HKMA are supporting the IFC's initiative for sustainable investing in emerging markets.
- The CIC is not yet participating in large-scale sustainability strategies, but the potential impact should it do so is huge.

China has accumulated more sovereign wealth than any other country. Its leading SWF is the China Investment Corporation (CIC), which is the world's second largest SWF. With estimated assets worth more than USD 850 billion, the CIC is the world's largest non-commodity SWF. As a country, China is promoting a number of high-level initiatives addressing GHG policy and reporting standards and facilitating the transition towards a low-carbon economy. However, with regard to climate-change-specific strategies, the Chinese SWFs are not yet aligned with other major investors, such as Japan's public pension fund or Norway's NBIM. Indeed, they have yet to develop such strategies.

The CIC has launched a number of initiatives for poverty alleviation, access to education and sustainable development. Using innovative tools, such as the creative use of public-private partnerships, the CIC has supported the sustainable development of several Chinese counties, assisting with infrastructure provision or financing educational facilities (CIC 2016).

The CIC's capacity for investing in green investment strategies is huge. Indeed, a recent large-scale investment made by the Corporation may indicate that it may be moving towards realising some of this capacity. In October 2017 the CIC joined a group of private-equity investors to acquire a large portfolio of Asian wind and solar energy projects from Singapore-based Equis for USD 3.7 billion. When finalised, this will be the largest renewable energy generation acquisition in history. CIC Capital, the private equity arm of the China Investment Corporation, is taking between a 10% and 20% stake in the company with an estimated value of USD 550 million.

Within China, the State Administration of Foreign Exchange (SAFE) and the reserve management unit of the People's Bank of China are providing a remarkable level of support to the IFC's Managed Co-Lending Portfolio Program (MCP). Established by the IFC in 2016, the MCP is a debt mobilisation platform for financing emerging-market projects in accordance with sustainability criteria and taking into considering the goals of poverty eradication and the sharing of prosperity. SAFE has committed USD 3 billion to the platform, adding to the investments already made by the IFC and other private sector institutional investors. Other SWFs may follow SAFE's lead, as the platform provides access to attractive infrastructure investment projects and mitigates the fears of risk-averse institutional investors by absorbing the initial losses made by any of these projects. Similar to other schemes developed by the European Bank of Reconstruction and Development, the MCP Infrastructure initiative hopes to mobilise risk-sensitive institutional investors to participate in sustainable development projects in emerging markets. This is crucial as the financing gap for achieving the SDGs in developing

countries remains at USD 950 billion a year for power, transportation and telecommunications infrastructure alone.

The central bank of Hong Kong, the Hong Kong Monetary Authority (HKMA), manages the Special Administrative Region's international reserves via its Exchange Fund. At the end of June 2017 the Exchange Fund's assets stood at USD 500 billion. In September 2017 the HKMA announced its intention to partner with the IFC on the innovative MCP, a move backed by the SAFE. The HKMA is committing USD 1 billion to the platform and, in so doing, will support the IFC to sustainably finance projects in more than 100 countries and in a range of sectors including infrastructure, telecoms, manufacturing, agribusiness and services. The use of such platforms, the sourcing of investable deals with appropriate risk management, governance frameworks, and the identification of sustainable goals in a wide range of industries are all factors that facilitate the mobilisation of long-term institutional investors' capital.

In 2017 the IFC's Climate Business, the world's largest global development institution focused exclusively on the private sector in developing countries, mobilised and invested a total of USD 4.8 billion. This enabled Climate Business to participate in 90 climate-smart projects in 41 countries, which together avoid 6.7 million tonnes of GHGs each year.

In terms of regulation, the CIC's role in promoting and investing in the activities of the Green Finance Task Force carries enormous potential. Launched by the People's Bank of China and UNEP Inquiry, the Task Force published its *Establishing China's Green Financial System* report in April 2015. This report makes 14 recommendations on how best to achieve this ambitious plan (Green Finance Task Force 2015), some of which fit well within the CIC's sustainable development approach. Central Huijin Investment, one of the CIC's three subsidiaries dedicated to the domestic financial sector, is set to play a pivotal role in efforts to build a green banking system, define the environmental legal liabilities of banks and, most importantly, enforce environmental disclosures by listed companies and bond issuers. The CIC may opt to support the development of green funds and the networks of green investors. More importantly, it might play a role in improving the environmental and social responsibility of overseas investments.

PART III. GUIDELINES AND CONSTRAINTS

6. Guidelines for designing SWFs to support the SDGs

6.1 Practical guidelines on designing SWFs to support the delivery of the SDGs

Beliefs

- Ensure the beliefs are agreed by the highest-level decision-makers.
- Reconcile the long-term vision with the long-term risks.
- Educate stakeholders.

SWFs tend to adopt very long-term visions and missions, all of which require the development of very long-term investment approaches. When assuming such long-term approaches, SWF portfolios should therefore include long-term risks. However, only a few SWFs have already included climate change in their long-term risk matrices. Beliefs are the founding step for the development of a successful sustainable investment strategy. Only those SWFs that have considered their mission and have been able to integrate sustainability as a key long-term theme will be able to deploy resilient sustainable investment strategies.

SWFs are institutions investing with very long-term horizons. SWFs' beliefs should therefore consider long-term risks like climate change to be worthy of inclusion in their investment strategies and ownership practices.

When defining its beliefs, an institution's first step is to revise the long-term approach and acknowledge that climate-change-related risks will affect long-term portfolio returns. An example of best practice in this area is provided by the NZSF's recent revision of its portfolio (see section 5.2). According to the NZSF, physical and natural resources, regulatory actions and technological innovations all present climate-related risks and opportunities. For example, companies with higher carbon emissions are exposed to stricter regulations that may affect their business strategy, and companies in the fossil fuel sector may be affected by technological innovations. Climate change risks extend beyond energy to other sectors through revenues, operations, expenses, global value chains, etc. According to the NZSF, the markets are not yet fully pricing the negative impact of climate change on asset valuations.

However, sovereign wealth funds hold different beliefs around climate change and sustainable development, which can be categorised as follows:

- (a) Core: SWFs that integrate climate change or sustainability strategies as part of their long-term belief.
- (b) Opportunistic: SWFs that look for green assets because of the financial returns they offer, without considering long-term beliefs. Some SWFs may see green investments as simply a strategy for building their reputation. These SWFs are open to changing their beliefs.
- (c) Disconnected: SWFs that do not consider sustainability at any level and do not perceive climate-risks to be material factors impacting on financial returns.

Any move to transform beliefs should include key stakeholders, with the new belief being cascaded from the board out to external stakeholders (government, regulators) and down to internal stakeholders (top management and investment teams). Educating stakeholders about

the SWF's long-term mission is critical for promoting an understanding of long-term risk such as climate change and for ensuring this mission is adopted in a consistent way when sustainable investment strategies are drawn up.

Governance

- The clearer the fiscal rule is that governs flows in and out of the SWFs, the easier it will be to design a consistent green strategy.
- Clear fiscal rules ensure the sustainability of the SWF and its goals, including sustainable and green investment strategies.
- Transparency enhances accountability and increases stakeholder pressure for larger green investments.
- Stronger in-house capabilities enable SWFs to understand and develop sustainable investment strategies.
- When owners are more responsible, engaging with their portfolio companies and exercising voting rights, they are likely to be more effective in promoting the uptake of sustainable strategies by these companies.

Fiscal rules must precisely determine the amounts the government is entitled to withdraw from the SWF each fiscal year. To be efficient, the fiscal rules must require harmonised sovereign asset-liability management, so that governments consider withdrawing from SWFs only when it is a cheaper option than accessing global debt markets under reasonable macroeconomic conditions. The optimal scenario is for withdrawals to be made on the SWF's net investment income rather than by eating into the capital that should be preserved for future generations. Ultimately, when the fiscal rule is sound, the fund will be able to fulfil its mission with less political interference, longer-term returns and more consistent asset allocation strategies. This would facilitate the design of decarbonisation strategies and the implementation of sustained long-term strategies for infrastructure, agriculture or renewable energy support.

Transparency enhances long-term investment strategies as it facilitates accountability. The more transparent the fund is, the bigger will be its efforts to design long-term strategies and the keener managers will be to obtain results aligned with the SWF's long-term mission. Also, transparency in areas such as portfolio asset allocation, risk management, and performance would make it easier to hold SWFs to account. When stakeholders (citizens, co-investors, media) are accountable, they are more likely to push the SWFs towards adopting greener strategies, and to exert a higher degree of responsible ownership. The fact that climate change risks and opportunities affect performance becomes even clearer when SWFs are more transparent and when stakeholders are able to pressure the fund to move in specific directions. Norway's SWF is a case in point: the transparency of both its ethical guidelines and exclusion decisions motivates multiple stakeholders (industry associations, companies, individuals) to make exclusion recommendations on a daily basis.

One of the major governance-level changes witnessed in the SWFs has been the move towards larger and more professional workforces. Headcounts have grown as a result of in-house investment approaches and the transition towards private markets, which has required more sophisticated teams. As a result, SWFs themselves have become more sophisticated, and their investments involving private market transactions in infrastructure, real estate and private equity have grown rapidly. SWFs' increasing levels of direct investment and their openness to wider asset classes are factors that support the selection of investment opportunities in the green economy. Funds such as the ADIA, GIC and Mubadala are well equipped to invest in green

companies operating in diverse sectors, from agriculture and technology to real estate and infrastructure.

Responsible ownership is a dynamic trend among large institutional investors. With their long-term mandates, SWFs are turning to more active ownership strategies, acknowledging the importance of preserving value over the long-term. In light of the fact that climate change presents physical, regulatory and technology risks, as well as opportunities, it would be beneficial for SWFs to engage with their portfolio companies directly or through their fund managers. Engaging the boards and managers of portfolio companies in sustainability is a vital task and is a powerful way to get companies to adapt their policies towards greener scenarios. Also, ensuring that contracts with asset managers align with the broader SWF sustainability strategy will accelerate the impact of SWFs in and foster replication across the entire sector.

Investment strategies and portfolio processes

- Thoroughly analyse the portfolio's exposure to carbon reserves and emissions.
- Set a credible carbon reduction objective:
 - Introduce alternative measures for sustainable returns in areas such as agriculture, water management and infrastructure.
- Operationalise the required changes via internal or external managers:
 - Redesign external asset managers' contracts to include ESG criteria.
- Start with passive portfolios and fixed-income portfolios.
- Expand the scope to include actively managed portfolios:
 - Adapt information systems to aggregate, harmonise and share information across investment teams.
- Join with other co-investors with similar sustainability goals and/or establish your own co-investment platforms for domestic markets with sustainability criteria for deal sourcing.

SWFs normally work through four steps when integrating sustainability into their investment strategies.

1. Analyse the portfolio's exposure to climate-related risks. Recent experiences show that SWFs prefer to start by decarbonising passively managed portfolios.
2. Set a credible objective that defines the percentage of fossil fuel reserves or carbon emissions to be reduced, or introduce an alternative measure for returns that considers wider sustainable development goals in other areas such as agriculture, water, and energy access.
3. Get internal or external managers to operationalise the required changes. When the bulk of the passive portfolios, invested in listed equities via indexes, is managed by external managers, the best option is to redefine the contracts to include climate conditions and criteria. For example, the NZSF only retained investments in companies appearing in the top quintile of the carbon emissions ranking (i.e. companies with the lowest emissions), while the rest were divested.

Here the critical point is data availability and the implementation of strong information systems that would be shared along the organisation. Technologies to integrate ESG criteria provided by financial data companies and managers remain key at this stage.

4. Expand the application of ESG criteria to include other asset classes such as fixed-income assets (divesting the corporate bonds of heavy polluters while selecting new opportunities in the growing green bond markets), infrastructure and agriculture (ensuring managers have a clear mandate to only source and invest in sustainable projects), renewable energy, technology, etc.

Co-investments with proven investors and multilateral institutions are worthwhile as they can facilitate the sourcing of new deals that are aligned with the SWF's sustainable investment goals. Joining co-investment consortia that comprise other responsible investors may provide easier access to deals and sector expertise, and expands the capital available for the largest deals.

Also, participating in investment platforms, be they developed by the IFC or established by specific SWFs, helps to increase sustainability in the portfolio of non-listed equities and to reduce the due diligence burden and sourcing costs. In addition, it may generate interest in learning processes as SWFs share and compare their abilities with other experienced investors in green assets. SWFs seeking to develop such co-investment platforms will need to examine each deal carefully, measuring its carbon impact. Deals should also be sourced from well-governed companies that deliver positive and sustainable social impacts. This effort to source sustainability-aligned deals for the platform increases the flow of deals, provides new information and intelligence about market niches and eases the fears of large foreign institutional co-investors.

As sovereign development fund portfolios are mostly dedicated to domestic, non-listed markets, they benefit from the design of consistent measures for capturing sustainable investment returns. Ensuring consistency between the global portfolio strategy and domestic investments is, however, key.

Beyond investing, all processes linked to active ownership – i.e. the exercise of voting rights either directly or through proxy advisors, and engagement with the boards and top management of portfolio companies – are applied as described in the previous sub-section on governance.

6.2 Potential challenges and constraints

- The transition costs of establishing sustainable portfolios are high for small and inexperienced SWFs.
- Lack of robust data on sustainability-focused investing, especially in privately held companies or projects.
- Sovereign development funds, which typically invest in privately held companies and projects involving infrastructure, real estate or agriculture, face greater difficulties to evaluate their carbon footprint and risk exposure, than reserve SWFs or intergenerational SWFs, which are largely exposed to listed equities.
- Aligning sustainable investment criteria with the global portfolio and with the domestic portfolio has been a real challenge due to the transition costs involved.

One major challenge is the initial cost of transitioning towards a comprehensive sustainability strategy. The diverse activities this involves – be it reducing carbon exposure, applying sustainability criteria to investment decisions, engaging and actively participating in annual shareholder meetings, or searching for new investment opportunities arising from climate change – all imply additional costs.³²

³² These four steps constitute the pillars of the NZSF's climate change strategy.

These costs are offset by the benefits of hedging against climate risks by factoring in regulatory, physical and technological risks. However, costs are realised whereas, in most cases, profits remain latent until the carbon effects materialise. The only quick return that can be gained from hedging is reputational, which can be significant for SWFs from smaller economies.

The second most important issue is the lack of information, one of the main factors driving up the costs of sustainability strategies. Increasing numbers of stock exchanges are scaling up their financial reporting demands. While the efforts of the TCFD and PRI may help to build international standards and reduce the fragmentation of information, uncertainty remains high. Some securities such as bonds may qualify as green bonds under certain regulatory frameworks but not under others. Some companies issue bonds to finance new green business lines while still producing contaminating products. The same may apply for equities.

In the case of listed markets, asset managers are generating green indexes, the components of which comply with a set degree of low or zero carbon exposure and emissions. In the case of privately held companies, which are less scrutinised and less regulated, the costs of accessing valid information remain substantial.

Also, achieving consistency between national and international regulations may be an issue for SWFs seeking to develop a sustainable investment strategy, especially those with a development mandate. Although SWFs have the potential to play a major role in supporting sustainable economic development in their domestic markets, it is essential that they harmonise their international and national portfolios. Take, for example, a situation where a country's regulators legislate to limit or ban its SWF from holding investments in fossil-fuel-based companies in their global portfolios. Such a move may also imply divesting from SMEs servicing (from technology to strategy) fossil fuel companies in the home country, which may have important implications for jobs or regional development. The transition costs may deter certain SWFs from taking up sustainable investment criteria.

7. Conclusion and 10 key messages

SWFs' green investment strategies are still nascent and somewhat rare. This study considers both the investment and divestment activities of SWFs in relation to climate change. The total value of green investments over the last three years totals USD 11 billion. This represents a mere 0.15% of total SWF assets under management. The study, the first of its kind, reviews SWFs' strategies for and investments in climate-related issues, with a focus on green investments and portfolio decarbonisation strategies.

The study also explores the challenges SWFs face when integrating climate-related risks into their investment analysis. Primarily a product of the apparent conflict between financial returns and climate-related investment strategies, these challenges include the following:

- (a) Most SWFs consider climate change to be a non-financial factor and therefore do not integrate it.
- (b) There is a lack of consensus in the sector about the performance of green funds and this is delaying SWFs' allocation to these funds.
- (c) SWFs may expedite greener investments if society more strongly demands them.
- (d) The lack of sufficient national green policies may deter SWFs from changing their strategy.
- (e) The costs of analysing the carbon footprint of portfolios or the costs of being active owners (exercising voting rights or engaging with companies) may be too high for smaller SWFs.

The study also draws out a number of best practices from the SWFs taking on green assets and looks at what further steps can be taken to enhance SWFs' participation in green and sustainable investments. First, the Santiago Principles, for instance, may provide the initial framework to guide the incorporation of climate-related risks in long-term investment design. In addition, the IFSWF may contribute by sharing best practices with its members and with other SWFs. Second, SWFs acting on climate change send strong signals to other investors both at home and abroad. The example set by the SWFs adopting climate-change investment strategies may serve to promote government policies on financial disclosure of climate change risks. Third, SWF co-investment is a growing trend and one that may stimulate new partnerships with other green investors globally.

Lastly, an ongoing and intriguing debate among institutional investors, which has implications for green SWFs, is whether it is better to divest polluting companies from the portfolio, or better to stay and engage with the top management and boards of such companies and take an active shareholder role with the aim of reducing these companies' emissions or signalling which companies are acting most responsibly in a given sector.

10 key messages

1. Sovereign wealth funds are a particular group of institutional investors that collectively manage assets worth USD 7.5 trillion. In recent years, SWFs have increasingly invested in real assets (real estate and infrastructure) and have invested heavily in privately held assets while reducing their fixed-income holdings. This expertise in alternative assets may help SWFs to increase their exposure to green infrastructure, agriculture and energy projects.
2. The wealth of the SWF sector is highly concentrated at the top, with the largest 20 funds controlling 90% of the sector's total assets. SWFs derive their wealth from natural

resources (57%) and other non-commodity sources such as foreign exchange reserves and fiscal long-term rules (43%). The sector primarily comprises developing-country SWFs, which hold 80% of its total assets. Clear leaders in sovereign wealth by number and size of fund are China, Norway and the United Arab Emirates. Six SWFs are based in LDCs.

3. SWF green investment strategies are still nascent and remain somewhat rare. This study considers the investment and divestment activities of SWFs in relation to climate change. The value of these actions over the last three years totals USD 11 billion, which represents a mere 0.15% of total SWF assets under management.
4. SWFs from developing economies such as China, Morocco, Saudi Arabia, Singapore and the United Arab Emirates are also investing in green infrastructure assets either directly or as limited partners of green infrastructure funds. However, climate-specific strategies need to be incorporated in the investment process.
5. Developed-country SWFs, such as those of Australia, Ireland, France, New Zealand and Norway, are implementing climate-related investment strategies, but only New Zealand and Norway have integrated climate-risks into their investment processes. So far, the main strategy adopted by developed-country SWFs is portfolio decarbonisation.
6. SWFs gain exposure to green assets by committing to green debt platforms (USD 4.3 billion), investing in renewable energy companies and projects (USD 3.5 billion) or participating in green infrastructure funds (USD 2.2 billion). The total value of the divestments made to decarbonise portfolios amounts to USD 2.9 billion.
7. Only a few SWFs are basing their investments on green investment criteria. These particular SWFs have the potential to play a major role because of their sophisticated workforces (a recent development), their improved investment practices, and their need for long-term returns, which may be more liable to climate risk.
8. So far, SWFs have not integrated climate-related risks for several reasons:
 - (a) The apparent conflict between the fiduciary mandate of preserving and growing national wealth through financial returns and the consideration of climate change as a non-financial factor.
 - (b) The lack of consensus regarding the performance of greener portfolios.
 - (c) The lack of sufficient national policies and/or society's lack of demand for greener portfolios.
 - (d) The costs of analysing the carbon footprint of portfolios, and the costs of being active owners (exercising voting rights or engaging with companies).
9. The main lessons to draw from the best practices of the SWFs taking on green assets are as follows:
 - (a) The Santiago Principles may serve as the initial framework to guide the incorporation of climate-related risks in the long-term investment design. The IFSWF may contribute by sharing best practices with its members and with other SWFs.

- (b) SWFs acting on climate change send strong signals to other investors both at home and abroad. The example set by the SWFs adopting such climate-oriented investment strategies may serve to promote government policies.
 - (c) SWFs' co-investment activity is growing, which has the knock-on effect of helping these funds to partner with other green investors globally.
10. An ongoing and intriguing debate among institutional investors is whether it is better to divest polluting companies from the portfolio, or better to stay and engage with the top management and boards of such companies in order to reduce emissions.

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