IRENA QUARTERLY
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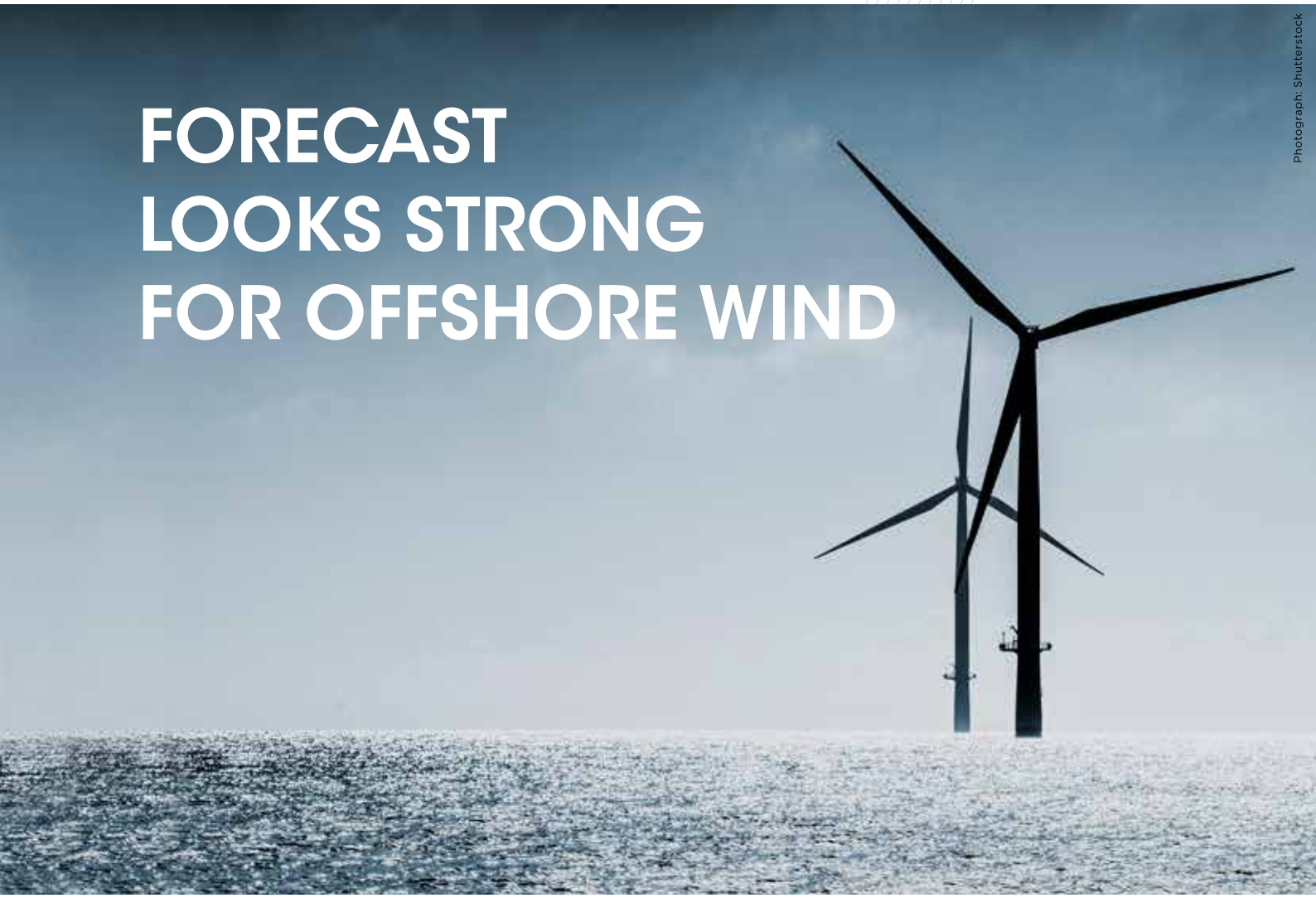
FORECAST LOOKS STRONG FOR OFFSHORE WIND



Photograph: Shutterstock

As offshore wind technologies rapidly become commercialised, the resulting electricity keeps getting cheaper.

In the year 2000, the world's installed offshore wind capacity amounted to 67 megawatts (MW) – only enough to supply 33 500 average EU households with electricity. By last year, this had reached almost 20 gigawatts (GW), which could, cumulatively, power a large US city like Los Angeles.

This growth has been driven by continual cost reduction, enabled by technology improvements and other developments in the offshore wind industry. Since the first offshore wind farm operated in Denmark, in 1991, turbine blades have been getting bigger and foundations more diverse. Yet turbines anchored to the sea floor are still constrained by water depth, keeping areas with the greatest wind potential – some close to enormous markets, like Japanese or US cities – out of reach. This is set to change quickly, however, with the advent of floating foundations.

Until today, offshore wind power has mainly been developed in Europe. Further expansion depends on more research, continued technology improvements and achieving reliability in different environmental conditions.

Floating turbine foundations on the cusp of commercial deployment

Floating offshore wind has achieved a major milestone that promises to open huge new markets around the world. The world's first array was commissioned last year, off the North Sea coast of Scotland, in the United Kingdom. The 30 megawatt (MW) Hywind project, which comprises five turbines, has withstood challenging weather conditions. Over the winter period, it achieved high levels of output, resulting in an average capacity factor of 65%, according to Equinor, (formally Statoil), the main company behind the project.

With this important tipping point, floating offshore wind has made the transition from pilot project into early commercial deployment. The Hywind array, along with the seven smaller floating offshore wind installations in place around the world to date, highlights the potential for floating foundations. At least nine further projects are in the planning phase around the world.

The world needs about 500 gigawatts (GW) of offshore wind by 2050 to meet rising power demand in a sustainable manner, according to analysis by the International Renewable Energy Agency (IRENA). The floating variant can make a significant contribution. By 2030, industry experts say around 12 GW could be installed worldwide, with the potential for far larger growth up to 2050.

Notably, floating offshore wind can build on the success of bottom-fixed deployment. But floating foundations have other advantages that could increase their yield and improve the economics.

Turbines rooted to the seabed are constrained by depth

Floating offshore wind concepts are innovative and diverse

Image courtesy of NREL

Deeper-water sites tend to offer more reliable and higher velocity winds.

Floating foundations allow turbines to be installed in deeper waters – typically over 100 metres – opening up many more sites. This can make offshore wind an attractive power generation option for many more countries.

More research and wider deployment will reduce costs for the technology

To ease challenges in deployment, some floating foundation designs allow turbines to be assembled remotely and towed out to sea.

For now, such projects remain more expensive than their bottom-fixed counterparts. Most experts, however, see no reason that costs should not fall into line by the late 2020s.

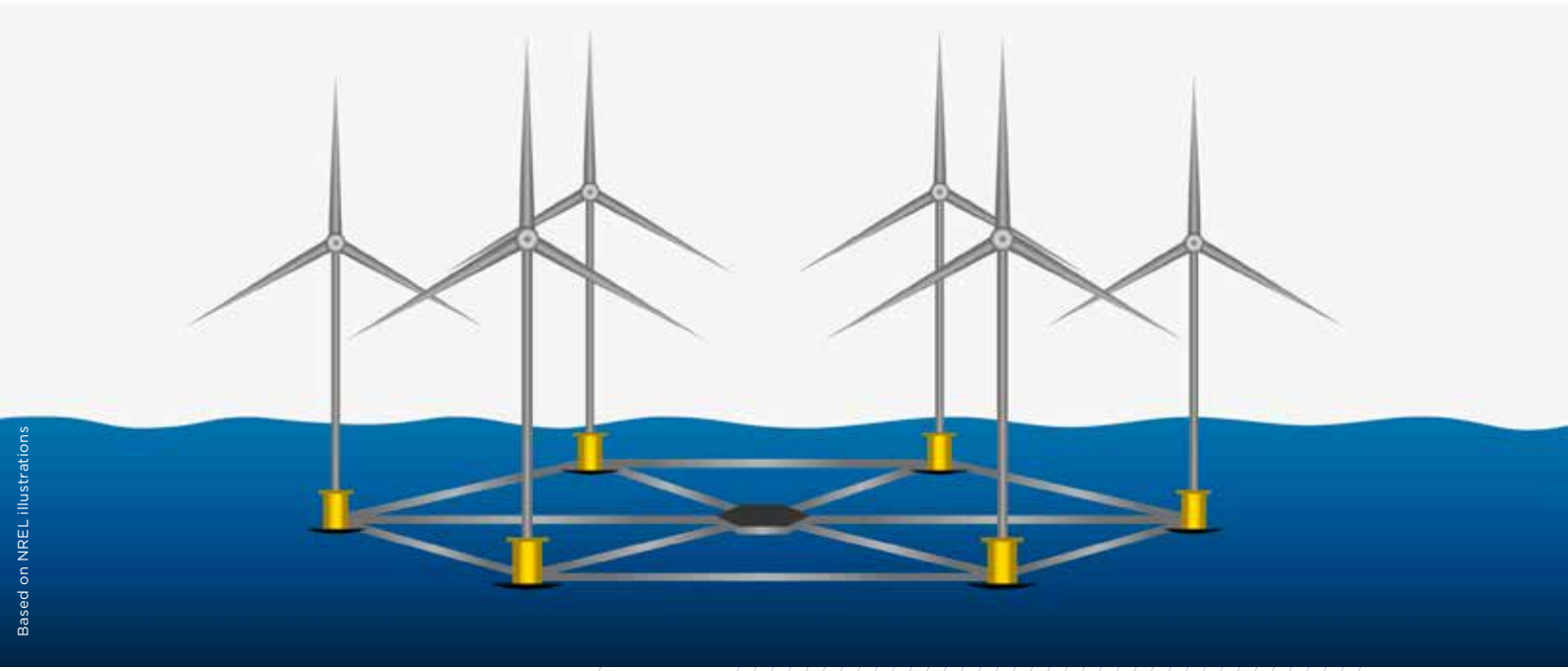
As with other energy technologies, cost reduction will come from a combination of research, development and demonstration (RD&D) and actual deployment. Several governments and companies have active RD&D programmes focused on reducing floating offshore wind costs. RD&D alone, however, is not enough. As prior experience with bottom-fixed offshore wind shows, the greatest cost reductions will come from building and installing more arrays.

Learning from deployment can improve efficiency in the process, increase investor confidence and feed back into improved technology and system design. Greater scale allows for more efficient manufacturing, supply chains and infrastructure.

With the right strategies put in place now, floating offshore wind could be competitive with other renewable and non-renewable energy sources by the late 2020s. In specific locations, it is sure to be a competitive option even sooner.

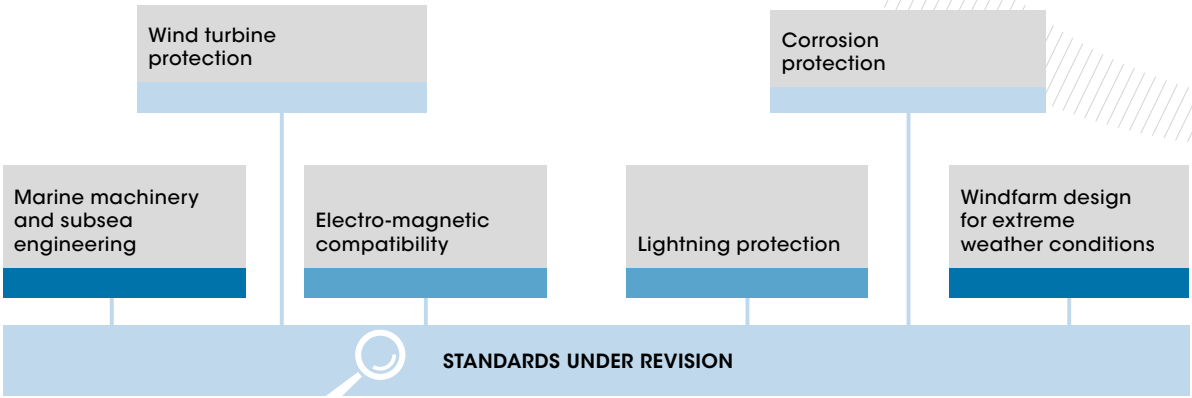
Like any ground-breaking technology, floating offshore wind power needs the prospect of a sufficiently large market to justify initial public and private investments. Early deployments, furthermore, need at least a degree of support, targeted at enabling commercial-scale projects. Already, however, energy system planners in coastal regions can consider the potential of floating offshore wind as part of their medium-term energy plans.

IRENA issued an interim status report on the technology at the Clean Energy Ministerial in May 2018, building on a ***December 2016 brief****.*



Based on NREL illustrations

Market development depends on adopting global standards



Any new technology needs to be trusted if it is to succeed worldwide. Like other industries, therefore, the offshore wind industry requires technical specifications or other precise criteria, used consistently, so that investors and policy makers anywhere can achieve predictable outcomes.

The resulting rules, guidelines or definitions do more than mitigate technical risks. Internationally harmonised and accepted standards can help to open market access, remove unnecessary barriers to trade, improve cost competitiveness and bolster customer confidence and acceptance in a previously unfamiliar technology.

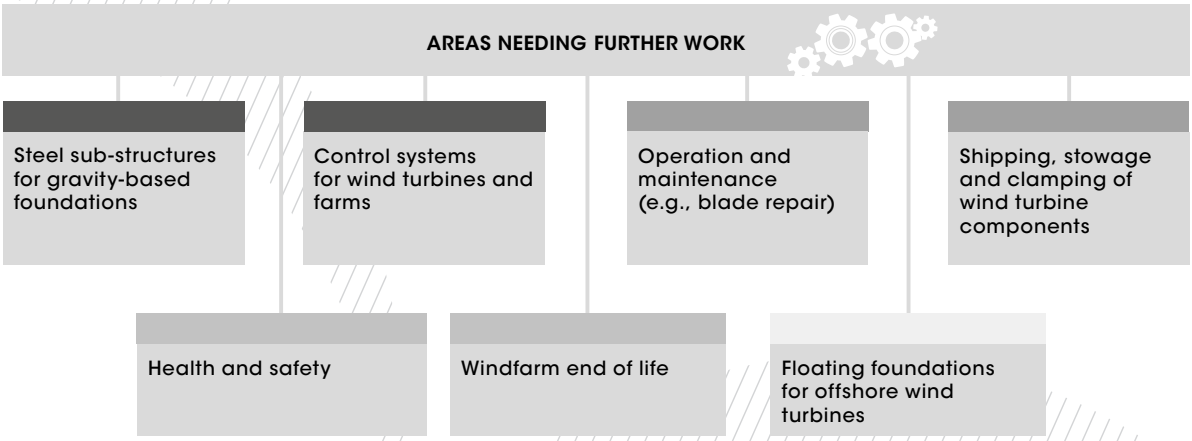
Offshore wind has relied on key standards from the more established onshore wind industry, especially for top-side structure – meaning the tower, rotor and nacelle. It has also incorporated standards from the offshore oil and gas industry, mainly for the support transition piece. It has also adopted standards for the underwater substructure, mooring, anchors and piles to permit installation.

As wind turbines keep improving, the latest designs need to be documented in new standards, which reflect specific adaptations to offshore wind conditions.

Existing standards are constantly revised and new ones are developed to keep up with the industry's latest advances.

Successful globalisation of offshore wind power generation will depend on co-operation between governments and the industry, as well as engaging experts from all countries with an interest in the technology. National and international standard-making bodies need support. Certification systems and the harmonisation of technical standards also need more attention at the international level.

IRENA's report, **Nurturing offshore wind markets: Good practices for international standardisation,** *analyses key forerunner markets – like Denmark, Germany and the UK – as well as initiatives occurring in emerging offshore wind markets such as China and the United States. The report highlights the best practices for countries interested in deploying offshore wind.*



The corporate world opts for renewables

Since the mid-2000s, companies have begun to deliberately power their operations with renewable-based electricity. Increasingly, companies in different industries and sectors are committing to ambitious renewable energy targets.

Globally, in 2017, companies sourced approximately 465 terrawatt-hours (TWh) of renewables. Production for self-consumption accounted for most of this (165 TWh), followed by unbundled energy attribute certificates (130 TWh), corporate power purchase agreements, or PPAs (114 TWh), and finally "green procurement" by utilities (34 TWh).

Companies in at least 75 countries have procured renewable power

The trend is widespread and dynamic. By volume, renewable electricity was mostly consumed in heavy industries like mining, pulp and paper, chemicals and other materials production (over 160 TWh). This mainly happens through companies generating their own hydropower, but increasingly also through "self-generated" wind and solar power.

Yet the highest shares of renewable electricity consumption are found in the financial (24%) and information technology (12%) sectors. Companies like Bank of America, Google, IKEA, Intel and Microsoft are among the major consumers and self-generators of renewable electricity outside the materials sector.

Photograph: Shutterstock

Companies in at least 75 countries are known to have procured renewable electricity as a deliberate choice. While North America and Europe account for most of those companies, the practice is spreading to other regions.

India and South Africa are among the top ten markets actively sourcing renewable electricity. Other developing markets, like China, Mexico and Ghana, are also experiencing significant growth in active corporate sourcing.

Most governments have not yet considered the potential of corporate sourcing in their energy strategies. Yet they recognise renewables as a way to attract new investment, meet energy needs, achieve compliance with national and international climate targets, and boost job creation.

Out of 2 410 companies analysed by IRENA, over half source renewable electricity, although only 17% indicated having a target in place. More than 200 companies source over half of their energy demand through renewables.

To learn more, see: **Corporate Sourcing of Renewables: Market and Industry Trends**.

From CSR to good business sense

Many companies initially turned to renewables as an act of corporate social responsibility (CSR), to fulfill environmental and social objectives, and to address a growing call for sustainability from investors and consumers. Lately, however, the stability and business advantages offered by renewables have provided an even stronger justification.

Commerce and industry are responsible for about two-thirds of the world's final electricity demand. Where and how companies in this sector source their electricity and other energy services will be a decisive factor in the world's pursuit of a sustainable future.

Photograph: Shutterstock

Iraqi solar potential beckons investors

Ensuring a stable, secure and cost-effective supply of power to a growing population has been a central aim in Iraq's post-conflict economic development. The challenges of maintaining oil and gas pipelines, however, combined with the need to stimulate new streams of economic growth, have prompted a rethink of domestic energy policy.

Aiming to diversify the supply mix, a new national energy strategy sets the ambitious goal of generating 2.2 gigawatts (GW) of power from renewables by 2020. Much of that would come from the country's copious sunshine.

"Iraq… enjoys more than 3 000 hours of bright sunshine per year and an average solar radiation of about five kilowatt-hours per square metre daily," said Dhia Baiee, Deputy Director General of the Renewable Energy Directorate at Iraq's Ministry of Science and Technology. "We hope to build a reputable investment programme [for solar] that underpins both our energy and economic objectives."

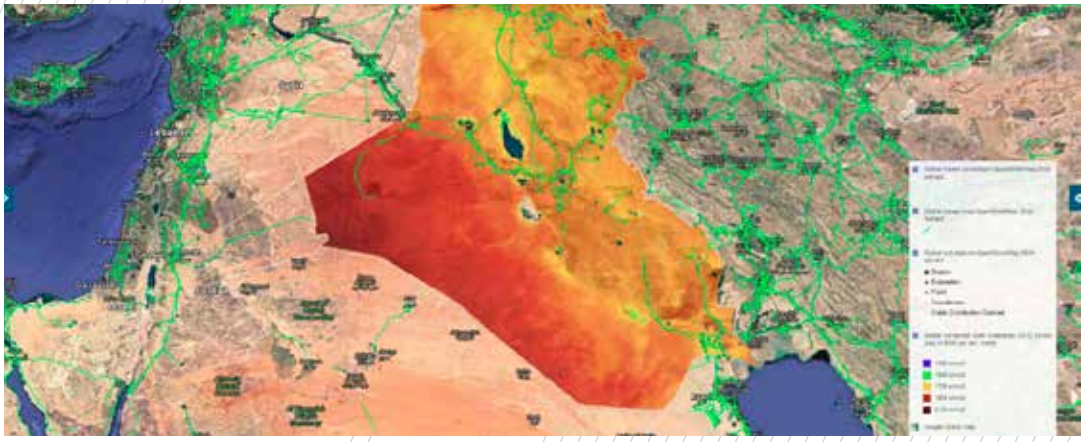
The abundant potential around the country is documented in a new solar resource map, developed in co-ordination with the United Nations Development Programme (UNDP) and the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE). Other maps highlight promising areas for wind power development.

Digitised maps can help to identify Iraq's best resource sites, informing and facilitating renewable energy planning. They also give investors and developers quick information about land availability, populated areas and grid access – all factors that influence the suitability of a site for solar or wind development.

For now, the country generates nearly 100% of its electricity from fossil fuels. Yet with power plants vulnerable to supply disruptions, blackouts have been common.

"Iraq has tremendous potential to develop its own domestic renewable energy resources, and its government has identified solar development as a clear, long-term priority," said Henning Wuester, Director of Knowledge, Policy and Finance at IRENA.

Iraqi solar and wind maps are freely accessible as part of IRENA's **Global Atlas for Renewable Energy**.

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Sustainable development hinges on world's uptake of renewables

Renewable energy technologies can contribute substantially to sustainable development around the world, well beyond the specific imperative to decarbonise the energy sector.

During the United Nations High-Level Political Forum (HLPF) on Sustainable Development, policy makers and experts discussed the substantial, cross-sectoral socio-economic benefits of the energy transformation that is happening today.

The meeting took place at UN headquarters in New York on 9-18 July, with a focus on making societies sustainable and resilient. Notably, participants reviewed the implementation of the Sustainable Development Goals (SDGs) adopted three years ago, shortly before the Paris climate accords.

Those goals include access to affordable, reliable, sustainable and modern energy, termed "SDG-7", which hinges on stepping up renewable energy deployment. But renewables can also help to fulfil health (SDG 3), jobs and economic growth (SDG 8), sustainable cities (SDG 11), climate action (SDG 13) and other key objectives.

"Renewables are transforming the global energy system at rapid pace and moving us towards a new age of energy," said Mr. Adnan Z. Amin, IRENA's Director-General, who moderated the official SDG 7 review session on 10 July. "This shift promises to not only support our long-term climate objectives but it also contributes to the realisation of a number of other key development goals."

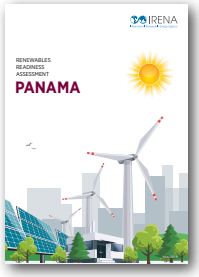
Renewable energy and energy efficiency combined could achieve 90% of the energy-related emission reductions needed keep the rise of global temperatures "well below 2°C", the key Paris Agreement target.

More than a billion people today still live without access to electricity. Off-grid renewable energy technology is starting to give them modern services. Off-grid renewables have grown three-fold in the past decade, from under 2 GW in 2008 to over 6.5 GW in 2017. Up to 133 million people are now estimated to be served by off-grid renewables globally.

"Renewable energy is supporting economic growth, creating jobs and improving health and welfare, in addition to mitigating climate change and delivering energy access," Mr. Amin added. "The energy transformation's multifaceted benefits can be realised if we put renewables at the heart of global efforts to achieve the SDGs, and we accelerate the speed of their adoption."

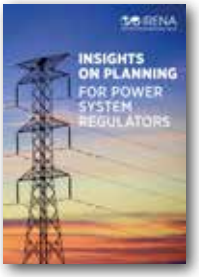
For more on the technologies and policies to fulfil the 2030 Agenda for Sustainable Development, see IRENA's brief, **Off-grid renewable energy solutions**. *Also look out for the 4th International Off-grid Renewable Energy Conference and Exhibition (IOREC), which starts on 31 October during Singapore International Energy Week 2018. See:* **iorec.irena.org.**

Recent publications



Renewables Readiness Assessment: Panama

Panama has vast potential to develop renewables. The National Energy Plan suggests that as much as 70% of the country's energy supply could be renewable by 2050. This report discusses flexibility measures, along with updated planning and operational practices for cost-effective integration of solar and wind power.



Insights on Planning for Power System Regulators

This report identifies useful regulatory practices for the era of rapidly improving renewable energy technologies. It draws key insights, particularly, from experiences with integrated resource planning (IRP) in South Africa and parts of the United States.

www.irena.org/publications

About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

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