

White Paper

# Thinking Strategically: Using Resource Revenues to Invest in a Sustainable Future

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# Foreword



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The challenges the world faces from climate change, and the related shifts in the global energy landscape stemming from the rise of renewables and changing patterns of energy consumption, are well known. Investors as well as citizens around the world are becoming acutely aware of their financial and human costs. Fossil-fuel-rich, resource-dependent nations bear multiple points of exposure to this global economic transition, as their institutions, infrastructure and wealth are based on an economic model that will gradually diminish.

At the same time, optimism and – crucially – investment in sustainable development, renewable energy and economic diversification continue to grow. With the harm of climate change and the investment in solutions to mitigate it both advancing, we must ensure that the latter prevails and that economies around the world are prepared for this shift.

This White Paper, produced as part of the World Economic Forum System Initiative on Shaping the Future of Long-Term Investing, Infrastructure and Development, envisions how policy-makers, particularly those from fossil-fuel-rich economies, can apply private-sector investment techniques to transform their economies in preparation for a sustainable future. It draws on the multi-decade history of the sovereign fund model, which aligns private-sector investment with economic policy objectives, and combines it with the ambitions of sustainable investment approaches, such as blended finance and impact investing.

This paper is the first step in what is expected to be a multi-stage process to explore new investment models and to provide leaders with the tools and network to scale them to match the challenges societies must confront. Fortunately, the wealth produced by fossil fuel production is vast and can serve as the foundation for new, diversified economies.

The multistakeholder nature of the Forum's platform and network is uniquely suited to address this topic in a holistic way. With this in mind, we would like to thank the investors, policy-makers, academics and other experts who have contributed to this work.

# Executive summary

The age of oil and gas dominance is slowly coming to an end. It will probably not be the dramatic collapse fearfully predicted just 40 years ago, but it will surely affect those who are not prepared. As the rise of renewables and changing patterns of energy use shift the global energy landscape at a breakneck pace, the risk for economies dependent on fossil fuel revenues continues to climb. Without an energy transition roadmap, these nations could be left stranded with natural resources, infrastructure, institutions and human capital altogether unfit for a new world in which renewable energy, knowledge workers, smart grids and autonomous, electric vehicles drive global growth.

This is an age of transformational change. The Fourth Industrial Revolution promises to fuse together the physical, digital and biological worlds, presenting opportunities for extraordinary growth and improved living standards, accompanied by deep disruptions.<sup>1</sup> This technological revolution is also sparking an energy revolution in renewables, energy efficiency, smart cities and storage. These innovations are paving the way for a more sustainable and inclusive future for those with the capacity to take advantage of change, while creating ever more uncertainty for those unwilling or unable to adapt.

The capacity for fossil-fuel-rich, resource-dependent economies to adapt to future changes is often limited by a narrow growth model and inflexible institutions. For these countries, the time to act is now. Though the effects of an “energy revolution” may not be felt for decades, the necessary policy changes and investment decisions will need to be made well in advance of the moment they are felt by citizens, investors and policy-makers. Already, the twin strains of demographic and climate change are putting increasing political pressure on many fossil-fuel-rich economies to invest in new sources of economic opportunity and growth, while neither of these megatrends is likely to slow down or wait for societies to catch up.<sup>2</sup>

“  
**The Stone Age came to an end not for a lack of stones, and the oil age will end but not for a lack of oil.**

”

**Ahmed Zaki Yamani,**  
Minister of Oil and Mineral Resources of Saudi Arabia (1962-1986),  
8 September 2000

Transformational changes do not come only from the outside, however. Governments and societies can choose their fate through the institutional structures with which they organize themselves. They must mobilize all the resources at their disposal, including coordination between economic policy, investment decisions and business actions. The World Economic Forum has worked to align the roles and responsibilities of the public and private spheres since its inception in 1971, and its flagship publications, such as *The Global Competitiveness Report*, provide a compass for policy-makers and stakeholders to shape economic strategies in this fashion.<sup>3</sup>

A clear candidate for public-private synthesis when facing transformational changes is the national and global investment landscape, and many fossil-fuel-exporting countries are already adept at applying private-sector investment techniques in coordination with economic policy goals. Funded through windfall commodity revenues, these countries have accumulated trillions of dollars in sovereign wealth funds, which invest to achieve policy objectives including economic stabilization and saving for future generations. In the face of new challenges, can this unique group of investors evolve to respond directly to the economic, climate and social implications of the impending global energy transition?

There is already a long history of government, investor and civil society attempts to use private-sector investment techniques to achieve both financial and non-financial outcomes. Terms such as “public private cooperation”,<sup>4</sup> “blended finance”<sup>5</sup> and “impact investing”<sup>6</sup> have all become commonly cited solutions to global challenges. Yet these options may not be feasible or sufficiently impactful responses to the dramatic changes the global energy revolution portends. They have often lacked the scale, human capital, time horizon and local market integration necessary to mitigate the impact of dramatic global challenges. What’s more, they largely envisage government as a secondary player unable to take advantage of the sizeable resource revenues at its disposal.

An alternative approach, therefore, is to combine the ambitions of impact-style investing with the scale, economic policy integration and private-sector techniques of the sovereign fund sector. Strategic investment funds (SIFs), politically independent yet state-owned funds capitalized with surplus commodity revenues and mandated through government policy to confront these challenges head-on, are one such promising synthesis for adapting to transformational change. With the potential to combine the strategic, long-term vision of their host countries and the best practices and market discipline of institutional investors, a sector of SIFs could help catalyse the necessary investment for a diverse, sustainable and inclusive economic future in these countries. In doing so, such funds would convert current, finite resource wealth into a new era of prosperity.

# The need for change: Understanding the rapidly evolving global energy landscape



The ‘energy revolution’ will reshape the modern world in ways comparable only to the switch from coal to oil a century ago.



The “energy revolution” will reshape the modern world in ways comparable only to the switch from coal to oil a century ago.<sup>7</sup> New technologies, changing patterns of demand, growing threats to the environment and dramatic shifts in policy will affect the political, economic and environmental trajectory of almost every nation.

In particular, it will transform those for whom fossil fuels have been the primary source of influence and wealth. More than ever, a country’s wealth will derive from the productivity of its citizenry, and the ability of its government to marshal all the tools at its disposal to prepare those citizens for an uncertain future.

Four critical developments in the global energy landscape will force hydrocarbon-based sovereign wealth funds (SWFs) to reconsider their investment mandates, asset allocations and outflow time frames:

1. **Electrification and decarbonization** will accelerate as technology improves and risks converge.
2. **Growth in energy demand** will slow overall, even as some regions continue to develop, electrify and industrialize.
3. Oil producers are likely to face problems of **overabundance** and newfound competition.
4. **Energy systems will decentralize** in response to the Fourth Industrial Revolution.

These changes are no longer speculative, and indeed many of the best predictions are still likely to undershoot the mark. For a SWF charged with protecting future prosperity, the risks therefore can no longer be whether these changes will disrupt the existing model, but how best to adapt in time.

## Electrification

2015-2016 may well be remembered as a historic turning point in global energy. In 2015, 195 countries signed the Paris Agreement, agreeing to limit the global temperature increase to 2°C. In 2016, the global consumption of electricity reached parity with oil products for the first time.<sup>8</sup>

Today, the world’s energy mix is the most diverse it has ever been and this “energy-mix-switch” will only accelerate from here.

According to the International Energy Agency (IEA), 40% of the increase in energy consumption between now and 2040 will be in electricity, of which renewables are the fastest growing source.<sup>9</sup> The consumption of renewable energy is predicted to increase by an average of 2.3% a year between 2015 and 2040, ushering in the largest change in primary energy consumption since the expansion of nuclear power from 1966-1991.<sup>10</sup>

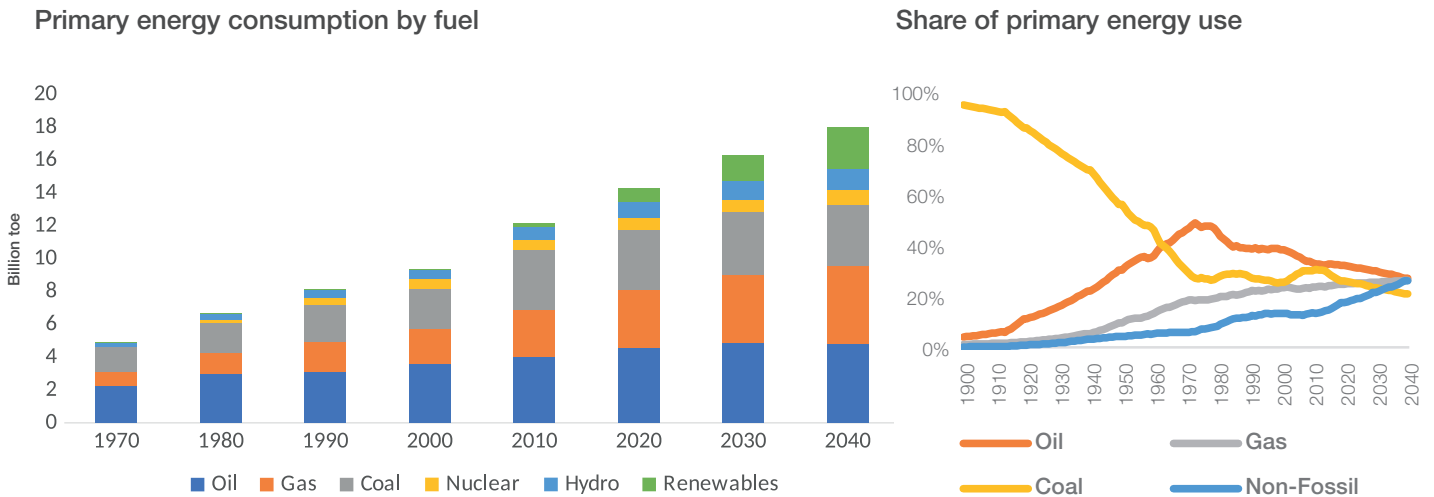
This has prompted some authors to speculate that the changes in global energy use will be as dramatic as the shift from coal to oil roughly a century ago. Though oil today is far from being as dominant as coal was at its height (Figure 1), the primary export and source of growth for certain countries today remains oil. In much the same way that coal continues to be a significant source of revenue for some countries but no longer sustains entire economies, this rapid shift towards renewables threatens to end the era of oil-led growth.



The world’s energy mix is the most diverse it has ever been and this ‘energy-mix-switch’ will only accelerate from here.



**Figure 1: Primary energy consumption**



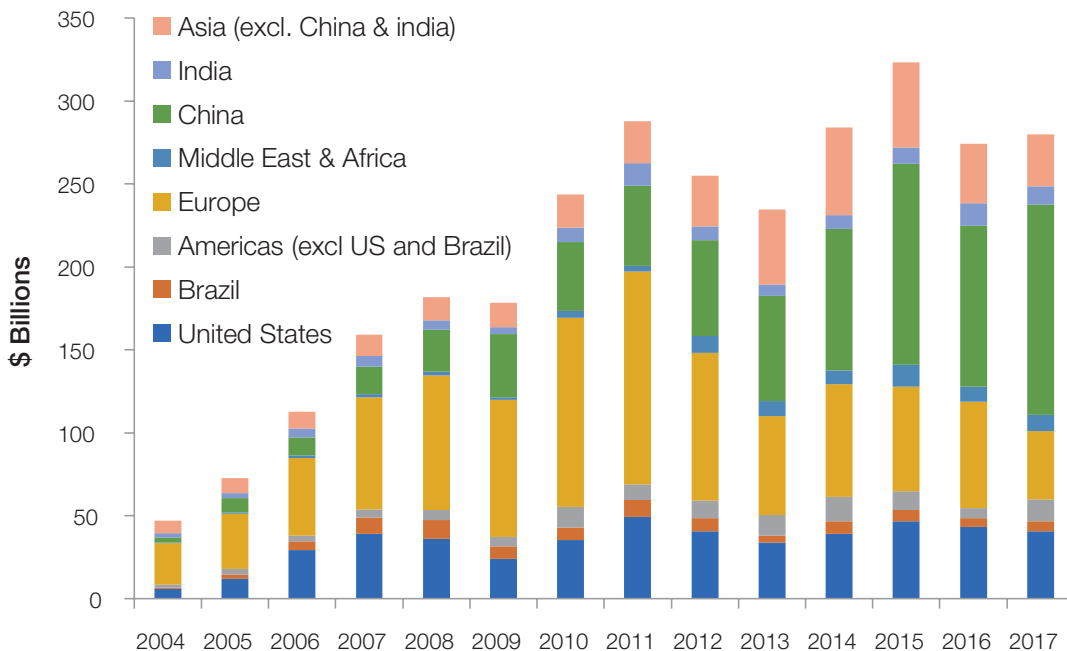
Source: BP Energy Outlook, 2018 edition, p. 68.

## Renewable energy technology

As more money, time and human capital are invested in renewable energy, the efficiency of these technologies will rise even as costs continue to plummet. As these technologies approach cost parity with their hydrocarbon competition, the rate at which countries abandon fossil fuels will accelerate dramatically. Despite currently

accounting for only 3.6% of global energy consumption, the IEA expects 72% of future investment in power generation globally between now and 2040 to be in wind and solar technologies, driven mostly by China.<sup>11</sup> Figure 2 shows the rapid increase in investment in renewables over the last decade. This clear signal from the market shows where the future of energy production and consumption lies.

**Figure 2: Investment in renewable energy by region, 2004-2017**



Sources: Frankfurt School-UNEP Centre, UN Environment Programme and Bloomberg New Energy Finance, *Global Trends in Renewable Energy Investment 2018*.

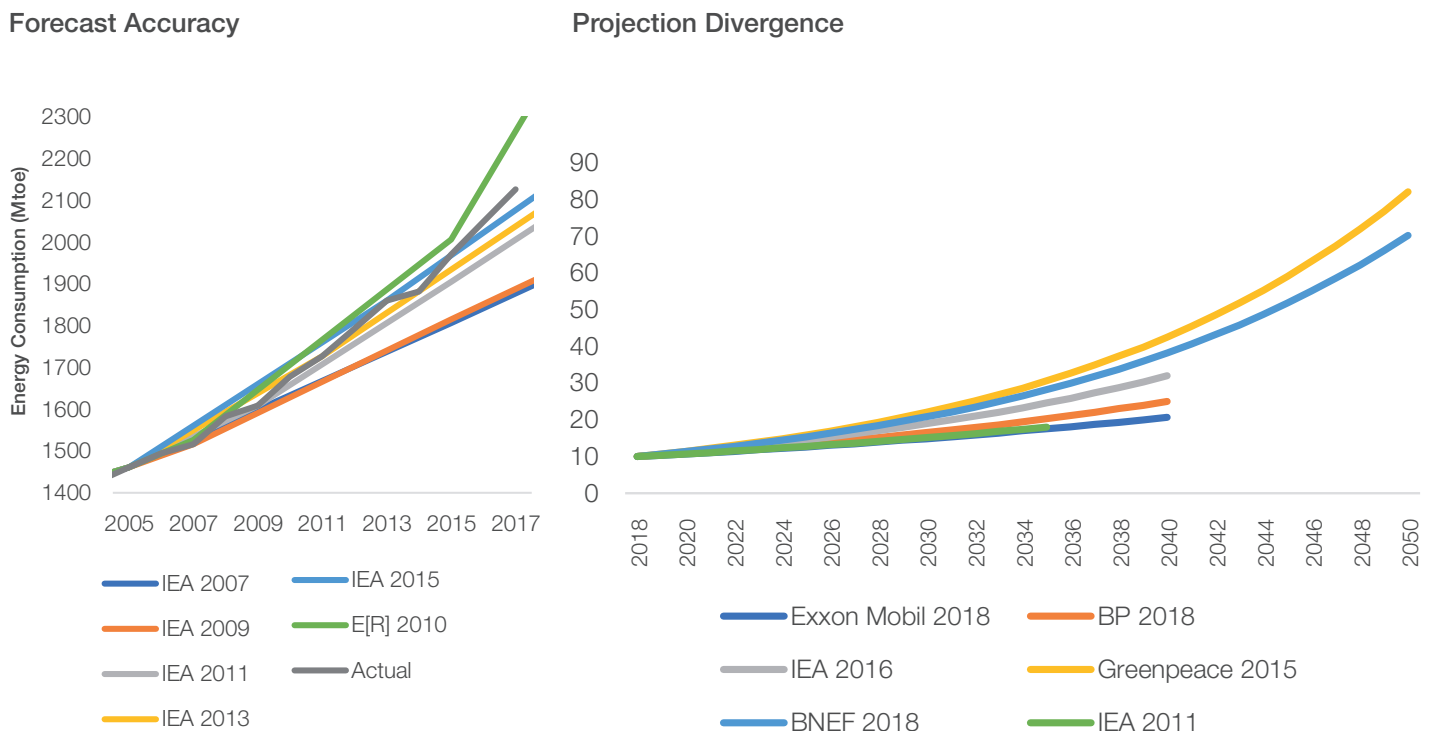
This shift is likely to occur sooner than one might think as costs fall faster than ever thought possible. Since 2010, the costs of new solar photovoltaic systems (solar PV) have fallen by an astonishing 70%, with utility-scale PV falling at a 20% compounded rate.<sup>12</sup> Solar is now officially as cheap as coal in Australia, Germany, Italy, Spain and the United States, and by 2021 is expected to be cheaper in Brazil, China, India, Mexico and the United Kingdom.<sup>13</sup> Estimates by the International Renewable Energy Agency suggest the levelized cost of electricity will fall by 59% over the coming decade for solar and a further 26% for onshore wind turbines.<sup>14</sup>

However, forecasting such uncertain changes remains far from an exact science. Exxon Mobil predicted in 2015 that the renewables share of global primary energy demand would barely surpass 15% by 2050.<sup>15</sup> Yet the latest projections from Bloomberg New Energy Finance (BNEF) claim that total energy production will shift from two-thirds fossil fuels today, to two-thirds renewables in 2050.<sup>16</sup>

Figure 3 shows how IEA forecasts, for example, have underestimated the growth of renewables since 2007 and how more ambitious proposals, such as the Greenpeace “Revolution Scenario”, have been closer to the mark. While past success is no guarantee of future accuracy, it is notable that Greenpeace’s latest *Energy [R]evolution* report in 2015 projected that renewables will comprise around three-quarters of primary energy use, roughly 10 percentage points more than BNEF and orders of magnitude greater than the IEA or oil companies like Exxon Mobile or BP estimated.<sup>17</sup>

“  
**As these technologies approach cost parity with their hydrocarbon competition, the rate at which countries abandon fossil fuels will accelerate dramatically.**  
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**Figure 3: Renewables forecasting and projections**



Source: Authors, based on BNEF, BP, Exxon Mobil, IEA and Greenpeace data.

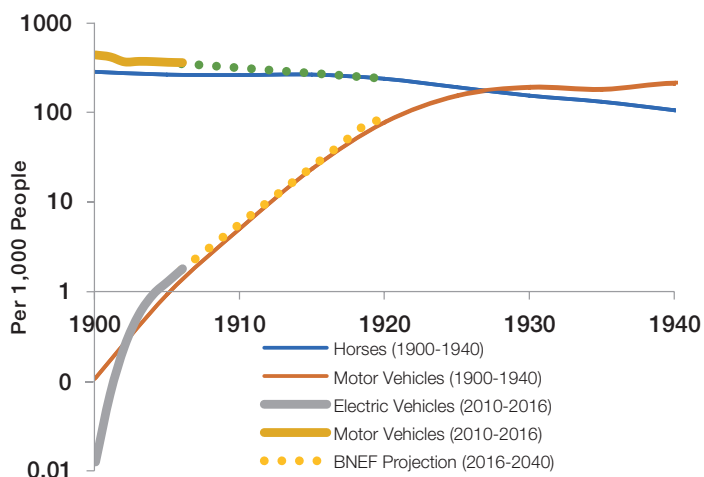
With almost every prediction over the last 15 years underestimating growth in renewable energy markets, and with considerable uncertainty regarding the future of climate change policies and technological disruptions, it may well be time for national governments and institutional investors to pay close attention to the most aggressive projections and seemingly outlandish scenarios.

## Electric vehicles

The rate at which electric vehicles (EVs) replace conventional modes of transport has arguably the greatest potential to reshape global energy consumption and pollution output. In the United States, the transportation sector accounts for approximately 29% of all energy use, 80% of which is by on-road (mostly petroleum gasoline) vehicles.<sup>18</sup>

Not only are the costs of EVs falling precipitously, but new breakthroughs, such as automation, hint at the possibility of the biggest revolution in mobility since the end of the horse and buggy.<sup>19</sup> Figure 4 plots the ownership of horses, motor vehicles and electric vehicles per thousand people, illustrating how, since 2010, EVs are on the same growth trajectory motor vehicles were in the early 20th century, even as motor vehicles are declining at about the same rate as horse ownership over the same period.

**Figure 4: Horses, motor vehicles and electric vehicles in the United States**



Source: Authors, based on BNEF, US Census Bureau and American Association of Equine Practitioners data.

In 2017 alone, Intel acquired Mobileye for \$15 billion, Shell invested in EV charging by acquiring Dutch Firm NewMotion, Tesla launched its Model 3 and the UK announced it would phase out sales of combustion vehicles. In 2018, Toyota announced it would electrify all its cars by 2025, Volvo announced all models after 2019 will be either hybrids or all-electric, and both General Motors and Ford announced plans for multiple new EVs. All in all, the automotive industry expects some 127 battery-electric models to come on the market in just the next five years.<sup>20</sup>



**New breakthroughs, such as automation, hint at the possibility of the biggest revolution in mobility since the end of the horse and buggy.**



EV sales are accelerating rapidly and once price parity is reached with gasoline vehicles (possibly as early as 2025<sup>21</sup>), many expect a so-called “S-curve inflection point of demand” to reshape the automotive (and fossil-fuel) industry in profound ways.<sup>22</sup> EVs’ critical component – their battery – is expected to fall in price by more than 70% by 2030, having already fallen by 73% since 2010.

By 2040, EVs are likely to make up the majority of car sales,<sup>23</sup> and could reach 75% by 2050 with high oil prices or greater-than-expected technology cost declines.<sup>24</sup> If a third of all light-duty vehicles were electric by 2040, this would displace some 8 million barrels of transport fuel per day, reducing carbon emissions and disrupting revenue streams for fossil-fuel producers.

## Climate policies

Much of the growth in renewable energy and electric vehicles has been driven by government policies and incentives intended to mitigate climate change risks. As the effects of climate change and global warming become increasingly apparent, it is not unreasonable to assume that climate change policies will take on an even greater role in the supply and demand dynamics of energy markets.

While total greenhouse gas emissions (GHGs) have slowed since the signing of the 2015 Paris Agreement, even the best estimates suggest overall emissions will not peak until at least 2040. By 2040, the global community will have well and truly missed the chance to limit global warming to below 2°C above pre-industrial levels, the level at which we can still “avoid incalculable risks to humanity”.<sup>25</sup>

The latest Intergovernmental Panel on Climate Change (IPCC) report, released in October 2018, noted that “there is no documented historical precedent” for the scale of required actions to avoid irreversible changes due to climate change.<sup>26</sup> To stay below 1.5°C, policy-makers would need to come up with ways to cut global GHGs by 45% by 2030. Needless to say, this would be extremely disruptive to global energy markets and the future of hydrocarbon-dependent industries and countries.

Signs indicate that governments are beginning to take the issue seriously. Since 1997, the number of climate change laws has increased 20-fold, regional and international agreements have proliferated, and investment in clean energy sources has rapidly increased.<sup>27</sup> China in particular, as the world’s largest emitter, has begun to shoulder this responsibility by intensifying its investments in clean energy products – \$44 billion in 2017, up from \$32 billion in 2016<sup>28</sup> – and revisiting its plans to expand coal generation.

However, not a single advanced economy is on track to meet its own pledges as part of the 2015 Paris Agreement on climate change.<sup>29</sup> With BNEF estimating an additional \$5.3 trillion investment will be needed in zero-carbon capacity, and the International Renewable Energy Agency calling for a more than 600% increase in renewable energy consumption, all countries will need to aggressively direct more resources into these sectors to reach the prescribed targets.

In addition to spurring investment and growth in renewable energy and EVs, the imposition of carbon taxes, cap-and-trade schemes and other forms of carbon prices could drastically affect the demand for fossil fuels. This, in turn, would reduce the value of these assets and potentially force a majority of fossil fuels to be left in the ground.

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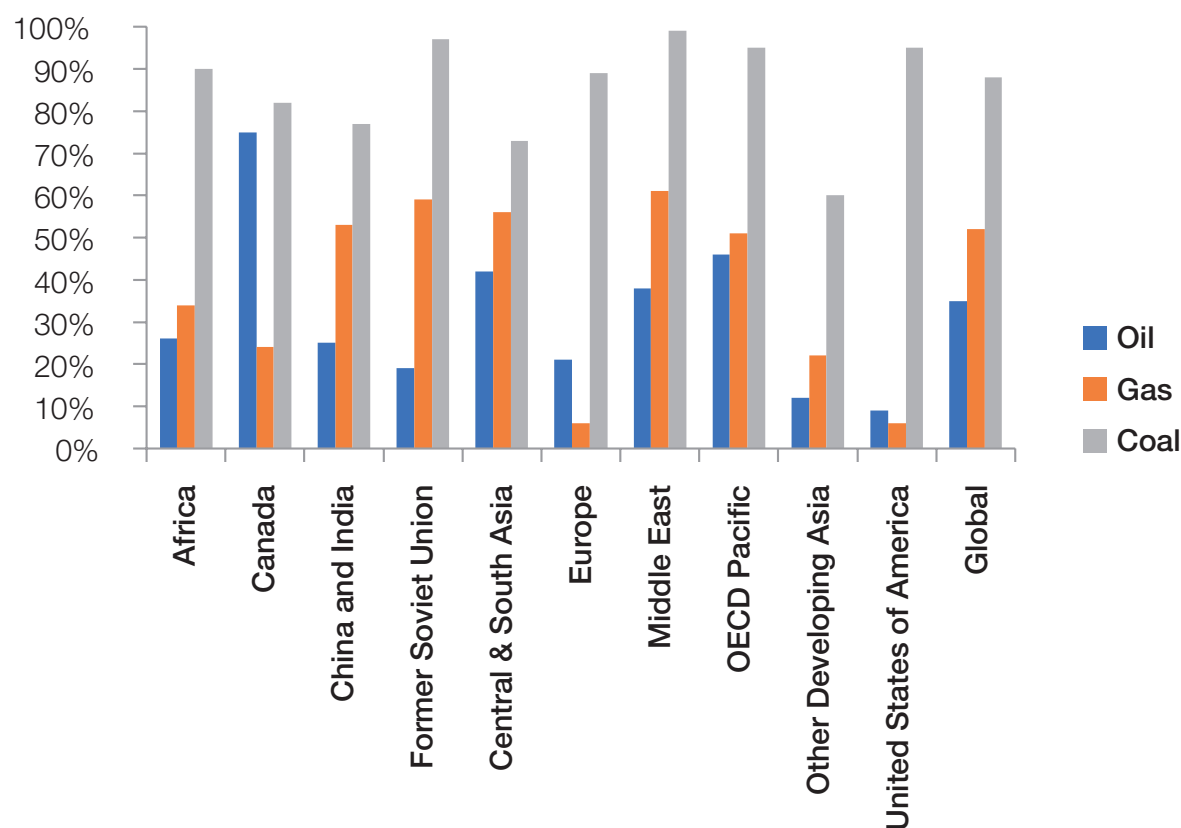
**Not a single advanced economy is on track to meet its own pledges as part of the 2015 Paris climate agreement.**

”

### Fossil fuels and climate change

According to 2014 estimates, with less than 600 gigatonnes of our “carbon budget” remaining and an estimated 2,900 gigatonnes of carbon dioxide content in the world’s fossil-fuel reserves, more than two-thirds of current reserves must remain untouched to avoid the worst effects of climate change.<sup>30</sup> Figure 5 breaks down how much of the world’s fossil fuels will need to remain in the ground by region.

**Figure 5:** Share of total reserves that need to be unused before 2050 to stay below 2°C warming by region



Source: McGlade and Ekins, “The geographical distribution of fossil fuels unused when limiting global warming to 2 C”, *Nature*, 2015.



**Two-thirds of current reserves must remain untouched to avoid the worst effects of climate change.**



Referred to as “carbon market risk”, the possibility of a permanent fall in fossil-fuel prices for producers only increases as more countries grapple with the implications of climate change.<sup>31</sup> However, there are several unpredictable variables in this equation. For example, in what is known as the “green paradox”, if fossil-fuel-rich economies (FFREs) increase the rate of extraction in anticipation of a future price decline, not only may they accelerate global warming and the adoption of climate change policies, but they may hasten the fall in prices.<sup>32</sup>

## Global demand

This is not to say the era of oil is over. Perhaps it might be appropriate to claim that it is approaching its twilight phase. Even if every second car sold were electric, global oil demand would continue to grow as China, India and other non-OECD countries develop and industrialize. Global energy demand is expected to rise by 25% between 2016 and 2040, with non-OECD demand increasing by 40%.<sup>33</sup>

The IEA expects the global economy to grow at 3.4% per year on average between now and 2040, and the world population to increase by a further 1.7 billion. With the urbanization and electrification of poorer countries, the world’s energy needs will expand by the equivalent of adding another China and India to today’s global demand by 2040.<sup>34</sup>

The nature of this demand is also changing in important ways. Energy per capita has likely peaked in most mature economies as energy efficiency has improved. Since 1971, for every 1% increase in global GDP, global energy demand has increased by 0.6%.<sup>35</sup> Constantly improving technologies are likely to further improve energy efficiency as electrical devices become more responsive and further gains are made in heaters and air conditioning units, in particular.

The IEA expects oil demand to increase until 2040, though at a decreasing pace over time.<sup>36</sup> While this has caused some to raise the spectre of “peak oil” again, there are fewer reasons to worry than in the past. Even if “peak oil” might be imminent, the term no longer refers to the end of oil supply as it did two or three decades ago, but rather to the slow, manageable decline in demand. The fear is no longer oil scarcity, but rather abundance – whereby assets are left “stranded” by consumers due to the forces of electrification and decarbonization.



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## From scarcity to abundance

According to recent estimates from BP, there are enough known oil resources using only existing technology to meet more than twice the world’s demand for oil up until 2050.<sup>37</sup> This dramatic shift from perceived energy scarcity to proven abundance is in large part due to a series of breakthrough technological innovations. For example, the “shale revolution” has unlocked huge new supplies of natural gas and oil thanks to horizontal drilling and fracking. As a result, the United States is now the world’s largest oil and gas producer, and by the mid-2020s is expected to be the largest natural gas exporter.

Other improvements in technology, such as smarter management of complex systems, automation and data analytics, have boosted the flexibility and productivity of energy companies. For example, in April 2017, BP announced that, with improved use of data analytics, it had identified an additional 200 million barrels of oil in an existing field in the Gulf of Mexico. Automation has already transformed aspects of the oil industry, such as remote offshore oil fields where robots are now performing jobs traditionally carried out by “roustabouts” and will soon be able to conduct remote drilling with few personnel required on-site.<sup>38</sup>

Ultimately, these changes are likely to make global oil markets more competitive and erode the considerable rents from which large FFREs have accumulated their wealth in the past. Since much of the world’s oil reserves may now never be recovered, a high reserves-to-production ratio is no longer a sign of strength, but of inefficiency. As such, low-cost producers are likely to increase production to gain market share and convert as much of these resources into financial wealth as possible. This may prove a difficult proposition, however, as production cannot be ramped up overnight, but will require considerable investment even as financing opportunities are increasingly scarce.

## Energy fragmentation and decentralization

Finally, just as the oil market has fragmented with the entrance of smaller, US shale producers, the electricity system more broadly is on the verge of widespread decentralization and decentralization amid the Fourth Industrial Revolution. The most obvious example of decentralized energy is rooftop solar PV, where falling costs are allowing decentralized energy grids to compete with utilities in most industrialized countries.<sup>39</sup> However, applications extend far beyond the household level and promise to remake the way citywide electricity distribution and beyond is structured.

With over 1.2 billion people – or 16% of the world’s population – still lacking access to electricity, the possibility of self- and locally-generated power has sweeping development implications as well as risks for existing energy providers. New technologies, including distributed ledger technology (blockchain), digital currencies, smart power meters and kill switches, have the potential to be combined in ways that overcome the uncertainty lenders have traditionally faced in financing solar microgrids.<sup>40</sup> Better use of these technologies, applied in a decentralized way, can

deliver low-carbon communities and significantly disrupt the utility-scale distribution networks currently using fossil-fuel-based technologies.

The Fourth Industrial Revolution also contains within it the possibility of developing sustainable and smart cities by using cutting-edge technologies. Cities account for more than 70% of global energy use and are full of opportunities for improved energy efficiency through decentralized energy generation, smart meters, intelligent grid management and the development of waste-to-energy plants. Furthermore, smart planning and construction can better manage energy-intensive urban sprawl, even as integrated transport and logistics systems reduce the need for private vehicles.<sup>41</sup>

## **Change: The only inevitability**

This section has presented just some of the megatrends in global energy markets and is far from an exhaustive list of potential disruptions. While some of the projections are aggressive, the history of predicting structural changes suggests that, if anything, the built-in status quo bias makes it more likely to underestimate the scope of change. More importantly, the risks to countries for whom the status quo is not just convenient, but a way of life, imply that such tail risks have to be the catalyst for dramatic shifts in the policy and practice of preparing for uncertainty.

# Stranded nations: The risks for fossil-fuel-rich countries

The risks from a global “energy revolution” are far better understood than what such a revolution might look like. Indeed, for many countries, these risks are not hypothetical but already under way. Whether it is a shifting investment landscape from hydrocarbons to renewables, widening budget deficits amid low commodity prices, or the political pressures of demographic change, clearly a status quo approach is not keeping up.

In *The Changing Wealth of Nations 2018*, the World Bank cites four key risks to the development trajectory of FFREs in this context.<sup>42</sup>

1. Existing assets are likely to both decline in value and remain untapped, eroding an important income stream for these countries.
2. Even if these developments are decades away, the impediments to taking further advantage of these assets in the short term are considerable.
3. Most FFREs have multiple points of exposure to carbon assets, such as downstream industries or national oil companies, which are also at risk of suffering when carbon assets decline in value.

4. Whether it is the “natural resource curse” or ongoing difficulties to diversify across a broader range of economic sectors, the range of challenges associated with being a FFRE persistent.

## Declining asset values

If demand for fossil fuels fall over time, so will their market value. Existing projects will become less profitable, if they even remain viable, tax revenues will decline, existing skill sets will become less useful, and the general prospects for continued economic development and prosperity will diminish.

The following table (Figure 6) lists all the countries (as of 2014) for whom more than 10% of total wealth is in carbon assets – the estimated value of all coal, oil and gas reserves – and, hence, are most at risk of becoming a “stranded nation”, that is, left behind economically as the world moves forward in its new decarbonized energy future. The table shows that the majority of these countries are either in the Middle East or Africa and that their total wealth per capita varies significantly. Generally their natural resource rents are a high share of their GDP.

**Figure 6:** Resource wealth among the most resource-rich countries as of 2014

Country	Region	Carbon Wealth (%)	Human Capital (%)	Produced Capital (%)	Wealth Per Capita	Natural Resource Rents (% GDP)*
<i>Iraq</i>	Middle East and North Africa	67	15	14	\$ 101,705	42
<i>Kuwait</i>	Middle East and North Africa	52	24	7	\$ 1,123,144	50
<i>Saudi Arabia</i>	Middle East and North Africa	49	31	13	\$ 512,869	36
<i>Azerbaijan</i>	Europe and Central Asia	42	14	24	\$ 85,341	22
<i>Qatar</i>	Middle East and North Africa	41	35	14	\$ 1,597,125	28
<i>United Arab Emirates</i>	Middle East and North Africa	35	38	17	\$ 738,270	20
<i>Oman</i>	Middle East and North Africa	32	45	18	\$ 277,574	35
<i>Yemen</i>	Middle East and North Africa	29	39	16	\$ 22,909	9
<i>Kazakhstan</i>	Europe and Central Asia	26	42	22	\$ 180,911	16
<i>Turkmenistan</i>	Europe and Central Asia	26	32	27	\$ 146,831	27
<i>Gabon</i>	Sub-Saharan Africa	26	31	17	\$ 199,901	25
<i>Congo, The</i>	Sub-Saharan Africa	26	38	22	\$ 68,779	38
<i>Nigeria</i>	Sub-Saharan Africa	21	56	10	\$ 37,408	9
<i>Chad</i>	Sub-Saharan Africa	20	45	8	\$ 20,077	20
<i>Venezuela, Bolivarian Rep. of</i>	Latin America and Caribbean	19	30	43	\$ 162,560	13
<i>Russian Federation</i>	Europe and Central Asia	18	48	26	\$ 188,715	12
<i>Ecuador</i>	Latin America and Caribbean	14	51	20	\$ 102,451	9
<i>Mongolia</i>	East Asia and Pacific	13	26	21	\$ 79,004	23
<i>Egypt</i>	Middle East and North Africa	11	59	15	\$ 38,470	7

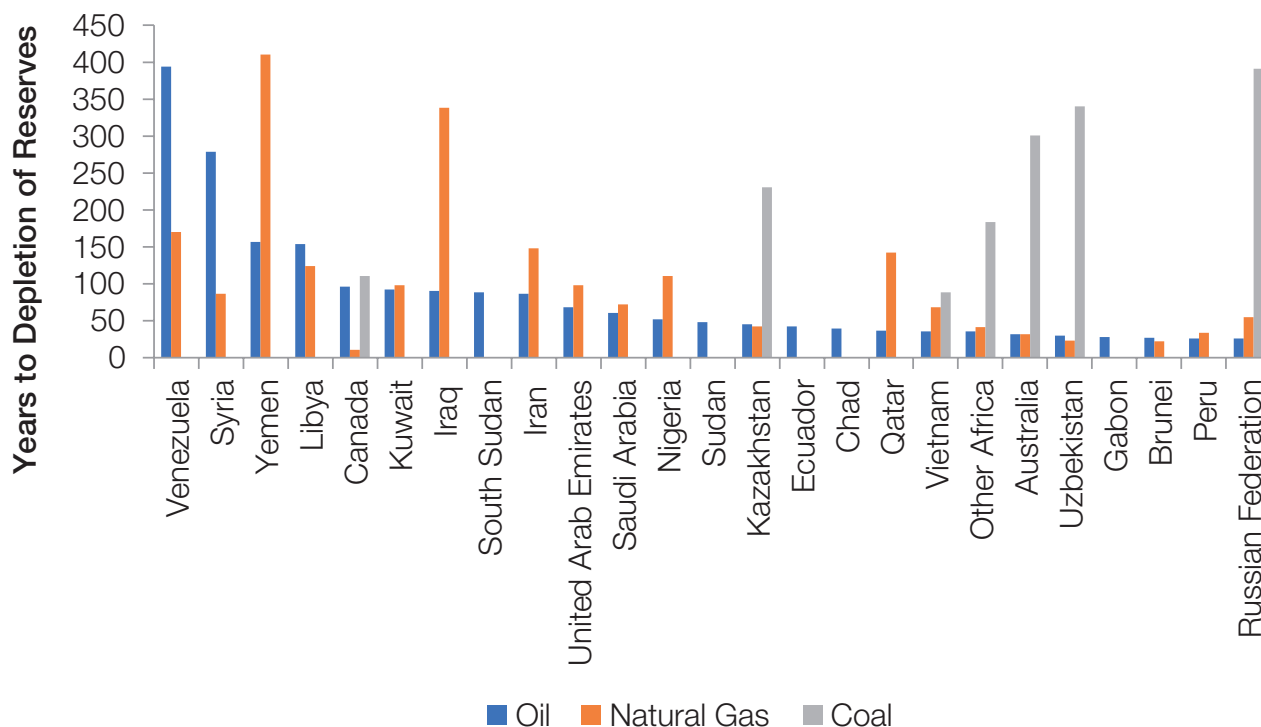
\*five-year average

Source: Cust and Manley, “The Carbon Wealth of Nations: From Rents to Risks”, in *The Changing Wealth of Nations 2018: Building a Sustainable Future*, World Bank Group, 2018.

## Race to monetize

At current rates of production, 25 countries hold more than 25 years' worth of oil reserves (Figure 7). In addition, 30 will not exhaust natural gas reserves over the same time frame.<sup>43</sup> While oil companies only hold an average of around 13 years of reserves<sup>44</sup> and are therefore less at risk, many countries will be hard pressed to capture even a fraction of this untapped wealth within the remaining years of fossil fuel primacy.

Figure 7: Hydrocarbon reserves by country



Note: "Years to depletion" refers to the reserves to production ratio.  
Source: BP Statistical Review of World Energy – all data, 1965-2017.

Furthermore, FFREs cannot simply ramp up their production rates. Countries with the highest daily production have generally spent decades investing in infrastructure and know-how, neither of which can be reproduced overnight. Governments can adjust the rate at which they license new fields for development; however, with global oil investment already down significantly over the past 3-4 years, the prospect for new, risky investments is low. Furthermore, if these countries were to successfully increase production rates, the fall in fossil-fuel prices may accelerate as extra supply comes to market. This drop would only further decrease asset values and the window available to take advantage of profitable extraction opportunities.

## Multiple points of exposure

Any threat to the value of a country's resources is a threat to the sustainability of a range of industries tied to fossil-fuel extraction. This value chain runs all the way from the upstream industries of initial exploration, appraisal and auxiliary services, to the midstream production of infrastructure, transport and pipelines, until finally extracted hydrocarbons are refined, manufactured into petrochemicals and marketed to end-consumers around the world.

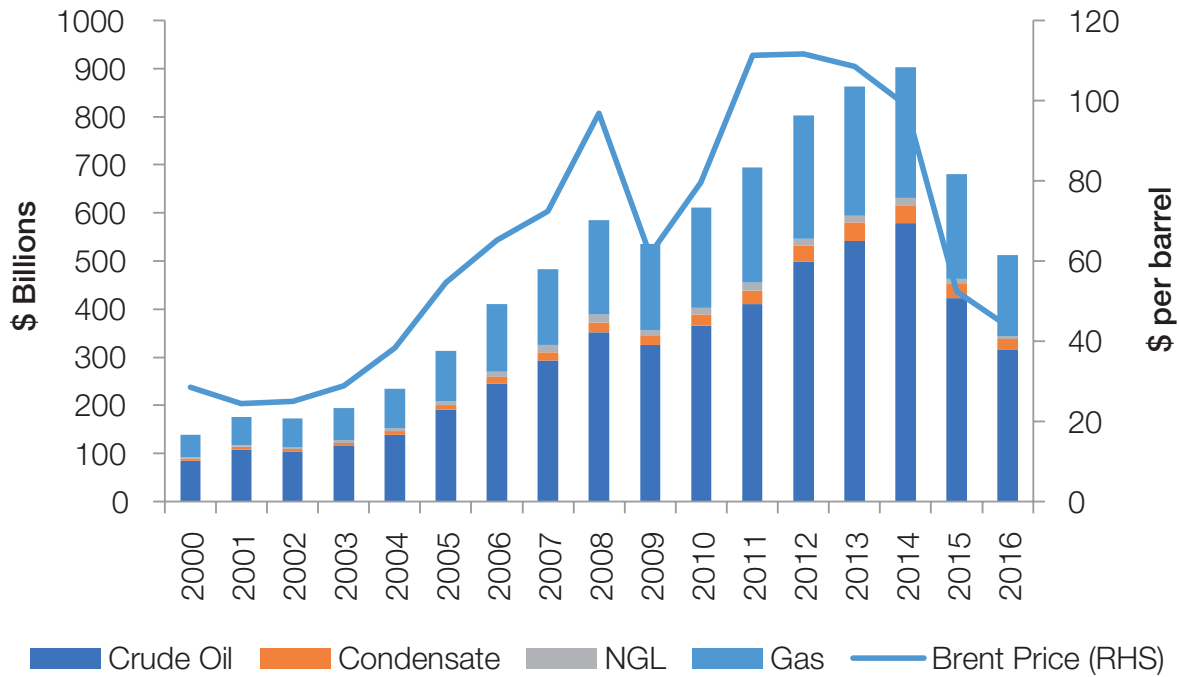
National oil companies, in particular, are extremely important

to both national economies and the global oil and gas industry, accounting for approximately 58% of global reserves and 56% of production.<sup>45</sup> These companies are also often used in combination with other policy tools to pursue a range of development and socio-economic objectives, including maximizing the net present value of rents derived from hydrocarbon extraction, promoting bilateral trade and energy self-sufficiency and achieving inter-temporal equity across generations.<sup>46</sup>

Following the dramatic fall in energy prices since 2014, a number of governments have considered partial privatization of national oil companies to raise capital and boost efficiency. This new strategy – "from volume to value"<sup>47</sup> – speaks to the mounting pressures on FFREs in a low-energy price environment.

This phenomenon is unsurprising given the collapse in upstream capital spending globally, which fell from nearly \$800 billion in 2014 to almost \$400 billion just two years later (Figure 8). While investment has gradually picked up in line with rebounding oil prices, it is far from returning to its peak.<sup>48</sup> Meanwhile, corporate investment in new energy technology companies reached an all-time high, suggesting companies anticipate technologies like electric vehicles and smart grids to be the way of the future.

**Figure 8:** Global upstream oil and natural gas capital investment, 2000-2016 (billion \$)



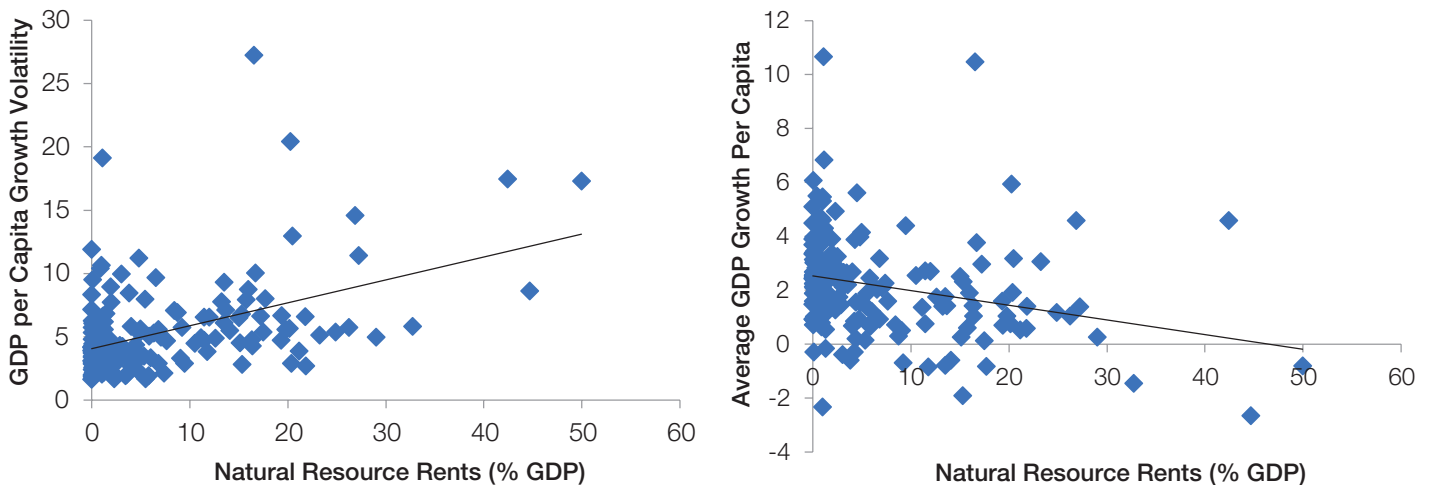
Source: U.S. Energy Information Administration, *International Energy Outlook 2018*.

Finally, many resource-rich countries are exposed to carbon risks socially and politically. With some of the fastest growing populations on the planet, governments will no longer be able to rely on providing comfortable public-sector jobs in hydrocarbon-related industries as a way to maintain political and social stability. The Arab Spring was a reminder of the critical link between social cohesion and job creation, yet without more private-sector jobs in industries unrelated to natural resources, this cohesion may prove difficult to maintain.

### Diversification

The broad exposure of FFREs to declining carbon values reflects the difficulties these countries have traditionally had in establishing sustainable growth models beyond the hydrocarbon value chain. Empirical research shows that diversified economies perform better over the long run,<sup>49</sup> leading several authors to proclaim that there is a natural resource curse,<sup>50</sup> or a negative long-run correlation between average growth and natural resources<sup>51</sup> and a positive correlation with output volatility, as shown in Figure 9.

**Figure 9:** Growth and volatility among countries of different resource dependency (measured as standard deviation changes in growth between 1960 and 2017)



Source: World Bank Development Indicators.

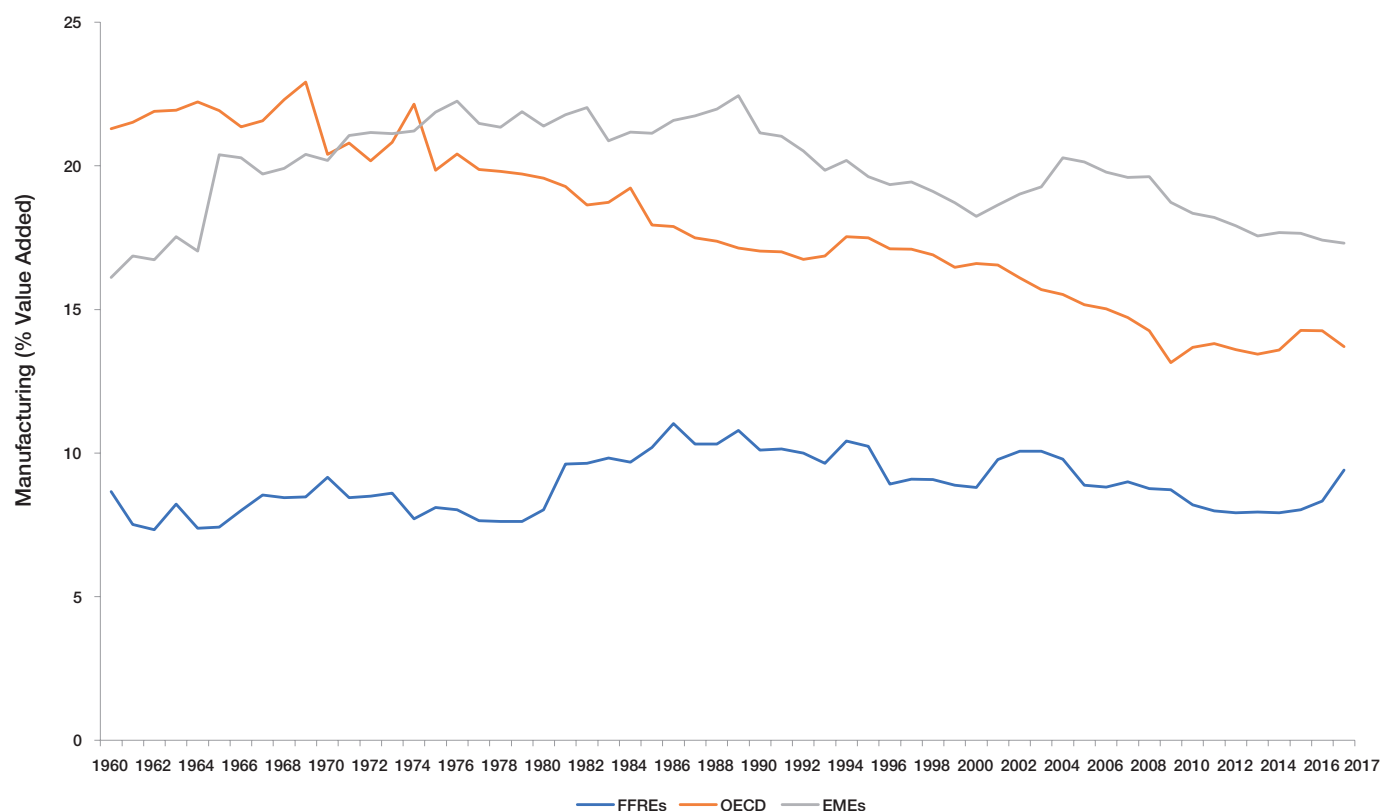
Though there are many competing explanations for the natural resource curse,<sup>52</sup> and some disagreement as to whether or not it truly exists, it does point to several factors that are disproportionately prevalent among resource-rich economies.

The first of these is known as “Dutch Disease”,<sup>53</sup> named for the side effects of natural gas discoveries in the Netherlands in the late 1950s. The phenomenon occurs when swings in commodity prices create excessive macroeconomic instability, including a higher real exchange rate, inflation, current account deficits and the crowding out of non-commodity industries.<sup>54</sup> These effects are often not helped by pro-cyclical government policies – that is, expansionary monetary or fiscal policy in good economic times and higher interest rates and budget cuts when things turn south. This has historically exacerbated the boom and bust cycle, leading to larger cyclical fluctuations in economic growth.<sup>55</sup>

When Dutch Disease is contracted for too long, its symptoms can bring on even worse afflictions, including deindustrialization and the erosion of human capital. Classical economic theory suggests it is beneficial for a country to specialize in its comparative advantage – natural resources, in this case.

However, a competing argument, and a wealth of historical data, states that a developed manufacturing sector creates a “learning-by-doing” environment that has positive spillovers throughout an economy.<sup>56</sup> A successful manufacturing sector requires investments in human capital, quality infrastructure and sophisticated institutions, all of which contribute to a sustainable economic growth model and, in general, stave off the worst effects of the dreaded Dutch Disease.<sup>57</sup> Figure 10, for example, shows how FFREs have always had much smaller manufacturing sectors than their rich country (OECD) or emerging market (EME) counterparts.

**Figure 10: Industrialization according to development and resource dependency, 1960-2017**



Source: World Bank Development Indicators.

A related theory argues that it is the relationship between natural resource extraction and political institutions that has the greatest effect on economic development. Several academics have found evidence that natural resource wealth creates a high-rent environment in which there is a political contest to capture ownership of this endowment, leading to poorer quality institutions and lacklustre development outcomes outside the resource sector.<sup>58</sup> On the other hand, in countries without such rents, political institutions must motivate their citizens to create wealth by fostering a civil society, investing in education and pursuing a more diversified growth model.

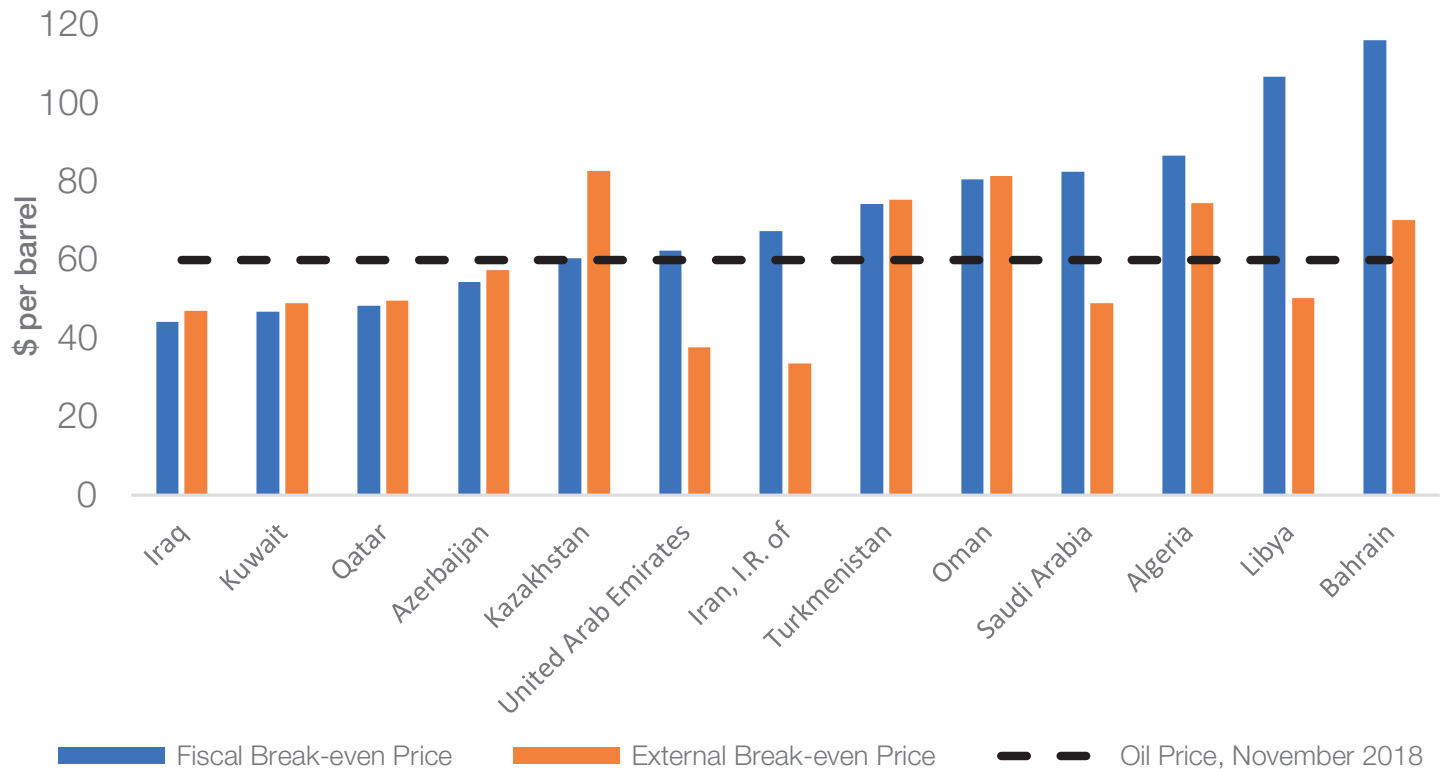
Resource-rich economies often have few incentives to develop the quality institutions that lead to long-term economic prosperity. Empirical studies show that a certain degree of accountability and transparency are necessary to reduce corruption,<sup>59</sup> increase the efficiency of public investment,<sup>60</sup> and create diverse private-sector employment.<sup>61</sup> This disparity between the short-term incentives to invest in political institutions and the long-term benefits of such entities helps explain why resource-rich countries often lack the economic diversity and prosperity of countries who were not as lucky in their natural endowments.

It is therefore imperative for resource-rich countries' prospects of sustained economic development that they encourage investment in a diverse range of industries and build robust political institutions. The best examples of such policy responses have been when the government works alongside the private sector to facilitate efficient as well as strategic investment using existing resources.

## Recent developments

With these challenges in mind, a number of FFREs, particularly in the Middle East, have begun to implement reforms and set ambitious targets for diversification. With oil prices falling below \$60 per barrel in November 2018,<sup>62</sup> several countries remain at risk of being unable to balance their budgets or maintain a positive external balance (Figure 11), threatening their economic security. Lower energy prices, demographic pressures and political developments have further entrenched the need for sweeping changes.

**Figure 11:** Fiscal and external break-even prices by country



Source: International Monetary Fund, *Regional Economic Outlook Update: Middle East and Central Asia*, Statistical Appendix, 2018.

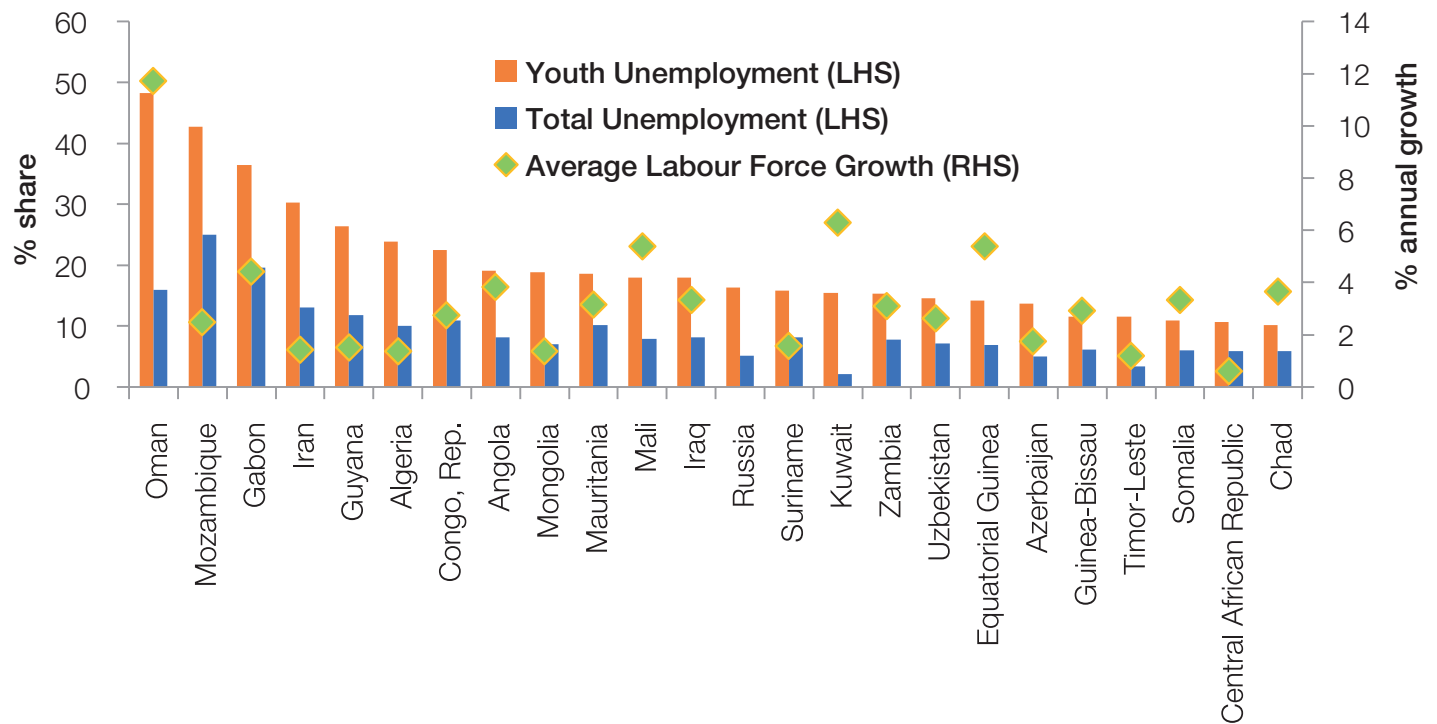
Gulf countries have received a healthy mix of praise and scepticism in response to their ambitious plans for expanding the role of the non-hydrocarbon sector and achieving a sustainable, inclusive growth model. Saudi Arabia, Oman and the United Arab Emirates (UAE) have all introduced national development strategies – such as Saudi Arabia’s Vision 2030 – with a set of key performance indicators and accountability mechanisms.<sup>63</sup> Qatar’s Second National Development Strategy also features an emphasis on robust monitoring and evaluation systems.

Each of these plans is especially focused on boosting priority sectors, such as financial services, manufacturing, tourism, healthcare and logistics. Qatar and Saudi Arabia have been investing in improving logistics and transportation facilities, for example, and almost every country has announced key infrastructure projects to boost tourism. Saudi Arabia has even revealed that it will build a new megacity, NEOM, which aims to transform hundreds of kilometres of the Red Sea coastline into a tourist destination, at a price tag of over \$500 billion.<sup>64</sup>

Other reforms include increasing the role of the private sector through gradual privatizations and public-private partnerships. Again, the most visible of these is in Saudi Arabia, with privatization programmes in 16 sectors of the economy. Reforms to improve the business environment also promise to boost private-sector investment. For example, Kuwait, Oman, Qatar and Saudi Arabia have all set up “one-stop windows” for business registration and licensing to lower the barriers to private enterprise.

The pressure on these initiatives to succeed in the face of a burgeoning young population and increasing political demands from women and minorities is great. With lower oil and gas prices already putting significant stress on government budgets, the existing model in some of these states where nationals rely on public-sector jobs is not sustainable. Over half of all FFREs (25 out of 44) have youth unemployment rates above 10%, even as their labour forces continue to expand rapidly<sup>65</sup> (Figure 12). Seventeen of the 44 FFREs have seen their labour force increase by more than a third in just 10 years.<sup>66</sup>

**Figure 12: Labour markets in fossil-fuel-rich economies**



Source: World Bank Development Indicators.

A large and persistent gender gap in many of these countries is further incentive for governments to implement reforms. Of the 23 countries in which less than a third of women participate in the labour force, nine are FFREs. Twenty of these are ranked in the bottom third of countries in the World Economic Forum *Global Gender Gap Report 2016*.<sup>67</sup> Some countries, such as Saudi Arabia, have begun to implement policies to increase their female participation rate, educational attainment and political empowerment, but there is still a long way to go. Creating a more diverse economy with more opportunities for all citizens will help address these pressures and alleviate social and political unrest.

### Recognizing risks

The upshot is that there is still plenty of time to act in response to these risks. The age of oil will end not with a bang but a whimper; the rise of renewables will be exponential but from a low base; and no nation will suddenly wake up to find itself stranded by megatrends decades in the making. Instead, countries with the foresight and discipline to act decisively can forestall many of these disruptions and even make good on the promise of a more diverse and sustainable prosperity.

# From stabilization to diversification: Using resource revenues to invest in a sustainable future

The response to accumulating risks needs to shift, and to a certain degree already has, from a reactive to proactive approach. For resource-exporting nations, reactive policy prioritizes short-term stability in the face of surplus revenues. Proactive policy, on the other hand, requires understanding a country's comparative advantages and mobilizing all available tools to capitalize on them.

This mirrors the three key uses of natural resource revenues for maximizing current and future welfare.<sup>68</sup> These can be thought of as being in order of priority, where each subsequent use should not be pursued until its predecessor has been successfully institutionalized. These are:

1. Accumulate **precautionary buffers** to protect against volatile commodity prices
2. Ensure **smooth consumption** across generations by investing today's revenue in long-term, diversified assets to be paid out to future citizens
3. Fund an "investing-to-invest" strategy that catalyses local economic **development and diversification**

For at least 50 years, one solution that has progressively been optimizing each successive use of resource revenues has been the SWF. Though differing from country to country, SWFs usually enjoy a degree of political autonomy that allow them to pursue private-sector quality investments in the long-term service of the nation. This has seen SWFs both proliferate in number and size. A total of 78 funds existed in March 2018, with over \$7.4 trillion of assets under management worldwide,<sup>69</sup> larger than the combined size of global private equity and hedge funds.<sup>70</sup> Meanwhile, they have also been expanding their mandates beyond reactive stabilization and wealth accumulation to investing in the long-term future of their host nations.

Understanding the history of, and need for, each of these approaches to using resource revenues is critical to adapting to impending "energy revolutions" and mitigating "stranded nation" risks. The reactive approaches of stabilization and wealth accumulation are necessary adjustments for short-term risks, but they provide little counterweight against long-term uncertainty.

## Precautionary buffers

Originally, most SWFs were commodity stabilization funds whose primary purpose was to offset declines in revenue due to falling commodity prices or production levels.<sup>71</sup> It is still advisable to set aside a pool of precautionary funds to help mitigate the effects of negative shocks inherent in global commodity markets. These funds are extra-budgetary and, in many instances, feed back into the government's budget in accordance with a stated rule or formula.

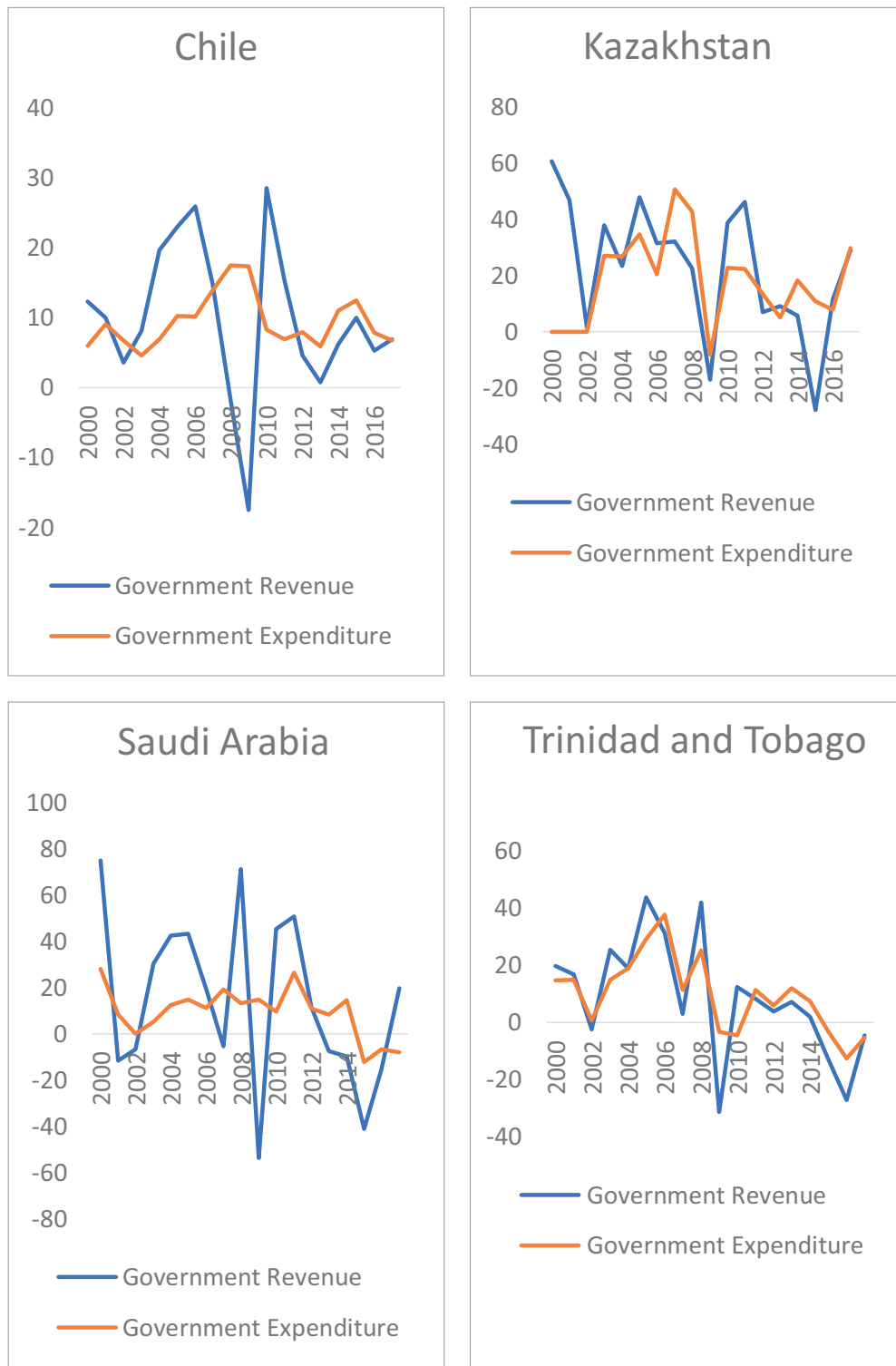
In an ideal world of no capital scarcity and frictionless markets, countries would be able to use futures markets

to hedge against volatile commodity prices. SWFs have found they can achieve a similar outcome by holding financial assets whose returns are negatively correlated with commodities.<sup>72</sup> A stabilization fund can then be drawn on by governments when natural resource revenues are low, and save a portion when high to avoid the "boom-bust" spending and economic cycles associated with the natural resource curse.

These funds have achieved varying success in protecting their host economies from the volatility of global commodity markets. Chile's Economic and Social Stabilization Fund is a notable example of a fund that has successfully helped the government stabilize its budget and its economy to avoid elements of the natural resource curse.<sup>73</sup> On the other hand, due to the vagaries of domestic politics, the stabilization fund in Venezuela has been entirely unable to protect its people from the effects of falling oil revenues. One measure of this success is the degree to which the government is able to smooth its expenditure over time, in response to volatile revenue flows.

Figure 13 shows how funds in Chile and Saudi Arabia have managed to maintain relatively stable public expenditure growth even in years when revenue has dropped significantly. On the other hand, the stabilization funds of Kazakhstan and Trinidad and Tobago have been unable to provide the necessary buffers for expenditure growth to be smoothed and, ultimately, for economic disruptions to be avoided.<sup>74</sup>

**Figure 13:** Growth in government revenue and expenditure in select countries, 2000-2016



Source: International Monetary Fund, *World Economic Outlook: Challenges to Steady Growth*, 2018.

The most successful stabilization funds have several features in common. One is that they have a clearly established objective to stabilize expenditures and are sufficiently protected from political interference such that they can concentrate singularly on this mandate. A fund's ability to meet this objective depends largely on the clarity and enforcement of fiscal rules, or numerical constraints on government finances. These should be clearly established through government legislation and, as such, act as a commitment mechanism on government, improve the efficiency of public financial management, and define the conditions of the deposits and withdrawals of the fund.

## Smooth consumption

Another function of a SWF is broadly what economists call the "permanent income hypothesis", namely that the consumption of current natural resource revenue should be distributed over generations in order to maximize the welfare of all citizens.<sup>75</sup> This savings mandate has been the guiding principle of most SWFs for the last few decades, as well as related pension reserve management funds, such as the New Zealand Superannuation Fund and the Australia Future Fund.

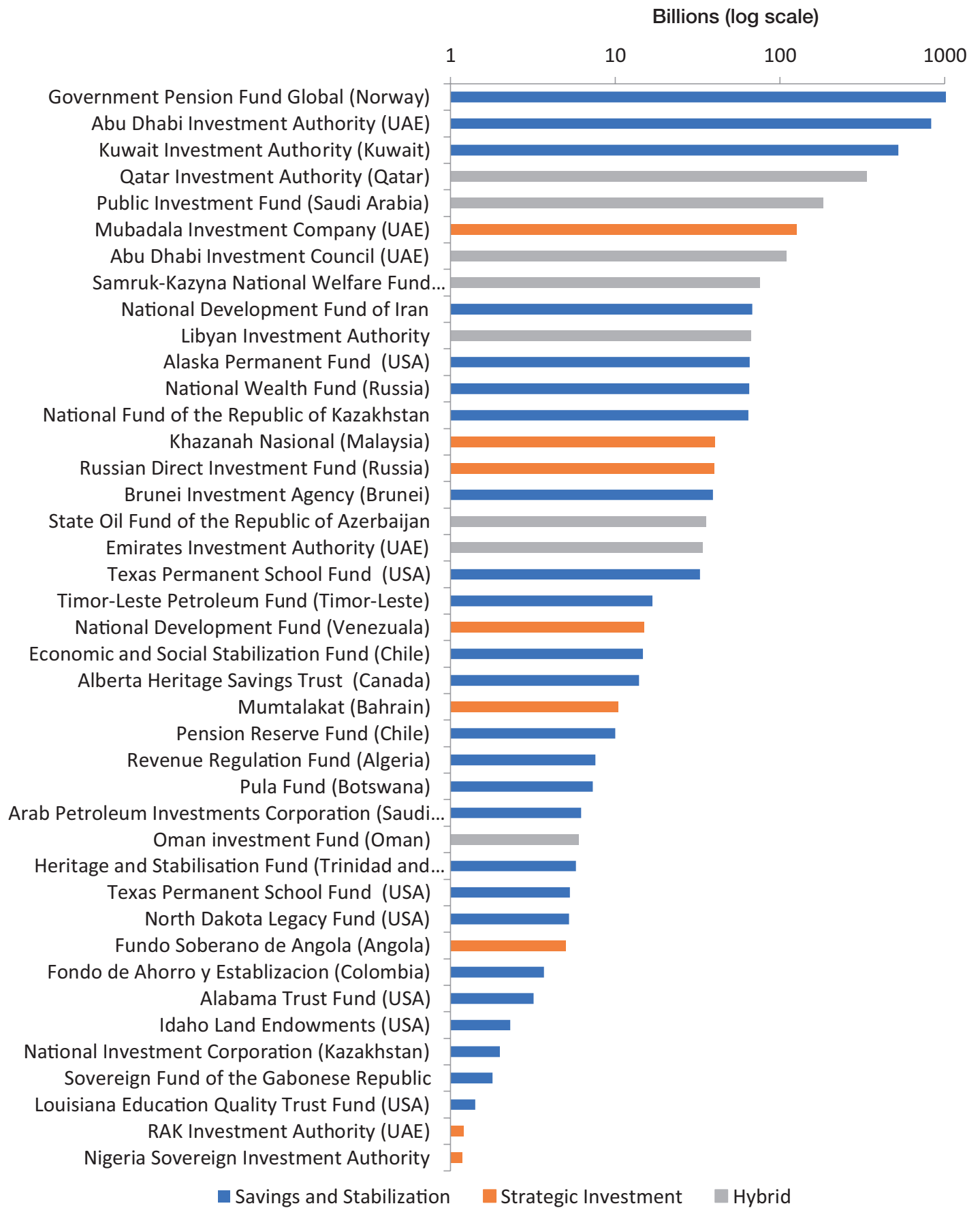
The need to save amid a rapid accumulation of assets was especially pertinent during the 1999-2007 period, when oil prices jumped from a low of \$19/barrel to \$160/barrel.<sup>76</sup> As a result, oil-producers suddenly found themselves awash with cash and without the ability to absorb all this extra revenue domestically, lacking what economists call the

"absorptive capacity". Without the necessary infrastructure, labour, skills, technology and institutions to spend all this cash without generating inflation and asset price bubbles, these countries decided they could generate more sustainable development by saving in foreign assets until their economies could productively absorb these revenues.

The success of Norway's Global Pension Fund Global, in particular, has prompted many funds to emulate its governance structures and investment strategies. This is perhaps unsurprising given that, in following its mission to "safeguard and build financial wealth for future generations", it has accumulated over \$1 trillion in assets – enough to give \$200,000 to every Norwegian citizen – and owns approximately 1% of all global equity.<sup>77</sup> The Persian Gulf countries like Kuwait, Qatar and the UAE have also amassed vast fortunes relative to the size of their populations, which should help to secure wealth for their citizens for generations to come.

With the institutional structure of a successful SWF firmly established by this time, it was relatively straightforward to set up a SWF and the sector grew rapidly. In 2000, there were just 26 SWFs accounting for less than 5% of institutional investors' assets under management; 10 years later, 57 SWFS existed, with assets of \$3.6 trillion.<sup>78</sup> While the downturn in oil prices has slowed the rate of expansion of the sector, it continues to grow, and today over 75 SWFs hold over \$8 trillion in total assets.<sup>79</sup>

Figure 14: Size and purpose of commodity-based sovereign wealth funds



Source: The 2018 Preqin Sovereign Wealth Fund Review.

Aside from maximizing future generations' welfare, the other primary argument in favour of this approach is to avoid the Dutch Disease dynamics that have plagued so many resource-rich economies in the past.<sup>80</sup> That is, without adequate absorptive capacity, a windfall of foreign exchange leads to the deterioration of non-resource intensive sectors as the exchange rate and domestic prices adjust to ultimately render them uncompetitive. A SWF can protect its home economy from these effects by holding this foreign exchange surplus in international assets, thus bypassing the constraints in the local economy and earning a stable risk-adjusted return. However, one risk is that these funds can become counterproductive if they continue to delay the reconfiguration of an economy and investment in necessary absorptive capacity.<sup>81</sup> For countries facing existing and impending risks to the resource-driven growth model, it has become increasingly clear that a third approach is also necessary.

## Development and diversification

In **2008**, a confluence of factors converged to suggest a new way forward for the sovereign investment sector. The global financial crisis struck, realigning portfolio allocations and prompting several countries to experiment with more

localized, direct investment strategies. The downturn in commodity prices also meant that fewer countries were fixated on absorbing excess resource revenues. Finally, the continued successes of an East Asian growth model predicated on state-led investment – alongside the perceived failures of the so-called “Washington Consensus” – renewed interest in the advantages of transformative public investment.

Since this time, over 25 SWFs with domestic and/or development investment mandates have been established around the world. Various called “sovereign development funds” or “strategic investment funds” (SIFs),<sup>82</sup> the rapid expansion of this sector has the potential to reshape the public investment landscape. Prior to the global financial crisis, SWFs were mostly established to better manage surplus state revenues, and can therefore be thought of as “supply-driven”.<sup>83</sup> This new crop of funds, on the other hand, has been driven by the demand to generate economic transformation, catalyse new industries, attract foreign investment, incubate national champions and deepen local financial markets. Figure 15 shows a sample of these objectives across SIFs globally.

**Figure 15:** SIF development objectives

Country	Name	Year	Size (\$mn)	Objective
<i>Bahrain</i>	Mumtalakat	2006	10,457	To create a thriving economy, diversified from oil and gas, focused on securing sustainable returns and generating wealth for future generations
<i>France</i>	Bpifrance	2013	64,935	To provide assistance and financial support to small and medium-sized enterprises, facilitating access to banks and equity capital investors, in particular during the high-risk phases
<i>Ireland</i>	Ireland Strategic Investment Fund (ISIF)	2014	10,413	To generate risk-adjusted commercial returns with an economic impact in Ireland
<i>Italy</i>	CDP Equity SpA	2011	4,113	To invest in companies of major national interest, with the aim of creating value for shareholders via growth in size, the improvement of operating efficiency and competitiveness in national and international markets
<i>Malaysia</i>	Khazanah Nasional Bhd	1993	40,183	To promote economic growth and make strategic investments on behalf of the government, contributing to nation-building, and to nurture the development of selected strategic industries in the nation's long-term economic interests
<i>Mexico</i>	Macquarie Mexico Infrastructure Fund	2010	408 (2016)	To have significant influence over the management, operations and strategic direction of infrastructure assets located in Mexico
<i>Nigeria</i>	National Infrastructure Fund (one of three NSIA funds)	2011	540 (2016)	To invest in projects that contribute to the development of essential infrastructure in Nigeria, selecting projects/sectors through national priority that have potential for nationwide economic development impact and attractive commercial and social returns

<i>Philippines</i>	Philippine Investment Alliance for Infrastructure	2012	630 (2016)	To mobilize private-sector capital for infrastructure development, seeking to invest in a portfolio of greenfield and brownfield projects across key sectors
<i>Russian Federation</i>	Russian Direct Investment Fund (RDIF)	2011	40,000	To make equity investments in strategic sectors within the Russian economy on a commercial basis by co-investing with large international investors in an effort to attract long-term direct investment capital; every transaction is mandated to be co-invested with an international investor
<i>Senegal</i>	Sovereign Fund for Strategic Investment	2012	937	To invest in projects that stimulate economic growth and job creation, primarily to boost investments and act as a co-investor in small and medium-sized enterprises and flagship projects in strategic sectors

Source: Halland et al., “Strategic Investment Funds: Opportunities and Challenges”, Policy Research Working Paper No. 7851, World Bank, 2016.

Of course, the history of public investment vehicles is long, going back centuries, with all manner of structures experimented with and policy goals aimed for. From post-World War II reconstruction efforts through the Marshall Plan and European Bank for Reconstruction and Development, to Soviet-era planned economies, domestic investment vehicles have long been a key feature of industrial policy. Indeed, some have compared contemporary SIFs with the chartered companies of the 17th century, such as the East India Company or France’s *Compagnie de l’Occident*.<sup>84</sup> While this may just be the latest in this long line of attempts to synthesize government policy and private investment strategies, they have the advantage of building from the knowledge base and experience of the SWF sector that preceded it.

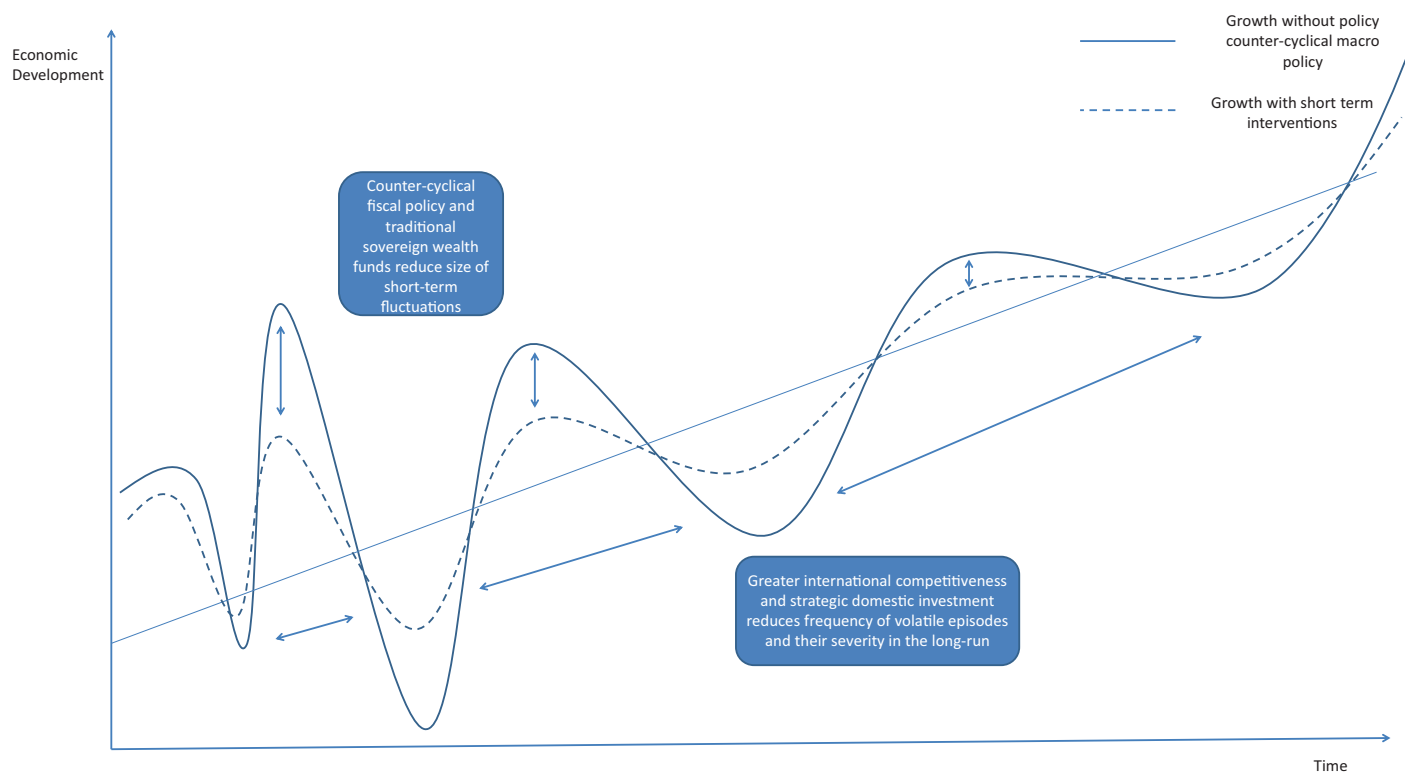
Public investment vehicles can also be thought of along a spectrum from debt to equity, with development banks at the debt pole, that lend to underdeveloped local markets and have a very mixed record, and with state-owned venture capital funds at the equity pole, a more recent innovation.<sup>85</sup> The strategic investment sector sits somewhere in the middle of this continuum and an individual fund’s debt/equity mix will depend on its specific mandate. There are advantages to both debt and equity strategies and, while the risks to equity may be greater, the possibility of increased control, an injection of long-term thinking and higher returns have seen many funds attempt to transition over time towards a more direct, equity-based approach.<sup>86</sup>

This is apparent in the development of the sector over time. The earliest funds – such as Singapore’s Temasek, or Malaysia’s Khazanah – arose directly out of the East Asian growth model and originally had mandates to effectively manage state-owned enterprises and “national champions”. Today, these funds operate with an increasing focus on private equity and have shown that it can be a successful, if risky, approach to catalysing local development.

Newer funds, such as the Nigerian Sovereign Investment Authority, have specific policy goals, such as building infrastructure or encouraging “green investment”, or are specifically designed to encourage foreign direct

investment (FDI). For example, the Russian Direct Investment Fund can only act as a minority investor in concert with a foreign, private partner. In addition to new policy goals, resource-rich countries have found they can support the goals of stabilization and intergenerational equity by investing in domestic infrastructure and development capacity. Quite simply, the best way to protect against volatile commodity prices or ensure economic prosperity over multiple generations is to foster a diversified and sustainable economy. A SIF can invest in the additional capacity needed to gradually build resistance to external shocks and absorb the higher rate of investment required for long-term sustainable development. The difference is shown in stylized form in Figure 16.

**Figure 16:** Business cycle volatility by policy and fund type



Source: Author's illustration.

A SIF can play a catalysing role in this process by “investing to invest” – that is by expanding the productive capacity of the non-tradable sector in a manner that does not induce Dutch Disease effects of its own. Since the critical infrastructure required for a diversified economy – a modern education system, transport infrastructure, sophisticated financial sector and so on – cannot be easily imported (for larger economies), this process will take decades to truly manifest.

For resource-rich developing countries, the demand for institutions that can contribute to such objectives will only become greater from here. While adopting a more strategic, domestically-oriented investment mandate in the use of resource revenues involves risks, they must be balanced against the possibility of future prosperity being inadequately prepared and, ultimately, economically stranded.

## The next step in public investment

The continued rise of fossil fuels as drivers of economic growth and the source of public revenue has led to the proliferation of SWFs as tools of economic stabilization and wealth accumulation.<sup>87</sup> By and large, these tools have been successfully employed by their host governments and contributed to the long-run prosperity of their nations.<sup>88</sup> However, these solutions simply do not go far enough.

While a precautionary buffer is useful in a short-term down swing, it is unlikely to be sufficient to counter the effects of a structural adjustment, such as the longer-term impact of an “energy revolution”. Flexible labour and product markets are more efficient at countering the effects of a real exchange rate appreciation, and a sophisticated knowledge economy is a better guarantee of future prosperity than any income stream derived from natural resource rents.

Various countries have made considerable progress in using their sovereign funds as development tools. However, it remains to be seen whether the momentum persists as oil and gas prices steadily recover from their 2014 lows.

# Time to think strategically

For countries rich in fossil fuels, their economic future stands at a pretty clear inflection point. Time is running out for the world to decarbonize, and exponential growth in alternative energy sources points towards an energy revolution not seen since the transition from coal a century ago.

The only known source of economic sustainability is diversity. Much as an effective portfolio manager deals with risk by investing in a range of sectors across different regions, so does an effective economic policy-maker facilitate diversity in a competitive business environment.

This has traditionally been difficult for resource-rich economies for both economic and political reasons: economically, disproportionately high resource revenues crowd out other sectors; politically, the incentives for elites to diversify economic growth and power are few.

SWFs have helped an increasing number of resource-rich countries overcome these challenges. But despite being an effective way of avoiding short-term volatility, they do not address the root cause of Dutch Disease or prepare for structural changes that will gradually erode the viability of their underlying revenue stream and economic model.

The SIF has the potential to pick up where stabilization and savings-based SWFs have left off. Unlike its predecessors, a SIF's very *raison d'être* is to build the absorptive capacity of its local economy, rather than circumventing those constraints. At its best, it can combine the best practices of private-sector investment with the long-term strategic thinking of government.

This future, however, is still a long way off. The full scale of disruption is beset by uncertainty and SIFs are still developing the capacity and know-how to facilitate genuine structural transformations. The shift towards a more proactive use of resource revenues, therefore, should occur in phases, adopting a long-term vision of investment integrated into government policy and moving progressively from a role of facilitating to catalysing.

## Seizing the opportunity

A SIF has the potential to be an important tool in a country's development or structural transformation policy if it provides *additionality*.<sup>89</sup> That is, a SIF needs to demonstrate that it can generate positive change above and beyond what would have happened anyway.

One risk in establishing a SIF is that the government is merely crowding out private investment that would have otherwise occurred or that it is simply a substitute for other, more effective government policies, like an efficient fiscal process. A SIF provides additionality if it operates above financial, social and economic return thresholds without replacing private actors or government policy.<sup>90</sup>

The critical dimensions along which a SIF can bring social and economic returns that may not arise otherwise include long-term thinking, policy integration, capital depth and equity control.

## Long-term investment horizon

As discussed in the first section of this report, the ongoing "energy revolution" will take place over several decades. While governments, corporations and private investors respond to the day-to-day fluctuations in political popularity, quarterly earnings and asset prices, SIFs are one of the few institutions with the mandate, experience and capacity to plan and act not just beyond the quarter or financial year, but in the time frame required to deal with megatrends and structural change.

For example, the sovereign wealth sector is beginning to help address climate change concerns, an issue typically beset by inadequate long-term planning or preparation. At least 21 SWFs and SIFs are taking a range of actions, including investing in green listed and private companies, adjusting investment policies, and undertaking portfolio decarbonization and engagement strategies.<sup>91</sup> Further momentum can be seen in international initiatives, such as the One Planet SWF Working Group Framework, which promotes common methods for climate-related disclosure, analysis and investment decision-making.

In the last three years, the UN Environmental Programme estimates that 21 SWFs made new green investments totalling over \$11 billion (Figure 17 shows a selection from over the last two years).<sup>92</sup> While this is a step in the right direction, it still represents a mere 0.19% of SWFs' total assets under management.

**Figure 17:** Selected green investments by SWFs, 2016-2018

Date	SWF	Deal	Target Country	Sub-Industry or Type	Value (\$m)
2017-2018	Public Investment Fund	Equity stake in Tesla, a manufacturer of electric vehicles and solar panel technology	United States	Green manufacturer	2,000
2017-2019	Mubadala	Wind and solar plants with total energy output of 810 MW	Global	Renewable energy	1,300
October 2017	Abu Dhabi Investment Authority	Fundraising National Investment and Infrastructure Fund	India	Green infrastructure	1,000
August 2017	Government of Singapore Investment Corporation (GIC)	Significant equity stake in Energy Development Corporation (EDC)	Philippines	Renewable energy	650
December 2017	Ithmar Capital	Green Growth Infrastructure Facility with the International Finance Corporation and others	Africa	Green infrastructure	500
December 2017	Several SWFs	Fundraising Amundi and International Finance Corporation Green Cornerstone Bond Fund	Emerging markets	Green debt fund and platform	300
September 2017	Temasek	Gogoro	Global	Green start-up	300
2016-2017	Nigeria Sovereign Investment Authority	Fundraising Green agricultural funds (FAFIN and Old Mutual)	Nigeria	Green agriculture fund	266

Source: UNEP, “Financing sustainable development: the role of sovereign wealth funds for green investment, Working paper, 2017, with updates from public sources.

The ability to directly invest in strategic sectors of the economy that may not yield fruit in time for an impatient private investor is critical to a SIF’s contribution to economic diversification.<sup>93</sup> The example of climate change also helpfully illustrates the additionality principle in that the private sector is not yet seeing sufficient financial returns while a public investment process is often too inefficient to accurately pick winners. More generally, SIFs may be better equipped to take advantage of environmental, social and governance investment strategies than private counterparts, as they can better afford to wait to see the social as well as financial benefits of such an approach.

## Policy integration

Broadly speaking, the overall objective of a SIF is to undertake investments that complement government objectives while meeting some minimum financial and economic threshold that would not otherwise be pursued by private or public actors. Instead of duplicating other government functions, SIFs can be key agents in a government’s strategy to coordinate the roles of market and state in the complementary fashion envisaged in “new structural economics”.

For resource-rich economies, each and every government-owned agency or institution has to be aligned towards the goal of diversification. For example, all six Gulf States

(GCC) – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates – have issued vision statements designed to accelerate their countries’ economic diversification and transition from fossil-fuel dependence, with SWFs and SIFs playing a key role in many of these plans. Across the GCC, oil and gas revenues often account for as much as 80-90% of government revenues and natural resource rents as a share of GDP range from around 20% in the UAE over the last five years to 50% in Kuwait.<sup>94</sup>

Ideally, these strategic plans should also include descriptions of how SWFs and SIFs fit into the vision and where their scope for additionality lies. The extent to which a SIF has a true mandate of additionality will depend on the range of alternate public investment vehicles (such as development banks), the depth of the local financial industry, as well as the specificity of its investment mandate. It will therefore differ from country to country, and region to region.

While the Gulf states are relatively early into their journey towards economic diversification, Singapore is a hopeful example to countries of how to use surplus export earnings through extensive integration between government and public investment vehicles. Singapore’s transition from a country relying on labour-intensive exports to professional and financial services has been facilitated by a range of institutions, an effective bureaucracy, and policies designed

to encourage local development and foreign investment. Importantly, it effectively used a range of institutional structures to privatize state-owned enterprises and facilitate investment into strategic sectors.

In line with the hierarchy of uses of surplus revenues described in the previous section, Singapore maintains separate funds for stabilization, wealth accumulation and diversification. The central bank manages its liquid reserves, GIC maintains a long-term portfolio of diverse international assets, and the Singaporean holding company Temasek has a strategic mandate for encouraging domestic diversification and economic development.<sup>95</sup> Singapore's SWFs have assets of approximately \$770 billion and have made an annual return in the vicinity of 6% over the last two decades.<sup>96</sup> Most importantly, Singapore today has a diverse range of industries supporting a vibrant and prosperous economy, with its sovereign-owned investors continuing to help chart the course alongside policy-makers.

## Capital depth and facilitating FDI

Many FFREs have relatively underdeveloped financial sectors and often struggle to attract sufficient foreign capital to address this shortfall. SWFs are now one of the largest blocks of institutional capital on the planet and have the potential to strategically direct capital in such a way that it creates depth in the local sector and/or attracts further foreign capital towards new, non-resource intensive industries.

Following a dramatic decline in foreign investment after the global financial crisis of 2008, many emerging markets turned to new or existing SWFs to help attract FDI, boost the local financial sector and encourage economic diversification. This “demand driven” approach<sup>97</sup> has been pursued by a range of countries with varying goals, such as Italy's CDP Equity, which acquires minority positions in strategic companies through joint ventures with both international and domestic partners, as well as the Ireland Strategic Investment Fund, which aims to “fill investment gaps”.<sup>98</sup>

The creation or transition of SWFs to promote a crowding in of foreign capital fulfils several key functions. The SWF can be an example of institutional quality both to potential investors and to its contemporaries in the local financial industry. Furthermore, a SWF sits in a relatively rare position of investing alongside private firms and maintaining close connections with government and bureaucracy. This can serve to reduce information and agency barriers to investment, and potentially lower risk thresholds. Many international investors are unfamiliar with local rules, norms and institutions, and may therefore require a well-connected and informed partner to engage in seemingly risky investments. This is particularly true in private equity transactions, as they are often the result of long-held relationships among co-investment partners and entrepreneurs, and may therefore benefit from a trusted intermediary such as a SWF.

The Russian Direct Investment Fund (RDIF) was established in 2011 to address the above concerns and catalyse direct investment in Russia. A prime example of a country that needs to diversify economically, Russia's resource rents are equivalent to roughly 11% of its GDP and 18% of its total wealth lies in hydrocarbon commodities. Between 2005 and 2015, the size of the state-run sector doubled from 35% of its economy to 70%<sup>99</sup> – the opposite of a diversifying, flourishing private sector.

The RDIF is a step towards reversing these trends and stimulating a revived non-tradables sector in Russia. Starting with reserved capital of \$10 billion under management, the fund has been extremely active, making large direct investments in leading companies and partnering with some of the world's most respected investors and SWFs.<sup>100</sup> It has invested in 60 projects in just over six years, accounting for 92% of direct investments into the country.<sup>101</sup>

Importantly, the RDIF is mandated to secure a 1:1 co-investment commitment from its partners, the very definition of “crowding in”. It has safely reached this goal, achieving a 9:1 ratio of investment from its partners to its own contribution.<sup>102</sup> It has established over 25 agreements with other institutional investors and its SWF co-investment partners include the China Investment Corp, the Korean Investment Corp, Mubadala and Qatar Holding. Its \$2 billion partnership with Mubadala, for example, promises to allocate \$5 billion towards infrastructure projects, meaning the fund now has more than a dozen infrastructure projects in the pipeline over the next few years.

While the jury is still out on how much of an impact such funds can really have – and it may be minimal if they are not supported by sound financial regulation – it is clear that FFREs need to encourage FDI and domestic financialization. Nor are these objectives separate, with the depth of local financial markets and quality of associated institutions being shown to have a significant effect upon the flows of foreign capital.<sup>103</sup>

## Equity capital as strategic control

Several SIFs have achieved success by pursuing a “wealth creation” strategy more akin to a private equity or venture capital firm than the wealth accumulation strategy of their SWF forebears.<sup>104</sup> While development banks and some private-sector banks will be well-placed to finance debt placements, successful SIFs have shown how the use of equity and equity-linked instruments have critical advantages in achieving financial and social returns. In particular, equity capital allows the SIF a degree of flexibility and control of strategic projects, such that they can be better targeted to strategic development objectives.<sup>105</sup>

Of particular importance to resource-rich economies is the capacity for a strategic SWF to catalyse new industries and help diversify the economy. Such a role lends itself to equity investment and illustrates the complementary nature of the market and state as advocated for in the “new structural economics” approach to development.<sup>106</sup> In this view, the state should seek to encourage sector-specific development consistent with an economy's competitive advantage.

A core idea in this catalytic approach is to develop industry-level clusters to facilitate economic development by making firms more competitive, creating specialized employment opportunities and accelerating firm creation. Clusters are designated locations designed to encourage firm creation, technology transfer and employment growth. In Porter's "diamond model",<sup>107</sup> clusters are critical to improving the ability of domestic firms to compete effectively by encouraging networking and vertical integration.<sup>108</sup> Empirical evidence looking at the effectiveness of cluster-based strategies suggests that it can be particularly beneficial to regions with otherwise imperfect investment climates, and that companies in clusters tend to grow and innovate faster than those not in clustered environments.<sup>109</sup>

Mubadala, for example, is in the midst of pursuing this cluster approach in several strategic sectors, such as aerospace, information and communications technology, semiconductors, metals and mining, renewable energy and utilities.<sup>110</sup> Through this approach, Mubadala has shown some of the advantages of direct investing, including by establishing a subsidiary, Masdar, in 2006, to concentrate exclusively on creating a renewable energy industry in Abu Dhabi – obviously impossible through lending mechanisms with no existing players to invest in. Mubadala has taken advantage of the government's long-term vision for Abu Dhabi, its integration with policy ideas and ability to attract FDI to develop an entirely new city as a hub for clean energy companies around the world and a cutting-edge research outfit, the Masdar Institution, which is a collaboration with MIT.

Finally, through its Clean Tech Fund, Mubadala has made several key investments in the renewable energy field internationally. With the knowledge that these investments are being made alongside the development of Abu Dhabi as a regional hub for renewable energy, several high-profile companies have welcomed Masdar and committed to its vision for a dynamic local clean tech sector. Examples include Masdar's partnership with EON, the German energy corporation, to create the world's largest offshore wind park, or its 40% acquisition of WinWinD, a Finnish wind turbine manufacturer. In an emirate inextricably associated with fossil fuels and a narrow growth model, Mubadala has used its direct investing approach to strategically reorient Abu Dhabi such that now the International Renewable Energy Agency, World Future Energy Summit and a host of clean energy companies call it home.

## Recognizing risks

These advantages should not blind policy-makers to the reasons SWFs have not played a larger role in domestic development historically. The biggest difference between a traditional SWF and a strategic or development-focused fund is the extent to which investment decisions create positive and negative feedback loops. While a SWF's investment decisions are unlikely to affect global economic cycles, the size and choice of domestic investment from a SIF may fundamentally alter the risk profile of future investments.

In particular, two key risks for a SIF are not necessarily of great concern to its traditional counterparts: first, that other institutions are better suited to undertaking domestic investment and, second, that the efforts of a SIF will have unintended negative economic or social spillovers. These factors of course need to be balanced against the structural risk of not acting – namely that a global energy revolution leaves nations stranded and without the resource revenues needed to diversify down the road.

# Conclusion

Rashid bin Saeed Al Maktoum, the Emir of Dubai, once famously said:

*“My grandfather rode a camel, my father rode a camel, I drive a Mercedes, my son drives a Land Rover, his son will drive a Land Rover, but his son will ride a camel.”*

This quote colourfully describes the impetus for action perhaps more strongly than any analysis ever could. That is, the current model of prosperity through fossil-fuel extraction cannot last forever. Where reactive policies have hitherto succeeded, proactive policies must take their place.

Without preparing for a future where hydrocarbons are no longer a guarantor of prosperity, these countries risk losing what they have worked so hard to gain. The resource revenues can be used proactively by investing in the technologies, infrastructure, human capital and growth sectors that will be necessary in such a future. The reactive approach of stabilization and SWFs are a necessary foundation, but are altogether insufficient to deal with the risk of becoming stranded by change.

Six decades of accumulated knowledge and expertise in the SWF sector, alongside a growing need for strategic investments, point towards one such proactive solution. SIFs merge the development objectives of public investment vehicles with the know-how of institutional investors. With appropriate governance and accountability, they can invest along a long-term horizon and be integrated in critical policy goals.

What's more, the security of their financial position and connections with government make them ideal partners for foreign investment, while their capacity to bring international best practices to the local financial industry can add depth and quality to the sector. Finally, their direct investing approach can create wealth rather than merely manage it, thus facilitating new sources of prosperity and additional capacity for weathering the challenges of tomorrow.

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