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Renewable Energy in Africa.

Trending rapidly towards cost-competitiveness with fossil fuels

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> "A surprising aspect of the analysis is the rate at which the cost of renewables is approaching parity with fossil fuels. This means that economic development and environmental objectives in Africa do not necessarily conflict; they actually work together."

Melanie Shanker, Managing Associate, London

This report features research and insights by Linklaters LLP, with research and analysis by the Overseas Development Institute (ODI).

Executive summary

> Renewable energy technologies are trending towards cost-competitiveness with fossil fuels and there is evidence to support cost parity in certain asset classes. Economic development and the deployment of renewable technology in Africa are now synergistic because of this movement towards parity.

> As renewable energy becomes more affordable there are signs that in some markets in sub-Saharan Africa, renewable energy technologies may leapfrog fossil fuels and Africa's economic development could actually be driven by renewables.

> The decreasing cost of delivering low-carbon economic development facilitated the Paris Agreement at COP 21[1]. All 195 countries agreed to reduce global greenhouse gas emissions as soon as possible, taking into account national circumstances, to hold the world to well below 2°C of global warming above pre-industrialised levels, and to pursue efforts to limit global warming to 1.5°C.

> The COP 21 decisions accompanying the Paris Agreement ("**Paris Decisions**") explicitly acknowledge the "need to promote universal access to sustainable energy in developing countries, in particular in Africa, through the enhanced deployment of renewable energy". This suggests that the G77's[2] historic concerns that any restrictions imposed by an international climate deal on the use of, or access to, finance for fossil fuels would impede the speed of African development have been partially mitigated.

> Consequently, the Paris Agreement is expected to facilitate economic development in Africa more rapidly than might otherwise have occurred, rather than it being perceived as a drag on development.

> The ambitious outcome achieved in Paris sends a long-term price signal to the market and may even help create a "virtuous cycle" of unlocking investment in renewables[3] in Africa. Under the Paris Agreement, developed countries have reaffirmed their financial support (with a floor of $100bn per year until 2020) and capacity-building assistance for developing countries' transition to low-carbon economies.

> Despite decreasing costs, there are still numerous risks and barriers to investment in renewables in Africa which still need to be overcome, largely through domestic de-risking policies, to fully enable investment. Multilateral and regional banks and the Green Climate Fund will continue to play an important role in this respect.

> The Paris Agreement has nudged the dial on renewable energy by setting out a framework to address some of the barriers to renewable energy generation (such as capacity-building and domestic ambition) and to favour renewables as a significant proportion of the overall energy mix in Africa.

>5x

Between now and 2030, Africa's renewable energy capacity is forecast to grow at least five-fold

290m

Only 290 million out of 915 million people in sub-Saharan Africa have access to electricity

45%

Energy use in sub-Saharan Africa has risen 45% since 2000

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[1] 21st Conference of the Parties to the UN Framework Convention on Climate Change.

[2] The G77 is a negotiating bloc of developing countries which includes African states on most matters at climate negotiations. Their negotiating power was slightly changed in the Paris round of negotiations by the formation of the 'High Ambition Coalition', a new negotiating group which included 79 African countries, the EU, Brazil and the US.

[3] International Energy Agency (IEA) Renewable Energy Medium-Term Market Report, 2015.

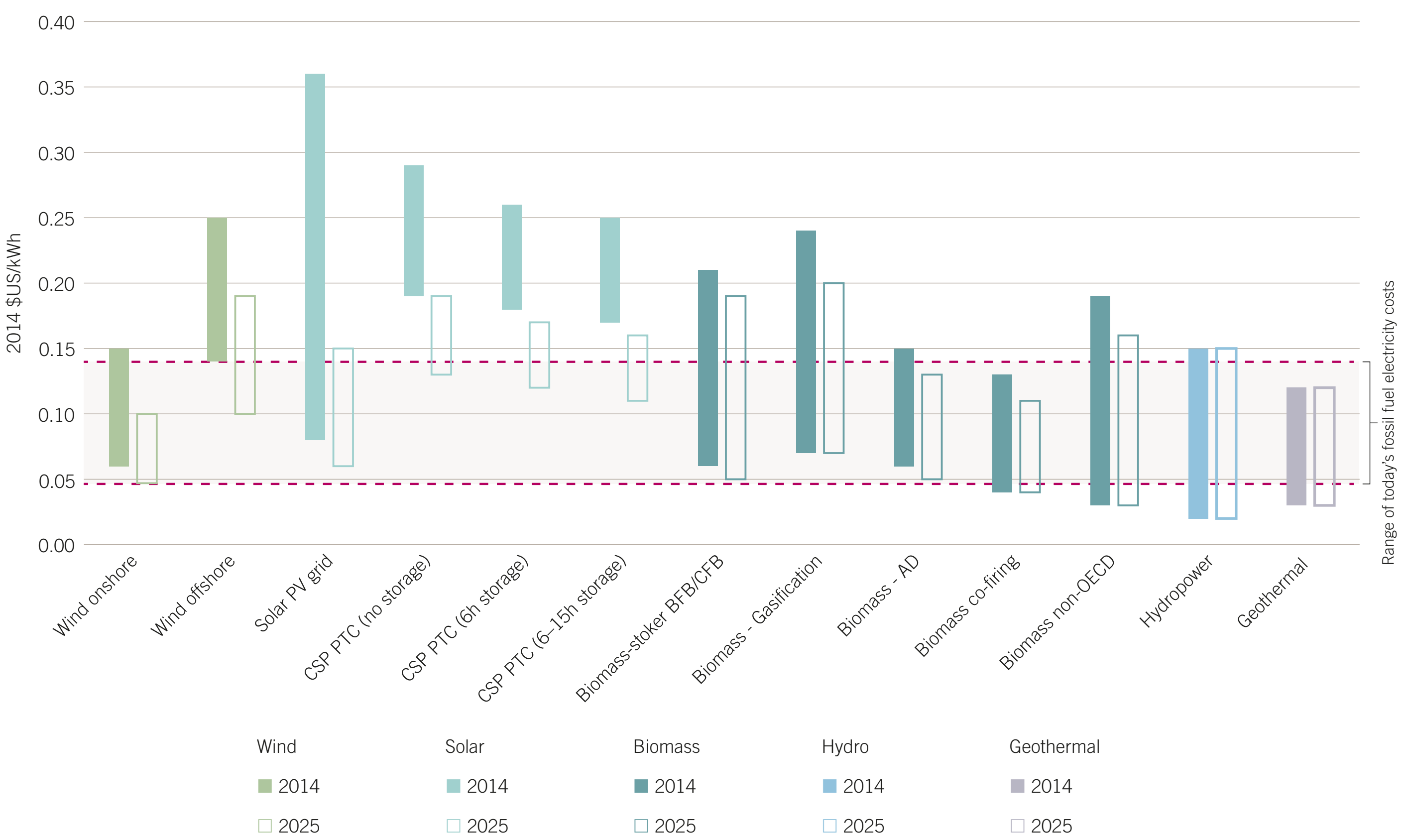
Comparing the costs of renewables to fossil fuels in Africa

The levelised costs of power[4] ("**LCOE**") for renewable energy technologies are trending towards cost-competitiveness with fossil fuels, and there is evidence to support parity in certain asset classes.

Costs for renewables are forecast to continue to fall significantly, driven by increasing technological maturity, better access to finance, economies of scale and increasing project experience.

Figure 1 shows that, at least at the lower end of the range, onshore wind, solar photovoltaic (PV), biomass, hydropower and geothermal are all cost-competitive with fossil fuels, based on today's costs and taking into account any future cost decreases. Figure 1 also projects a substantial decline between 2014 and 2025 in the cost of solar PV and Concentrated Solar Power ("**CSP**"), and onshore and offshore wind over the next 10 years. Solar has already decreased dramatically, with solar PV module costs falling 75% from 2009-2014 and the cost of electricity from utility-scale solar PV falling 50% from 2010-2014[5]. The striking increase in cost-competitiveness of solar technology should encourage significant uptake of this opportunity in its various forms.

Figure 1. Global Levelised Costs of Energy (LCOE) Ranges by Renewable Power Generation Technology, 2014 and 2025[6]



[4] **Levelised cost of power or (LCOE)** is a unit to represent the per-kilowatt hour cost of building and operating a plant over its assumed life cycle and at an assumed utilisation rate. It includes: capital costs, fuel costs, operations and maintenance (O&M) costs (fixed and variable) and financing costs. The IEA data and the International Renewables Agency (IRENA) data used for this analysis do not include government incentives or subsidies, system balancing costs associated with renewables, or system-wide cost savings from merit order (i.e. prioritising one source over another for power dispatch). The analysis of LCOE also does not take into account indirect subsidies to fossil fuels, such as those that government support that reduces exploration and production costs and thus fuel costs, or other such support.

[5] IRENA 2015 *Renewable Power Generation Costs in 2014.*

[6] IRENA 2015 *Renewable Power Generation Costs in 2014.*

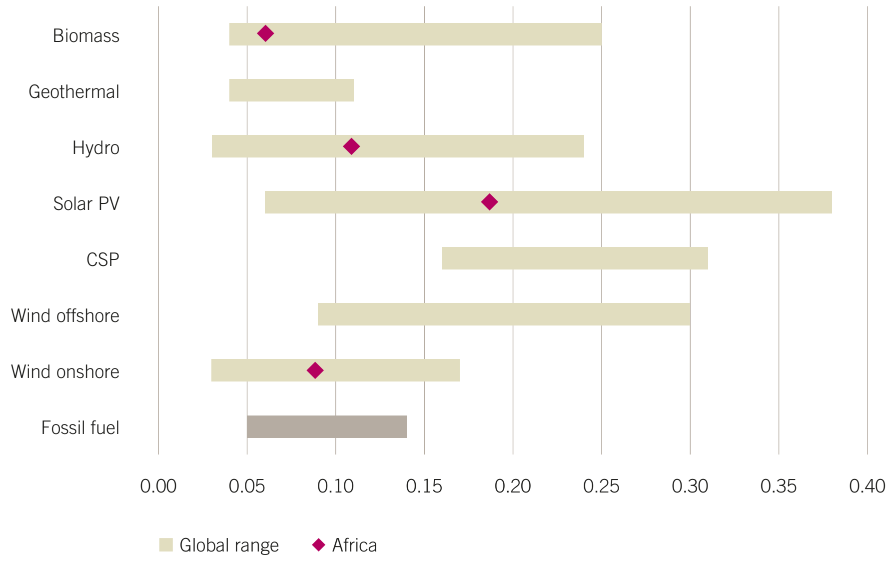
> "Africa has the potential to leapfrog a whole generation of technologies that have served the West and Asia very well, but perhaps don't need to be deployed to the same extent in Africa. Coal clearly has a role to play in Africa, but there is scope to do a whole lot more with renewables as infrastructure is created in this next period."

John Pickett, Partner, London

17%

Wind power contracted through South Africa's Renewable Energy Independent Power Producer Procurement was purchased at prices 17% lower than those projected for the country's two new coal-fired power plants

Figure 2. Levelised Cost of Energy (LCOE) for Renewables and Fossil Fuels (2014 US$/kWh)[7]



[7] Interpreted by Overseas Development Institute (ODI) from IRENA Renewable Power Generation Costs in 2014. Africa-specific data were not available for geothermal, Offshore Wind and CSP. Although projects such as the two coal-fired IPPs Jorf (700 MW) and Safi (1230 MW) have been financed in the last three years, relatively few projects involving other asset classes are being built and there is relatively poor data availability to break down the LCOE for fossil fuel generation across different asset classes in Africa in more detail.

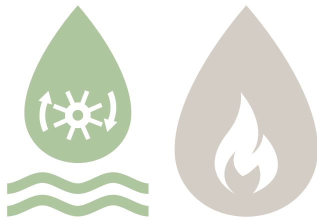
As project-to-project LCOE variability is high, individual project economics may already make renewables the most cost-competitive option. With the average cost of non-hydropower renewables declining rapidly in the past few years, and continuing to decline, even for "average" LCOE values, renewables are cost-competitive relative to fossil fuels.

While the costs in Figure 1 reflect global LCOEs, similar trends have been noted in Africa, assisted by the abundance of renewable energy sources. The LCOE of some renewables technologies in Africa is already cost-competitive with fossil fuels, as shown in Figure 2, and African costs are generally lower than the global average for each renewable technology. For example, wind power contracted through South Africa's Renewable Energy Independent Power Producer Procurement ("**REIPPP**") was purchased by the utility at prices 17% lower than those projected for the country's two new coal-fired power plants, Medupi and Kiseli. Committed investment through REIPPP – including to develop power from wind, large-scale solar PV, and biogas – has totalled over US$10 billion (more than a quarter of which has come from international investors). The REIPPP programme has also enabled the entry of grid-connected renewable energy at highly competitive prices.

To benefit from the trend towards cost parity, as more renewables come online, the use of fossil fuels will need to be adapted to meet changing grid requirements. Investment in transmission and distribution will also be a large part of the required investment to meet growing power demands regardless of the mix of renewables as discussed further in "Comment: African Renewable Power Market Size". ▶ *Continued on p8*

> "There is no longer a choice between a "slow, expensive" renewables pathway versus a "quicker, cheaper" fossil fuels pathway. There will be a mix of both."

Chris Staples, Partner, London



Hydropower and natural gas are currently responsible for most electricity generation in the region

Renewables will make up a significant proportion of new generation capacity in Africa

There is very significant and growing demand for capacity across most African markets, and IRENA and IEA projections for the growth of generation capacity in Africa show that the more that capacity is required and built, the more this will come from renewables. Energy use in sub-Saharan Africa has risen 45% since 2000[8]. In sub-Saharan Africa as a whole, only 290 million out of 915 million people have access to electricity and the total number without access continues to increase, with population growth outrunning electrification[9]. Under business-as-usual scenarios, over 600 million Africans will still not have access to electricity by 2030.

It is important to note that a larger proportion of the growing demand for electricity is likely to come from existing consumers' expanding demand and industry, rather than rural electrification and bringing electricity to the poorest part of African populations, who are likely to struggle with initial financial barriers to connection and whose ongoing demand will be less than existing customers. Some countries such as Morocco and South Africa (see Case Studies on South Africa and Morocco for more detail) have shown that faster rates of electrification are possible where expertise is developed and ambitious policies implemented.

Capacity Growth and Demand

Renewable energy is currently expected to meet two thirds of the growth in demand for power in sub-Saharan Africa by 2020[10]. Between now and 2030, Africa's renewable energy capacity is forecast to grow at least five-fold to 128 GW of new capacity, based on IEA's "current policy scenario"[11]. Applying more aggressive assumptions about pricing and policy objectives yields a "high renewables scenario", in which the forecast for renewable energy capacity triples to a market size of 377 GW of new capacity by 2030[12]. Fossil fuel generation (plus nuclear) is projected to represent approximately 250-300 GW of installed capacity by 2030, compared to 165 GW in 2012 under both the "current policy scenario" and "high renewables" scenario.

Under both scenarios, fossil fuels capacity in Africa remains relatively unaffected regardless of which policy scenario is adopted[13]. The total energy supplied by fossil fuels is also similar, but the capacity factor (which is the ratio of a facility's actual output over a period of time to its potential output if it were possible for it to operate at full nameplate capacity continuously over the same period of time) of fossil fuel plants decreases in a high renewables scenario.

Most electricity generation, transmission and distribution are still owned and operated by state-owned utilities in Africa (IEA, 2014). Nonetheless, a number of countries – including South Africa, Nigeria, Kenya, Uganda, and Ghana – have recently unbundled generation from transmission and distribution, opening the door for independent power providers ("**IPPs**"). Most IPPs operate through power purchase agreements in which utilities negotiate an electricity price with power producers or, in some cases, power producers bid an electricity price. However, with international support, Uganda implemented a "global energy transfer feed-in tariff (GET FiT)" in 2013, allowing international institutions to supplement the electricity prices offered to small-scale independent power producers that sell renewable electricity to the national grid. The GET FiT creates an attractive investment environment as it effectively offers a guaranteed market for IPPs using solar, hydro, biomass and bagasse, and producing 1-20 MW (GET FiT Uganda, 2014).

Utilities entering into power purchase agreements ("**PPAs**") with renewables suppliers already need to factor the intermittency of renewables in, to balance the grid. As more renewables enter the grid, the use of fossil fuels will need to be more flexible and the grid will need to be adapted. This has implications for fossil fuel operators who typically model their returns based on an 80% capacity factor; that may no longer be possible as more renewables enter the grid. Energy storage options are not sufficiently advanced to be an outright alternative to fossil fuel backup at this time. However, they will become more relevant to utilities determining how to meet electricity demand in the future. Technology funding initiatives such as Mission Innovation and the Breakthrough Energy Coalition, launched at COP 21, which are devoted to funding clean energy research and development, have the aim of commercializing solutions such as storage to fully harness the potential of renewable energy in Africa.

Despite rapid growth in renewables capacity, hydropower and natural gas are currently responsible for most electricity generation in the region and are projected to continue to make up the majority of production in the future. Most of the increase in gas-powered electricity will occur in west Africa and, to a lesser extent, in southern Africa, while moderate increases in hydropower will occur throughout the sub-continent. Coal-fired power is also projected to grow significantly in southern African nations and emerge as a source of power in both west and east Africa. ■

[8] IEA Africa Energy Outlook 2015 –The "Current Policies Scenario" assumes business-as-usual, with no changes in policies from the mid-point of the year. The "New Policies Scenario" of the World Energy Outlook broadly serves as the IEA baseline scenario. It takes broad policy commitments and plans that have been announced by countries into account, including national pledges to reduce greenhouse-gas emissions and plans to phase out fossil-energy subsidies, even if the measures to implement these commitments have yet to be identified or announced.

[9] IEA Africa Energy Outlook 2015.

[10] IEA Renewable Energy Medium-Term Market Report, 2015.

[11] IEA Energy Outlook 2014.

[12] IEA Energy Outlook 2014.

[13] ODI analysis of IEA and IRENA scenarios.

> To meet its ambitious renewable energy target of 42% by 2020, Morocco has profoundly reformed its legal and institutional framework.

Paul Lignieres, Partner, Paris

Morocco benefits from irradiation levels that are 30% higher than some of the sunniest sites in Europe

Case Study: Morocco

Morocco offers an attractive investment environment for renewables, particularly large-scale solar PV and concentrated solar power (CSP). The Moroccan Energy Strategy (the "**MES**") for 2020-2030 aims to increase Morocco's installed renewables capacity to 42% by 2020, with solar, wind and hydro each contributing 14%.

Under the MES, Morocco set a target of 2 GW by 2020 for wind power[14]. In order to reach this target, the Moroccan Integrated Programme of Wind Energy mandated the development of wind farms in five new sites in Morocco (Tarfaya, Akhfenir, Bab El Oued-Laayoune, Haouma and Jbel Khalladi). Even with the remarkable growth rate experienced in South Africa during 2014, Morocco still had the largest installed wind capacity in Africa which, at the end of that year, stood at 787 installations.

Tarfaya[15], the wind farm development with the highest energy-generating capacity (at 300 MW), commenced commercial operations on 8 December 2014. The power generated from this installation is expected to offset 900,000 tonnes of CO_2 emissions per year. The installation is an example of the growth in Morocco of Independent Power Producer ("**IPP**") projects which foster private sector participation in energy production projects. Such growth has in part resulted from changes to the legal framework for the generation, transportation and distribution of electricity[16].

Morocco also benefits from irradiation levels that are 30% higher than some of the sunniest sites in Europe (>2300 kWh/m^2/y). Following the creation of the Moroccan Agency for Solar Energy ("**MASEN**")[17], which provides feasibility assessment, project design, development and financing of solar projects in Morocco, along with contributing to expertise and research in the solar industry for projects, specific targets were set to implement the Moroccan Solar Plan.

Pursuant to such targets, Morocco is about to cut the tape on the world's largest concentrated solar power ("**CSP**") plant; the Ouarzazate plant[18], the first phase (Noor 1) of which should result in a reduction of 240,000 tonnes of CO_2 equivalent emissions per year. The plant became operational in February 2016 and will ultimately supply electricity to 1.1 million Moroccans by 2018. Phase two[19] is divided into two separate projects: a CSP tower project (Noor 2) and a CSP parabolic trough project (Noor 3), with respective anticipated capacities of 100 MW and 200 MW. ■

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[14] IRENA Africa 2030 Renewable Energy Map 2015.

[15] On which Linklaters advised the sponsors.

[16] Dahir no. 1-63-226 dated 5 August 1963 (as amended).

[17] This is the state-owned agency in charge of solar IPP projects which acts as a vehicle for risk allocation, mobilising resources, feasibility assessments, project design, development and financing of solar projects.

[18] On which Linklaters advised MASEN

[19] The contract for which was won by a consortium involving SENER and ACWA International Power (announced in early 2015).

Barriers to entry: de-risking and incentivising investment

Although the costs of renewables and fossil fuels are approaching parity, the renewable energy market in Africa is relatively new and many of the risks associated with investment are still considered to be barriers to investment for some, particularly new investors.

> "The fundamentals of investing in renewables are the same as they are for investment more generally in Africa. Involvement of the World Bank or other IFIs can be key to enhancing governments' credit or to putting in place security to ensure that payment obligations to investors are met."

Andrew Jones, Partner, London

Historically, financing costs and hurdle rates have been higher in Africa than in developed countries due to perceived and actual political, regulatory, financial and administrative barriers and risks. To attract private investment, de-risking policies are required both at an institutional level (for example, support for policy design, institutional capacity-building, skills development for local operations and maintenance and resource assessments) but also at the finance level to incentivise investors to justify taking on the perceived or actual risk[20]. See the Case Studies on Morocco and South Africa for more detail.

International Financial Institutions (IFIs) will play a key role in supporting the rapid deployment of renewables in Africa. Following the outcome in Paris, IFIs will likely be required to reconsider their investment criteria to take into account the Paris Agreement. In particular, projects may be screened for consistency with the long-term objective of peaking greenhouse gas emissions and overall efforts to limit global warming to 1.5-2°C above pre-industrialised levels. In addition, IFIs can be expected to assist with institutional capacity and credibility building required to attract international investment. There have already been some promising examples of such assistance such as the International Finance Corporation ("**IFC**")'s "Scaling Solar" programme[21] which seeks to transform the way these projects take place through a package of donor funding (to help countries develop projects to a sufficient level to get investors interested), a standardised approach to documentation (so that bidders know when they examine a particular project exactly what it is going to look like because they have seen it before), and a process of pre-diligencing sites and projects and making this diligence available to bidders to reduce their transaction costs. This allows investors to take part in power procurement processes without putting a significant amount of their own capital at risk.

Some of the risks associated with energy investment in Africa and the potential policies to mitigate them are set out in Table 1.

In the short to medium term, while the costs of renewables are approaching a level which will provide an acceptable level of remuneration for investors, government policies that decrease the cost of developing renewables still play an important role to encourage investment. These policies may include financial guarantees, transparent tariff cost structures, market reform to enable independent power providers (IPPs) to enter the market, integration of regional power pools, implementation and improvement of transmission and distribution infrastructure, and support for decentralised power centres. ▶ *Continued on p12*

> "Key investment risks such as political risk, behavioural risks like corruption, and social acceptance of the project should be actively managed from the outset to optimise access to finance."

Vanessa Havard-Williams, Partner, London

[20] UNDP "Derisking Renewable Energy Investment: A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries (2013)".

[21] Linklaters advises IFC on its Scaling Solar programme.

Table 1. Risks and mitigation

	Risk	Nature of issue	Mitigation
1	**Political Risk** > rule of law; > expropriation; > war/civil disturbance; > convertibility/ remittability risk; > political Force Majeure (FM) (war, including civil war); and > compliance with contracts.	Political risk remains a significant issue for emerging markets projects of all kinds, though there is a high degree of variability depending on the country. It can be intertwined with concerns over performance of state-owned counterparties, the court system and the security of incentives for renewables projects. That said, recent research for the UK's DECC[22] suggests that the principal concern relates to payment delays under PPAs rather than real or stealth expropriation or total non-performance.	Political risk is best managed through a range of measures including: > careful choice of partners; > good diligence, structuring and contingency planning; > a strong and fair PPA/investment agreement; > clear government commitments; > political risk insurance such as MIGA; > access to BIT and use of offshore arbitration; and > involvement of multilateral and development finance institutions and export credit agencies.
2	**Support regimes**	Change in policy reducing the economic viability of the renewables project (e.g. by loss of subsidy).	This can be less of a risk in African projects than in Europe, because (i) depending on the fossil fuel alternative, the cost may be at or close to parity (e.g. diesel relative to small scale renewables generation); and (ii) for larger scale projects, payment (including any incentives) is typically provided under the PPA rather than by regulation. Where incentive regimes exist at law, some export credit agencies ("**ECAs**") and IFIs will offer policy risk insurance (e.g. Overseas Private Investment Corporation ("**OPIC**")).
3	**Change of law risk**	Change of law adversely affecting the viability of the project	As for political risk above. In addition, clear stabilisation regimes may be appropriate on a case by case basis.
4	**Corruption**	Avoiding corruption risk remains challenging for project companies and their investors, particularly given the extra-territorial reach of US and UK anti-bribery legislation and regulators. It is critical to ensure that PPAs and concessions are obtained in a fair, transparent way.	Ensure robust ABC due diligence and know your client work is undertaken early, and that politically exposed persons (PEPs) are identified. Projects should have robust and effective compliance systems to manage this, particularly with regard to government officials and PEPs.
5	**Counterparty risk**	Perhaps the biggest focus is whether the counterparty (typically a state-owned utility) can meet the contract payment obligations under any PPA/investment agreement.	Counterparty credit risk can be managed through a range of measures including: > credit enhancement from Government and/or under schemes such as World Bank credit enhancement; > de-risking through leverage including multilateral and development finance institutions and export credit agencies; > political risk insurance; and > contractual terms (such as set off or payment terms).
6	**Currency risk**	Exposure to volatile local currencies may not provide for sufficient long-term certainty for equity investors or lenders.	Given limited market capacity for affordable long-term FX hedging, it is still the norm in many countries for project revenues to be in hard currency.
7	**Local content and skills capacity**	Most projects must satisfy local content requirements. This can pose material challenges to project delivery and reliability given frequent problems associated with access to enough skilled workers. Similarly, a lack of skills in government and among regulators can impose constraints on the development and operation of projects.	Often the solution is to train local workers but this may require focus by the developer not just on the adequacy of its own training but also that of its contractors. Skills gaps can also create project risk (safety, quality, procurement problems) and delays. It is an area scrutinised by international financial institutions and ECAs. Multilateral and other funding can also be provided to give governments access to suitable specialist resources. The development of standard form bankable documentation by entities (as has been done by IFC, KfW and the South African government) should help to unblock bottlenecks caused by insufficient government capacity during negotiations.
8	**Technology, transmission and distribution**	No prior use/regime for use of the technology or inadequate supporting transmission systems (or other infrastructure) can be a major risk.	Assess country track record and adequacy of infrastructure and (if no infrastructure) adequacy of funding for new infrastructure. Build in upgrade requirements and ensure adequate contingency for delays and patching works. Clear allocation of risk is needed in relation to failures of infrastructure. Inadequate transmission infrastructure may also favour off-grid solutions.

[22] "Policy Risk in Renewable Energy Investments in Developing Countries" dated July 2014 by Cambridge Economic Policy Associates Ltd, for the UK Department of Energy and Climate Chance (DECC).

> "Renewable energy doesn't necessarily go where the most wind or sunshine is, but where the best regulatory regime is. In Africa, you can have both."

Thomas Schulz, Partner, Berlin

Case Study: South Africa

In 2013, South Africa implemented the Renewable Energy Independent Power Producer Procurement (REIPPP) programme[23], which made the country a highly favourable market for renewable energy investment. Five bidding windows have now closed (one remains) with a total of nearly 7 GW of capacity set to be installed before 2020. As of March 2015, 4.1 GW had been procured from 66 IPP projects through a competitive bid process and 1.7 GW was already operational. Furthermore, the number of qualifying and competitive bids in Round 2 onwards exceeded the available allocation or cap that could be procured. This suggests that if more RE capacity could be accommodated on the system, the supply is available. Linklaters and Webber Wentzel advised on over 30 projects in the program, including in relation to the financing of two of the largest Concentrated Solar Power projects in Africa: Khi 50 MW Concentrated Solar Power (CSP) Project in Upington and the KaXu 100 MW concentrated solar power (CSP) plant constructed near Pofadder, in the Northern Cape Province, South Africa.

Much of the success of the REIPP programme derives from the standardisation of approach – a carefully considered risk allocation in the programme documentation enshrined in non-negotiable power purchase and associated documentation has allowed the programme to be rolled out on an industrial scale. ■

[23] On which Linklaters and Webber Wentzel advised the South African government.

African renewable power market size

It has taken time for domestic transmission and consumer demand for electricity in Africa to grow to a sufficient level to support large-scale power investment. Many African countries are at or approaching that point today. The renewables market in Africa is growing rapidly. This rate of growth will, in part, be driven by policy frameworks adopted at a domestic level and supported by ambitious signals from the Paris Agreement going forward. In 2014, IEA reported a base case scenario (the "**New Policies Scenario**" or "**NPS**") that projected that, between 2014 and 2030 cumulative investment would be US$827 billion in the power sector, of which US$255 billion would be for renewable energy capacity. A year later, in 2015, one of IRENA's more ambitious renewable energy deployment scenarios ("**RE-MAP 2030**") suggested that cumulative investment between 2015 and 2030 would be US$1055 billion, of which US$486 billion would be for renewable energy capacity. In the high ambition scenarios, more renewables are deployed, but more power capacity is also built and more power supplied. Total electricity actually supplied by renewables in 2030 (in TWh) is projected to be between 20-30% of total power generation depending on the scenario, albeit that the absolute value of both total generation and renewable output is significantly higher in the high ambition or RE-MAP scenario.

Transmission and distribution requirements are different depending on whether there is a lot of renewable energy in the mix. However, the IEA and IRENA data, which the figures below are based on, do not break down transmission figures to a level of detail to indicate whether it takes into account these differences. Overall, the costs associated with renewable energy transmission and distribution appear on balance to be fairly similar to fossil fuels. A good deal of power demand will be driven by industrial production requirements and the increasing demands of existing consumers (growing middle class) rather than new low income rural users, so transmission and distribution costs will not necessarily be higher due to a need to set up linking networks in rural areas, for example. ■

> Transactions will continue and will become more sophisticated. There will be aggregation of smaller projects, portfolio sales… similar to the evolution of the power sector we've seen in Europe.

Sarosh Mewawalla, Partner, Dubai

Figure 3. Investment in African power sector (US$ billion)

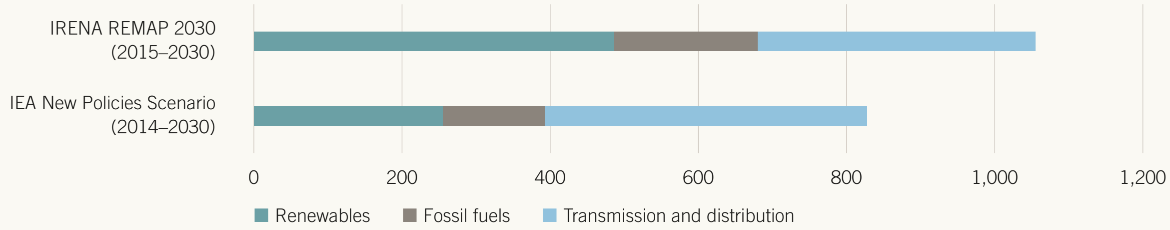
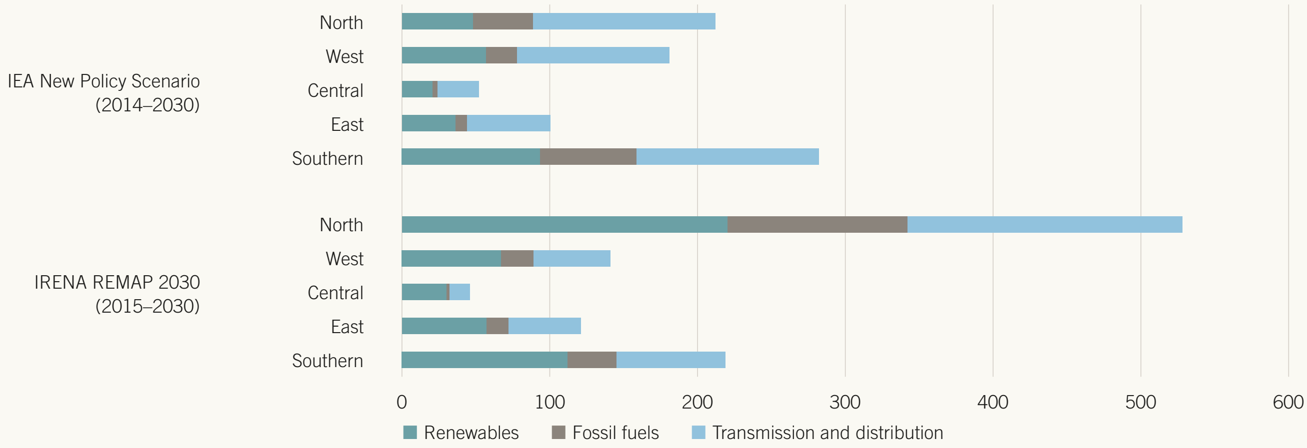


Figure 4. Cumulative investment to 2030 by region (US$ billion)



Impact of the Paris outcome on the African renewables market

The Paris Agreement and the accompanying decisions of COP 21 (the "Paris Decisions") were adopted on 12 December 2015, creating the first truly global agreement on climate change. 195 countries have agreed to hold the world to well below 2°C of global warming above pre-industrialised levels, and to pursue efforts to limit global warming to 1.5°C.

Developed countries agreed they should take the lead in these efforts by reducing their absolute emissions economy-wide and by providing finance and capacity building to developing countries for climate change mitigation and adaptation. All parties to the Paris Agreement, not only developed countries, will implement measures determined at a national level, known as "Nationally Determined Contributions" or "NDCs", to ensure that, taking into account national capabilities, greenhouse gas emissions peak as soon as possible (although it is acknowledged it will take a longer time for emissions to peak in developing countries).

The decreasing cost of delivering low-carbon economic development was one of a number of factors that facilitated the Paris outcome. It sends a long-term pricing signal to the market and may even mark the beginning of a "virtuous cycle" of unlocking investment in renewables[24] in Africa. Even before COP 21, analysts predicted that some markets in sub-Saharan Africa may leapfrog fossil fuels technology where supported by an appropriate policy framework to enable investment, and that Africa's economic development could actually be driven by renewable technology[25]. The outcome of COP 21 represents an opportunity to achieve development more rapidly. It substantially undermines the argument for rejection of renewables as a risk to economic development in Africa through restrictions on the rapid deployment of fossil fuel technology. However, the future impact of the agreement depends upon whether the political will exhibited at COP 21 can be translated into domestic actions and the extent to which NDCs continue to align with domestic African priorities.

In the lead-up to COP 21 more than 170 countries (including European Member states), accounting for at least 90% of global emissions, submitted national climate pledges (then known as "Intended Nationally Determined Contributions" or "INDCs") setting out commitments on national emissions reductions strategies. These INDCs will be converted to NDCs at the time a country submits its instrument of ratification of the Paris Agreement (which will be possible from April 2016), either through the submission of a revised NDC, or by confirmation that the existing INDC will apply. If the INDCs are implemented, they will require US$13.5 trillion investment in energy efficiency and low-carbon technologies from 2015 to 2030 globally. Many African INDCs including those from Morocco, Kenya, Nigeria, Zambia and the Democratic Republic of Congo, include emissions reduction targets that were conditional upon the receipt of external support and financing. This support still needs to be secured before the full policies and resulting pipeline of projects is clarified. Focus in the coming months and years will be on the policy frameworks that countries will put in place to implement their NDCs.

While the Paris Agreement has certainly created positive sentiment in the market, it is unclear whether the agreement itself will stimulate short-to-medium term investment in the African renewables market, given that it comes to force only in 2020. However, 'non-state actors'[26] and even some governments will continue to pre-empt or act independently of the implementation of NDCs, which technically will also only occur from 2020.

[24] IEA Renewable Energy Medium-Term Market Report, 2015.

[25] IEA Renewable Energy Medium-Term Market Report, 2015.

[26] A broad term used in the United Nations Framework convention on Climate change (UNFCCC process encompassing sub-national, multilateral, private sector and NGO actors).

A number of significant commitments were made by non-state actors at COP 21 to support the rapid deployment of renewables and energy efficiency technology in Africa and other regions. Some of these initiatives include:

> the Africa Renewable Energy Initiative (AREI) aimed at installing 10 GW by 2020 and 300 GW by 2030 of renewable energy capacity which is backed by $10 billion from the EU, Sweden and G7, and aims to leverage an additional $5 billion from other sources, for which the African Development Bank (AfDB) will act as Trustee[27]; and

> new partnerships of PowerAfrica, a US government initiative launched in 2013, with: (i) the UK Department for International Development (DFID) focussing on how to rapidly accelerate growth in the African household solar industry; (ii) the Government of Norway with the aim of bringing 1,500 MW of renewables in Africa online over a five-year period, contributing to Power Africa's overall 30,000 MW goal; and (iii) IRENA, to increase information-sharing to further renewables growth in sub-Saharan Africa.

Developments in renewables technologies are being made at a rate which the negotiators who started this round of international negotiations in Durban in 2011 could not have predicted. This means that for the first time the solutions to provide clean, cost-competitive energy are ready to be rolled out at scale, with a nudge.

The G77 negotiating bloc in global climate change negotiations, which historically included the African States in most matters, had previously expressed concerns that an international deal restricting global greenhouse emissions could impede African development. The Paris Decisions mark a shift from this position. They acknowledge expressly the "need to promote universal access to sustainable energy in developing countries, in particular in Africa, through the enhanced deployment of renewable energy". It is unusual to have such a specific reference in this type of high-level agreement and in part, reflects both the degree of focus on the issue of the African States and their partners and that the concern has been at least partially mitigated, as the competitive environment for clean energy has improved. 79 African countries also joined the 'High Ambition Coalition' - a joint developed and developing countries bloc which included the EU, US and Brazil, calling for a 1.5°C target and other measures, in part breaking up the African States' historic grouping with the G77. The High Ambition Coalition may continue to play a role post-COP 21 in the form of bilateral or multilateral funding of African nation NDCs and the provision of further assistance with capacity building.

This shift does not ignore the need of many African states for development assistance and support for adaptation to, and the mitigation of the impacts of, climate change which cannot be avoided. In the Paris Decisions, developed countries have reaffirmed their financial support (with a floor of $100bn per year until 2020) and capacity-building assistance for developing countries' transition to low-carbon economies. Parties must agree a new target for climate finance by 2025. However, as the overall cost of delivering low-carbon development decreases, the level of ongoing "subsidy" required by Africa from the Paris Agreement (in addition to existing development assistance) may decrease.

Policy-makers responsible for implementing NDCs now have the opportunity to nudge the dial on renewable energy through addressing some of the barriers to renewable energy generation in Africa and to favour renewables as a significant proportion of the overall energy mix. There will be an informal stocktake in 2018 to assess collective efforts thus far. Once the Paris Agreement comes into force there will be a global stocktake in 2023 and every five years after that, and parties will be required to submit nationally determined contributions every five years, with each successive NDC progressing in ambition beyond the last. The Paris Agreement also establishes a transparency framework, requiring a national inventory of emissions and information necessary to track progress in implementing NDCs to be reported centrally. This may facilitate funding of NDCs by increasing the consistent monitoring and accountability of African countries.

International climate finance will be an important source of funding for the accelerated deployment of renewable energy in Africa, as seen through the conditionality of many INDCs. It may be delivered through the Green Climate Fund ("**GCF**") or bilateral funding of NDCs. The GCF is a fund established to channel public and private finances to developing countries for climate change adaptation and mitigation activities and is the operating entity of the Financial Mechanism of the UNFCCC. The GCF can contribute financially to the deployment of renewables in Africa and through the multilaterals and national development banks to mitigate some of the risks of investment. ▶ *Continued on p16*

[27] Other initiatives focusing on Africa include SE4ALL, U.S. Africa Clean Energy Finance initiative, Africa-EU Energy Partnership, the UK's Energy Africa and the EU's Electrification Financing Initiative (ElectriFi) and Technical Assistance Facility.

> "The South African renewables programme has attracted investors from all over the world. These international players know Africa now much better than five years ago."

Karel Potgieter, Partner, Webber Wentzel

Which renewable energy sources have greater potential in different regions of Africa?

The opportunities for continued renewable deployment in Africa are very strong due to the abundance of natural renewable energy resource in multiple regions of Africa and the degree of unmet and growing demand. Certain power sources will be more competitive by region, thereby resulting in more installed capacity, as set out in Figure 5. Resource abundance generally lowers LCOE, which then in some cases (like Morocco and South Africa) has led to the development of a favourable policy environment, institutional capacity building and local deployment and implementation experience that further drives down costs.

By Region:

Central Africa's potential hydro capacity. The hydro capacity that could technically be exploited is the highest in Central Africa among the regions, although political risk continues to restrict international investment. As of 2012, hydropower provided about 96% of Africa's renewable energy capacity; however, forecasts show a diversification away from this and hydropower is expected to represent between 25 and 55% of generation by 2030, depending on whether a low or high ambition scenario is adopted.

Significant scope for solar across the regions. While almost all of Africa has double the days of sunlight and levels of solar irradiance as Germany (the world leader in installed solar as of 2014), the resource is most abundant in North Africa, Southern Africa and across the Sahara. Numerous solar PV projects involve international investment. Since the beginning of 2014, SkyPower has signed agreements for solar PV installations of 3 GW with Nigeria (US$5 billion), 1 GW with Kenya (US$2.2 billion) and 200 MW Djibouti (US$440 million). Linklaters is also advising Neoen on the development of its 30 MW solar photovoltaic plant in Mozambique, one of the first two major projects of its kind in the country.

Medium- and high-quality wind resources exist across most of North Africa. Areas around the Horn of Africa, eastern Kenya and areas of West and Central Africa that border the Sahara also have good options. Recent developments suggest that wind power, previously concentrated on Morocco and South Africa, may be on the rise in other parts of sub-Saharan Africa. The first industrial-scale wind project in Senegal has been signed, with over US$300m in investment in what will be 150 MW of capacity supplying a 20-year PPA. In May 2015, Ethiopia opened its third wind farm, Adama II, the largest in sub-Saharan Africa, at 153 MW capacity. It brought the country's installed wind capacity to 324 MW. In Kenya, construction has begun on the first 50-90 MW of the Lake Turkana Wind Power Station. When complete, it will also have a capacity of 300 MW[28]. Linklaters advised the African Development Bank (AfDB) and European Investment Bank on the Financing of Cabéolica wind farm portfolio in Cape Verde, South Africa.

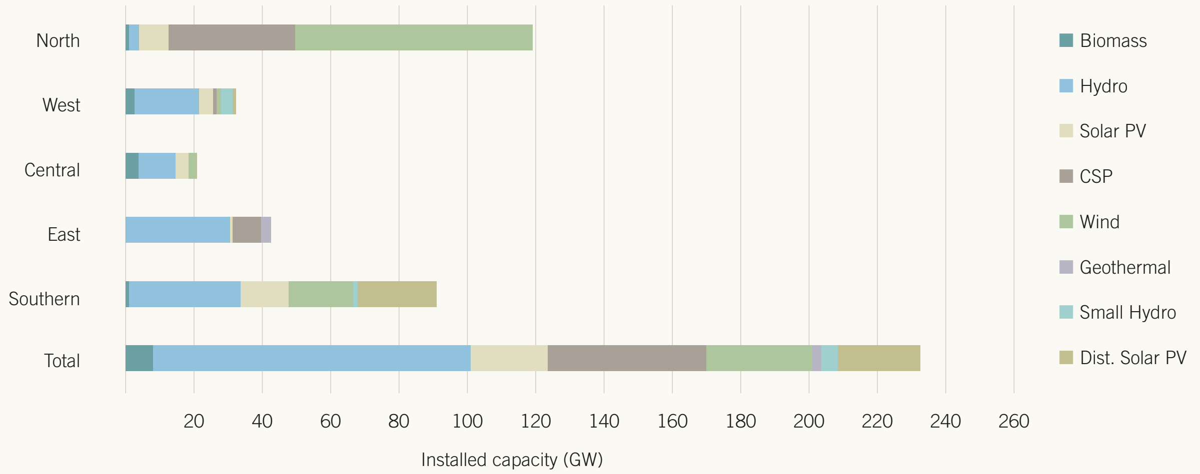
Substantial geothermal resources exist in the Rift Valley in East Africa.

[28] AFP, 2015; Davis Jr., 2015.

> "The Mozambique Government is becoming more and more aware of the requirements of international investors in the electricity sector and sensitive to the need to give protection versus political and country risk."

Francisco Ferraz de Carvalho, Partner, Lisbon

Figure 5. Installed capacity by region



These figures are interpreted by ODI from IRENA (2015) 'Africa 2030: Roadmap for a renewable energy future' Abu Dhabi: International Renewable Energy Agency (IRENA).

Regional co-operation

The need for increased regional integration and co-operation in order to develop many renewable energy resources compounds political and regulatory risks, because state utilities are hesitant to become reliant on imports to meet their domestic needs[29]. To mitigate these risks and improve the "enabling environment" for RE, infrastructure planning must be carried out at the regional level. The ongoing construction of the West African Power Transmission Corridor and plans to develop an "Africa Clean Energy Corridor" from Egypt to South Africa are promising steps in the right direction.

It is also worth noting that some large-scale projects and interconnection could substantially change how the African power sector develops. For example, if the planned 4.8 GW Inga III project in DRC and the widely discussed ~44 GW Grand Inga project come online, the electricity produced could displace fossil fuels and renewable energy in Central, West and Southern Africa. Barriers to the development of the Grand Inga project include political instability in the region, securing the regional governments' and stakeholders' consensus, complexities surrounding the scale of upfront costs and financing capacity, the need for associated infrastructure and the lack of a market in Central Africa that is capable of absorbing the levels of electricity produced. Its implementation is also largely contingent on the expansion of transmission and distribution infrastructure to unlock electricity trade. The uncertainty surrounding such a large project illustrates the problems involved in modelling future energy scenarios. ■

[29] IEA, 2014; APP, 2015

Conclusion

"As renewables quickly approach cost parity with fossil fuels, we are seeing signs that African economic development will be powered by renewables."

Melanie Shanker, Managing Associate, London

The investment case for renewable energy in Africa is becoming easier for policy makers, investors and financiers to make, as the cost of renewables trends rapidly towards cost-competitiveness with fossil fuels and even cost parity in certain asset classes.

The Paris Agreement was facilitated by the decreasing trajectory of the overall cost of low carbon development. From the perspective of developed countries, the trend reduces the potential size of required financial assistance. From the perspective of African states, it gives some comfort that the Paris Agreement and supporting Paris Decisions provides a framework for achieving economic development supported by renewable energy investment more rapidly than might otherwise have happened, rather than it being a risk to economic development through restrictions on the rapid deployment of fossil fuel technology. The numerous Africa-specific initiatives announced in the lead up to, and at, the Paris meeting including the Africa Renewable Energy Initiative and new PowerAfrica initiatives may also unlock investment in the African renewables market.

This is not to say there is no role for fossil fuel power. Clearly there is, and an important one, particularly for some larger, industrial uses. There are also real barriers to investment in place which must be overcome to truly unlock international investment in renewables in Africa. However, a strong, ambitious outcome from COP 21 has given investors long-term pricing signals that will boost the renewables market across Africa. Their ability then to unlock large-scale investment in renewables in Africa will depend on driving through the implementation of reliable domestic policy frameworks and development of the right skills and capacity. ■

About Linklaters

For over 40 years, Linklaters has been at the forefront of helping clients do business across Africa.

Through our unique combination of skills and experience in Anglophone, Francophone and Lusophone Africa, and our UK, U.S. and Islamic Finance capabilities, together with a deep-rooted alliance with Webber Wentzel in South Africa, we offer clients across all sectors an unrivalled legal offering to support their Africa-related work.

Linklaters also has a specialist group of climate change lawyers, based around our international network, which advises businesses on all their climate change related legal requirements. Clients come to us for strategic risk management advice in relation to sustainable investment, advisory guidance covering policy developments, low-carbon investment and green bonds. ■

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Contacts

UK

Melanie Shanker
Managing Associate, London
Tel: (+44) 20 7456 2994
melanie.shanker@linklaters.com

UK

Andrew Jones
Partner, London
Tel: (+44) 20 7456 5892
andrew.jones@linklaters.com

UK

Vanessa Havard-Williams
Partner, London
Tel: (+44) 20 7456 4280
vanessa.havard-williams@linklaters.com

UK

Jeremy Gewirtz
Partner, London
Tel: (+44) 20 7456 5900
jeremy.gewirtz@linklaters.com

UK

Chris Staples
Partner, London
Tel: (+44) 20 7456 4876
chris.staples@linklaters.com

UK

John Pickett
Partner, London
Tel: (+44) 20 7456 5926
john.pickett@linklaters.com

France

Paul Lignières
Partner, Paris
Tel: (+33) 1 56 43 57 01
paul.lignieres@linklaters.com

France

Bertrand Andriani
Partner, Paris
Tel: (+33) 1 56 43 57 80
bertrand.andriani@linklaters.com

Portugal

Francisco Ferraz de Carvalho
Partner, Lisbon
Tel: (+35) 121 864 0010 5010
francisco.carvalho@linklaters.com

Dubai

Sarosh Mewawalla
Partner, Dubai
Tel: (+97) 1 4369 5843
sarosh.mewawala@linklaters.com

Germany

Thomas Schulz
Partner, Berlin
Tel: (+49) 30 2149 6238
thomas.schulz@linklaters.com

Webber Wentzel

Karel Potgieter
Partner, Webber Wentzel
Tel: (+27) 11 530 5315
karel.potgieter@webberwentzel.com

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