IRENA
International Renewable Energy Agency

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Annual Report of the Director-General on the Implementation of the Work Programme and Budget for 2016-2017

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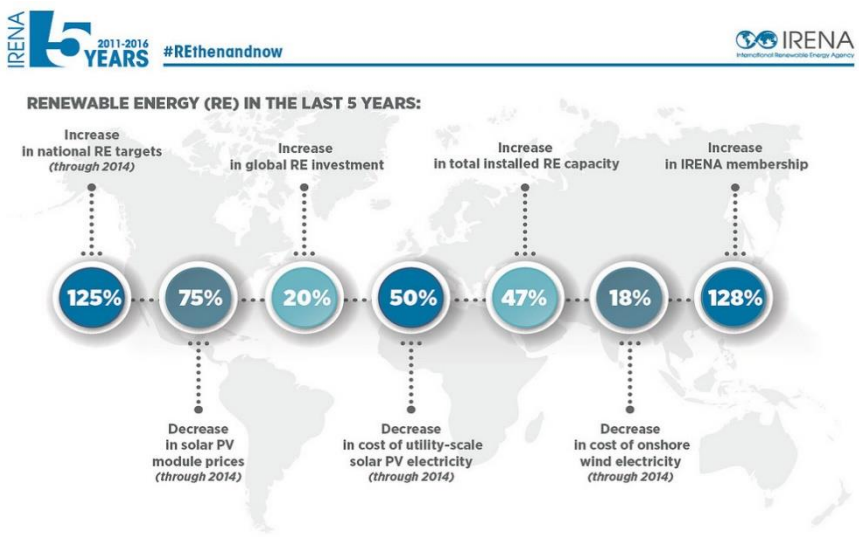
INTRODUCTION

1. This annual report on the implementation of the IRENA Work Programme and Budget for 2016/2017 outlines progress over the first year of the current biennium, which also coincides with the fifth Anniversary of IRENA as an intergovernmental organisation on the world stage. In the course of the last year, IRENA has built on the outcome of the qualitative and quantitative evaluation of its work, as well as intensive consultations with member states and stakeholders in the public and private sectors, to sharpen the relevance and effectiveness of its activities.

2. The growing membership of the Agency, now at 150 members with 26 states in accession, attests to the mounting impetus of the global energy transition. Over the last two years, the majority of new capacity additions to the global power mix has come from renewables. 156 gigawatts (GW) of new power capacity was added in 2015 alone, and a record USD 286 billion invested in renewable energy worldwide. Emerging market investment in renewables has surpassed that in developed markets for two years running, signalling that the energy transformation is becoming truly global. During the five years of IRENA's existence, renewable energy has, through its increasingly strong business case, achieved grid parity in more and more countries around the world and has become a preferred option for new power generation capacity.



3. Two new global agreements, the Sustainable Development Goals (SDG) and the Paris Climate Accord have given fresh impetus to the case for a sustainable energy future. The SDGs have highlighted the centrality of sustainable energy to sustainable development, both as an essential aspect of poverty alleviation through the energy access and rural electrification agenda, as well as to the sustainability of key sectors relating to water, food security, employment and agriculture. The Nationally Determined Contributions (NDCs) of the Paris Agreement provide a coherent framework to successively bolster ambition on renewable energy as a major aspect of this commitment. With these international agreements, the need for international cooperation is more necessary than ever, and IRENA's knowledge frameworks and technical and advisory services are increasingly sought after.

4. The objectives of these agreements are intertwined with the transformation of the energy sector. To transition to a sustainable energy system, a range of solutions is needed, with renewable energy being one of the main options that exists today. The 2016 edition of IRENA's *REmap: Roadmap for a Renewable Energy Future* shows that renewable energy, combined with energy efficiency, can set the world on a pathway towards meeting its climate goal in line with the Paris Agreement. REmap shows that at the core of the energy transition is continuous technology innovation that needs to be fostered through policy frameworks and sustained by markets. As a contribution to the global discussion on the energy transition, IRENA will be releasing the third edition of *REthinking Energy* at the 7th Assembly, titled *Accelerating the Global Energy Transformation*. This edition presents a compelling narrative of the remarkable energy transformation underway, and of some of the pressing policy, technology and financial challenges it faces ahead. During the first IRENA Innovation Week held in Bonn

in May 2016, policy makers, engineers, private sector actors, utilities, regulators and thought-leaders considered some of these challenges, with a common agreement that international cooperation is key to benefit from a common learning curve and accelerate transformation of the energy sector.

5. Decentralised renewable energy solutions to bolster energy access are a major element of this energy transformation. In September 2016, IRENA organised the 3rd International Off-grid Renewable Energy Conference and Exhibition (IOREC) in Nairobi, Kenya, in partnership with the Kenyan Ministry of Energy and Petroleum and the Alliance for Rural Electrification (ARE). IOREC 2016 attracted stakeholders from government, rural electrification agencies, the private sector, financing institutions, development agencies and academia. Some 600 participants discussed how the virtuous circle of cost reductions, continuous innovation and increased deployment of off-grid and mini-grid solutions can be maintained to further strengthen their business case.

6. The transformation of the energy sector will also require a considerable increase in investments. The REmap pathway foresees that the transformation of the energy sector will require a tripling of annual investments, from USD 360 billion in 2015 to USD 1.3 billion trillion in 2030. Much of the growth will happen in countries that have difficulties in accessing finance due to a high risk, real or perceived. To help identify the avenues to overcome this major barrier, IRENA analysed the options for their mitigation in its report, *Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance*. The Agency also analysed policies and markets in different settings and regions to share experiences and highlight replicable practices. In addition to its analytical work, IRENA continues to deploy and adapt its programmatic activities that act as market facilitators and catalysts. These include the Renewable Readiness Assessments, Clean Energy Corridors, and SIDS Lighthouses to name a few, all aimed at creating enabling environments to increase interest in new markets and attract projects. Development and realisation of these projects is supported by IRENA through its Global Atlas, the Project Navigator, the Sustainable Energy Marketplace, and the IRENA/ADFD Project Facility. Combined, these programmatic products provide to Members a concrete and practical support in realising their renewable energy ambition.

7. Active engagement in diverse geographical and thematic settings on energy and sustainable development remains central to IRENA's work. In recent months, this included participation in the EU Sustainable Energy Week, the UN General Assembly, the Habitat III Conference, and COP22, as well as contribution to the G7 and G20 processes. Through such engagements IRENA ensures that the most current and objective information on renewable energy is available to stakeholders for informed debate and decision-making, as well as to help identify possible actions and measures to scale-up renewable energy. For instance, at the G20 Energy Ministerial held in Beijing, China in June, Energy Ministers adopted a G20 *Voluntary Action Plan on Renewable Energy* and agreed to continue implementing the IRENA-led *G20 Toolkit of Voluntary Options on Renewable Energy Deployment*. During the meeting, the Agency launched its REmap report that outlines the potential and options for accelerating renewable energy deployment in G20 member states. Through such engagements, IRENA not only contributes to advancing the deployment of renewables, but also gains additional perspectives on broader energy and related issues for the benefit of its entire membership. This is becoming increasingly important as the global share of renewables increases, and technology, policy and finance issues become more nuanced.

8. Engagement with the private sector is of fundamental importance to the success of IRENA's mission. Therefore, the Agency is systematically engaging with the industry in all relevant areas of the Agency's work to support the initiatives that have the potential to accelerate the deployment of renewables. Dialogue with the private sector highlights some of the areas where the Agency can help overcome common barriers and accelerate the deployment of renewables. For instance, during the Clean Energy Ministerial (CEM), the Director-General guided the discussion in a roundtable and a plenary session on how to facilitate sourcing of renewables for a growing number of companies who are making the commitment to sustainability. These discussions have shown that companies increasingly look for renewables energy options to meet their energy demand, and are willing to

share experiences and engage with policy makers to find solutions for the common objective of sustainability. They also yielded new ideas on how IRENA's Coalition for Action can be leveraged to bring visibility to the efforts of companies to drive the deployment of renewables.

9. A detailed account of IRENA's work is provided in the present report, which also includes the matrix of deliverables detailing progress to date. This progress has been greatly facilitated by the timely receipt of Members' contributions. To date, 89.3% of assessed contributions for 2016 has been received. In addition, USD 4.9 million was received from Germany and USD 2.85 million from the UAE, as part of budgeted core non-assessed contributions. Over USD 4.7 million was received in additional voluntary contributions from Germany, Japan, and the UAE, and new commitments were made by the European Commission (EC), France, the Kingdom of the Netherlands, and the Walloon region of Belgium.

10. An important development has been IRENA's inclusion in the list of ODA-eligible international organisations. With this change, donor countries may include their contributions to IRENA's core budget as part of their ODA reporting, with a co-efficient of 66%. Voluntary contributions to IRENA may also be ODA-eligible provided the contribution meets the ODA criterion of having the promotion of economic development and welfare of developing countries as the main objective. This change in IRENA's status will contribute to its strategy for diversification of its resource base.

Thematic Programme Areas

I. Planning for the global energy transition

11. The world's energy system is undergoing change at multiple levels. This change is taking hold across all energy-dependent sectors: electricity, heat and transport; and is reshaping ancillary areas such as producers, networks, and markets. In support of the global energy transition, IRENA is analysing system integration and technology outlooks, and advising policy makers at all levels through roadmaps, energy planning and targeted cities work.

REthinking Energy

12. As a part of the REthinking Energy series, IRENA is currently finalising the third edition, which is focusing on policy, finance and investment, and technology - three key areas for the growing adoption of renewable energy as the energy transformation gathers pace. This edition provides a comprehensive overview of topical issues in these areas, including an up-to-date analysis of latest trends in policy and investment frameworks, renewable energy data and statistics, and the potential for renewable energy to provide modern energy services to all. It also examines the central role that renewables play in meeting the UN Sustainable Development Goals. REthinking Energy is being developed in consultation with a broad range of stakeholders, enriched by the Agency's global reach and the wealth of knowledge and experiences within IRENA's membership.

Power system design for renewable energy integration

13. To increase knowledge of energy planning options for the integration of a large share of renewables into the grid, IRENA has analysed two separate, but related, issues: variable renewables in long-term energy planning, and grid integration planning. *Addressing Variable Renewables in Long-Term Energy Planning* (AVRIL), to be released January 2017, provides an overview of methodologies for long-term energy planning with a high share of renewable energy, targeting policy makers and planning practitioners in the context of developing and emerging economies. In further support of long-term energy planning, IRENA has undertaken a range of capacity building programmes, such as a regional training programme for West African countries, held in close cooperation with ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), the United Nations Framework Convention on Climate Change (UNFCCC) and the International Atomic Energy Agency (IAEA) in Dakar, Senegal.

14. IRENA and the International Energy Agency (IEA) jointly prepared a report entitled *System Integration of Renewables: Implications for Electricity Security*. Submitted to the G7, the report contains three recommendations on how to facilitate variable renewable energy integration. In May 2016, a joint ministerial statement was released which states '*We will work on additional vulnerability assessments of our electricity systems. We ask IEA and IRENA to build on their work and to provide further advice in this regard'*.[1] Complementing this work, IRENA is developing guidelines on interconnectors and energy storage as flexibility measures, titled '*Electricity storage for renewable power'* and a methodology to assess the flexibility of REmap country power systems and the investment needs. In cooperation with Ireland's University College Cork, IRENA has operationalised an EU power system model with findings discussed with the EC and EU Member States in October in Brussels.

[1] G7 Kitakyushu Energy Ministerial Meeting, Kitakyushi Initiative on Energy Security for Global Growth, Joint Statement. (Paragraph 28)

G20 VOLUNTARY ACTION PLAN ON RENEWABLE ENERGY

Over past years, IRENA has been an active participant of the G20 work on energy. As a result, in 2015 at its meeting in Turkey, the G20 Energy Sustainability Working Group (ESWG) asked IRENA to take the lead in a collaborative effort to develop a toolkit of voluntary options on renewable energy. The toolkit builds on the G20 Principles on Energy Collaboration and provides voluntary options for the G20 to take an integrated and sustainable approach towards enhanced deployment of renewable energy, aligned with national circumstances and priorities.

The G20 adopted the *Toolkit of Voluntary Options for Renewable Energy Deployment* with IRENA as a central coordinator for implementation, in collaboration with international organizations engaged in the process. Building on this work, a *G20 Voluntary Action Plan on Renewable Energy* was put forth with focus on climate change mitigation plans, energy access and security, and endorsed by G20 leaders under the Chinese Presidency in 2016.

"We endorse the G20 Voluntary Collaboration Action Plan on Energy Access, the G20 Voluntary Action Plan on Renewable Energy and the G20 Energy Efficiency Leading Programme issued by the G20 energy ministers and ask them to meet regularly to follow up on the implementation of these plans".

The Leaders of the G20, Hangzhou, China on 4-5 September 2016.

IRENA is working with Germany as the incoming Presidency and other international organisations to continue to advance deployment of renewable energy within the G20 setting.

Transforming Energy

15. The IRENA REmap programme focuses on identifying the realistic potential of renewable energy to the year 2030 and beyond, in all parts of the global energy system, and quantifies renewables in terms of their costs and investments, as well as the contribution to the climate and environmental objectives. The programme has grown to include 70 countries making up around 90% of global energy use. The programme is unique in that participating countries nominate national experts to work with IRENA to determine their renewable energy potential, making the resulting findings a joint assessment. Since the programme's start in 2012, some 30 reports have been released and stakeholder engagement ensured through more than 100 country meetings and workshops.

16. The second edition of the global REmap report *Roadmap for a Renewable Energy Future* was released in March during the Berlin Energy Transition Dialogue. The report shows how to significantly increase renewable energy globally in all energy sectors, and how renewable energy, combined with energy efficiency, can set the world on a pathway towards meeting its climate goal in line with the Paris Agreement. It also provides information on the level of investment required to meet climate goals, as well as where deployment must concentrate regionally and sectorally. Importantly, REmap shows that renewable energy is the least-cost energy option of the future. To help guide the next phase of energy transformation, the report lays out ten key focus solutions for action.

17. Among key REmap outputs are country reports, with 10 released to date for various world economies that include the largest energy users as well as rapidly growing countries. Regional roadmaps complement country work and, to date, roadmaps have been finalised for Africa and Southeast Asia. The recently released REmap report *Renewable Energy Outlook for ASEAN* was developed with the ASEAN Centre for Energy (ACE) and 10

ASEAN Member States to identify a pathway for the region to meet its aspirational renewable energy objective of a 23% renewable energy share in its total primary energy supply mix by 2025. The findings were welcomed by the Energy Ministers during the 34th ASEAN Ministers on Energy Meeting (AMEM) that took place in Myanmar in September 2016 and also referenced in the Joint Ministerial Statement. The report was subsequently launched at a dedicated event during the Singapore International Energy Week in October 2016.

18. Furthermore, REmap analysis of the EU has started in November 2016 to advise on possible pathways towards the Union's objective of 27% by 2030. IRENA and the European Commission, which provided resources for this analysis, are organising a series of monthly technical review meetings to engage with the national experts of each EU Member State. Sector-specific reports for the transport sector, district heating and cooling, and industry, and numerous studies on energy efficiency, bioenergy, external costs of energy, and impact of renewables on GHG emissions have also been released.

19. At present, the REmap time-horizon is being expanded to 2050, with the first report envisaged to be released in March 2017. IRENA is assessing the energy consequences of the climate agreement, notably in terms of investments and stranded assets. This work, enabled by a voluntary contribution from Germany, is being undertaken in cooperation with the IEA and OECD, and the findings will inform the G20 discussions under the German G20 Presidency.

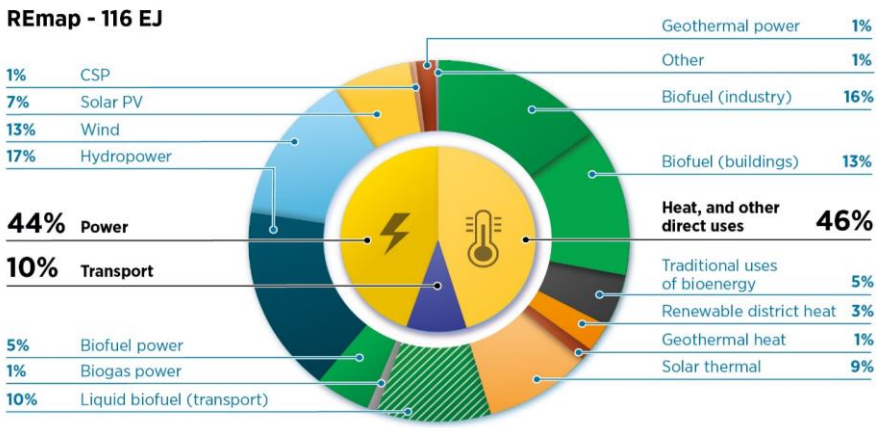
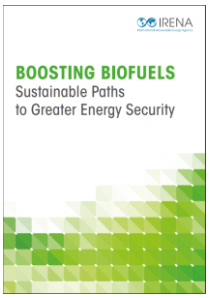


Figure 1: IRENA's REmap analysis shows that half of the most cost-effective options for doubling the share of renewable energy in the global energy mix by 2030 are different forms of bioenergy (in green).

20. Bioenergy activities have been expanded in 2016 in response to Members' request to place greater importance on biomass, and following REmap findings on the importance of bioenergy as a cost-effective solution to double the share of renewable energy in the global energy mix by 2030. IRENA, together with the IEA Bioenergy Agreement, UN Environment Programme (UNEP), Food and Agriculture Organization (FAO) and others, is compiling sustainable "success stories" in countries where bioenergy production has been increased without harming food production or resulting in increased land use. IRENA has also published a working paper on Bioethanol in Africa, highlighting the benefits of technology transfer between Brazil and Africa.

21. Further expanding bioenergy activities, IRENA has released *Boosting Biofuels: Sustainable Paths to Greater Energy Security*, with extensive supporting analysis. The report describes the potential to expand bioenergy supplies without reducing food supplies or harming the environment. Examples of sustainable potential include using residues from food and lumber production, in excess of those needed to enrich the soil or feed livestock, and planting energy crops on land which is not in productive use or could be freed from agricultural use by raising average food yields or reducing food waste, which amounts to a third of all food produced. The results have been

presented at a wide range of international events, including the European Biofuel Conference and Exhibition in Amsterdam, Bioenergy 2016 in Washington and seminars organised in Rome by the IEA Bioenergy Agreement, Budapest by the Global Bioenergy Partnership (GBEP) and Nairobi by the World Agroforestry Center (ICRAF). IRENA also organised a Roundtable on Sustainable Bioenergy Supply: Potential, Scenarios and Strategies in Berlin, to compare estimates of global bioenergy potential. A follow-up study is being prepared to highlight the bioenergy potential in five countries in Southeast Asia, namely Indonesia, Malaysia, Philippines, Thailand, and Vietnam.



REMAP DOMINICAN REPUBLIC

At the request of the Government of the Dominican Republic, represented by the National Energy Commission of the Dominican Republic (Comisión Nacional de Energía, CNE), IRENA developed a REmap country study *Renewable Energy Prospects: Dominican Republic*. The study highlights national potential to increase the share of modern renewable energy and provides a roadmap to achieve this goal for government, policy makers, and the power and private sectors.

Analysis shows that although key opportunities and challenges lie in the power sector, renewable energy uptake has great potential for industry, transport, residential and commercial sectors. Recommended action includes setting clear and consistent renewable energy targets, designing appropriate incentives and market mechanisms, and coordinating the planning of generation and transmission expansion to develop a power system with the flexibility needed to host targeted renewable energy shares.

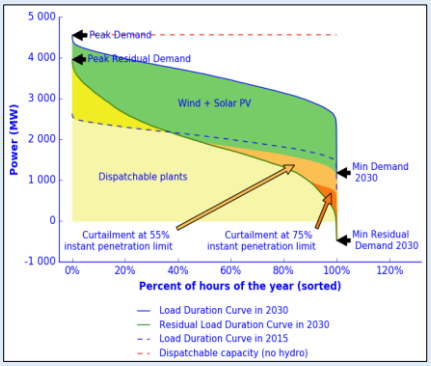


Figure 2: Simulated wind and solar PV generation, projected demand, residual demand (left) and load duration curve (right)

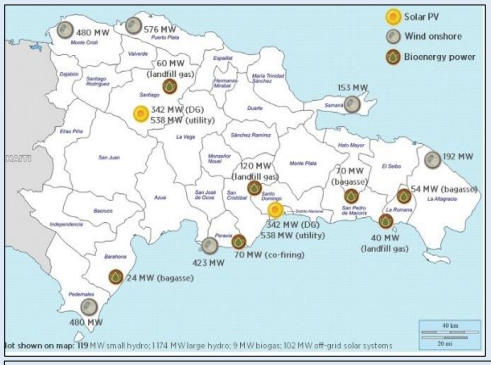


Figure 3: Location of renewable power generation capacity in 2030 under REmap

Special attention was paid to the power sector, considering abundant national renewable energy resources, isolated power system and associated power generation deployment challenges. The analysis applied an interdisciplinary approach, which included a technical assessment of the integration of variable renewable energy in the power sector. Technical challenges revealed included generation adequacy and utilisation of conventional generation fleet, management of high instantaneous variable renewable energy penetration levels, and flexibility requirements and adequacy of the transmission network.

REmap findings were presented during the 15th Anniversary of the National Energy Commission of the Dominican Republic (CNE) in July 2016 which included a panel discussion on the future of sustainable development for renewables.

IRENA INNOVATION WEEK, 2016

Six key outcomes emerged from Innovation week 2016:

1. The technology to push a global renewable energy transformation in the next two decades is already here, but more innovation is needed in policy formulation and business models.
2. Markets need to adapt as renewable energy takes a greater share, with new regulatory approaches and policies to ensure its long-term success.
3. The relationship between information technology and renewable energy is essential, but the full scope of complementarities is yet to be fully understood.
4. Electricity storage is integral to the renewable transformation, with diverse views on forms it will take.
5. Innovation can be found at all scales, from micro-grids to continental super-grids, from rich to poor.
6. Flexibility is key; context-relevant solutions essential.

A follow-up workshop was held in May in Abu Dhabi, UAE, where the outcomes of the Innovation Week were shared and discussed. Both events provided an opportunity for IRENA to engage and seek input on the ongoing work in this area.

Input from participants during these two events also helped refine the scope of the upcoming Innovation Landscape report. The report, focused on system innovation for power sector transformation will help guide policy makers on priority innovation areas to decarbonise the power system. Preliminary analysis indicates that the power sector transformation requires innovation in system integration.

Technology status & outlook

22. As renewable energy emerges as a central solution to multiple development and climate objectives, innovation remains a key driver for change. In May 2016, IRENA convened the first IRENA Innovation Week. With global participation from policy makers, engineers, private sector actors, utilities, regulators, and thought-leaders, the four-day event covered a wide range of topics. This included the latest development and trends in grids, energy system modelling and planning and business applications, and priority areas for support in decentralised, emerging and mature electricity systems. The event enabled the sharing of expectations on innovative solutions for transformation for utilities, and for systemic, technological and operational innovation. The outcome of the

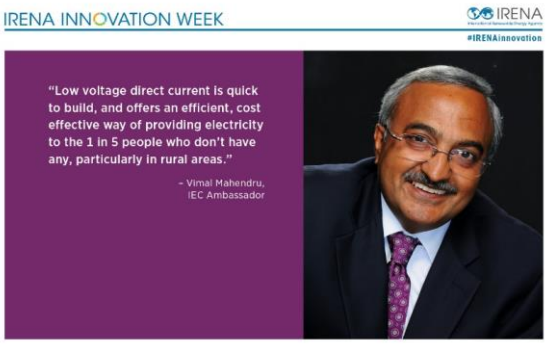
week includes a set of recommendations for each of the areas discussed. Participants' feedback was highly positive, with country representatives expressing how these insights would support their national agendas on the future of the power sector in their countries. Participants strongly supported the continued organisation of the Innovation Week, and recommended that IRENA should host such Innovation Weeks on a regular basis.

23. IRENA also continues to provide analysis on selected technologies. As part of the *Renewable Energy Innovation Outlook* series, in-depth studies have been released in 2016 on Renewable Mini-grids, Advanced Liquid Biofuels and Offshore Wind. These studies provide information relevant to policy makers, industry actors and practitioners on the outlook for the analysed technologies, in terms of technology progress, competitiveness, and market development.

24. Together with the German Metrology Institute (Physikalisch-Technische Bundesanstalt, PTB) IRENA held a dialogue event on the potential of quality infrastructure services for sustainable economic development, with particular focus on renewable energy/energy efficiency and climate change, in the framework of the German Development Cooperation Policy in Bonn in November 2016. Over 30 leading experts in the field of technology quality infrastructure for Latin America participated. The event helped to better specify needs and next steps in the region.

25. Together with the Government of Korea, the State of North-Rhine Westphalia and the UNFCCC secretariat IRENA organised the Global Renewable Energy Forum 2016 in Bonn in December with a focus on the role of renewable energy in meeting climate objectives. Around 150 participants discussed policy, financing and investment, innovation and technology aspects. The event highlighted the rapid progress and the key role renewable energy will play in the global energy transition and in the implementation of the Paris Agreement.

26. To support dissemination and practical application of its analytical work, IRENA continues to engage with the UNFCCC Technology Executive Committee on technology transfer mechanisms for renewable energy, and a range of private and public stakeholders.



INNOVATION OUTLOOK

The "Renewable Energy Innovation Outlook" series identifies technology-, industry- and policy-related challenges to be overcome and assesses the potential breakthroughs and research needed to scale up the deployment of renewable-based solutions.

Renewable mini-grids

Ground-breaking improvements are underway for renewable mini-grids in components and in system integration, controllability and flexibility. Artificial intelligence to balance supply and demand, enhanced electricity storage systems and low voltage direct current mini-grids are reaching commercialization. This report examines these and other innovations that can help to unlock future power supply for unserved areas and communities through the rapid roll-out of renewable mini-grids in the next two decades. The report was launched at IOREC 2016, and has become a reference to countries looking for renewable technology options to address the energy access challenge.

Advanced Liquid Biofuels

This report provides a global technology outlook for advanced biofuels between 2015 and 2045, specifically for liquid transport fuels for road, shipping and aviation use. It includes details of the technical and non-technical barriers to commercial deployment and the role of innovation in overcoming these barriers. The report was presented at the 24th European bioenergy conference in Amsterdam. Two technical magazines have issued articles on this report, including the BioEconomy Magazine and the American Chemical Society Journal. The report is also used in the ongoing debate in the EU on the new regulation for advanced biofuels.

Offshore Wind

This report aims to inform policy makers and other stakeholders about anticipated developments in the next three decades to make offshore wind competitive on a large scale. Offshore wind capacity could reach 100 GW by 2030 as innovation continues and the industry matures, and it could increase faster with more ambitious policies. The report was launched at the World Wind Energy Conference 2016 in Tokyo. It is now mentioned in numerous specialised media, and used as a reference in the discussion on offshore wind deployment in China and Europe.

Global Geothermal Alliance

27. The Global Geothermal Alliance (GGA) is a platform to increase the geothermal share in the world's energy mix comprising 41 countries and 29 development and industry partners. With the strong engagement of Alliance members, facilitated by IRENA, an Action Plan was adopted this year after an inclusive consultative process. The Action Plan identified a number of priority areas for activities to be implemented in the upcoming period. The first Call for Activity Proposals resulted in 19 applications from governments and industry, which include requests for technical assistance, advisory and capacity building support, and facilitation of access to finance and risk mitigation instruments. The applications were circulated to the Alliance's members with a view to examining the best way of responding to the requests and needs brought forward.

28. In addition, IRENA is working to foster targeted geothermal resource development. Supported by GGA members and Japan, IRENA is preparing a capacity-development plan for the Pacific in collaboration with countries and key regional stakeholders, such as the Secretariat of the Pacific Community. The Agency has also received additional funding from the government of Switzerland to develop a capacity building programme, and discussions are underway to formulate implementation plans.

REpowering cities

29. Cities are home to more than half the world's population and represent two-thirds of global energy consumption today. They are uniquely positioned to directly benefit from renewable energy solutions. The UN Habitat III Conference in Quito, Ecuador, highlighted for the first time the contribution of these solutions to meeting a range of challenges faced by cities such as growing energy demand, heating and cooling in buildings and sustainable transportation.

30. Launched on the margins of Habitat III, IRENA's report *Renewable Energy in Cities* shows how cities can promote renewable energy technologies in various urban contexts (high versus low density, developing versus established, hot versus cold climate), and across different categories of urban energy demand in buildings (heating, cooling, and electricity) and transport. The report highlights areas for action, including the roles of cities

in designing and implementing renewable energy policies and integrated strategies, as well as the potential in the commercial, residential and transport sectors.

31. *Renewable Energy in Cities* provides concrete examples of how municipal leaders and administrators can accelerate the shift to renewable energy at the local level by acting as planners, regulators, financiers and operators of urban infrastructure. Analysis builds on an extensive set of city case studies as well as a bottom-up assessment of energy use in more than 3,600 cities to get an understanding on renewable energy options in real-life settings. The report provided a basis for discussion for the *High-Level Forum on Renewable Energy in Urban Settings*, organised in Quito in collaboration with the governments of Ecuador, Germany and the United Arab Emirates.

32. The Forum, gathering some 300 participants, affirmed that renewable energy, coupled with energy efficiency, can provide financially viable sustainable energy solutions for cities in extremely diverse settings around the globe. Participants highlighted that renewable energy aligns Agenda 2030 and objectives of the Paris Agreement, as it is crucial for mitigating climate change, reducing urban air and water pollution, lowering energy costs for businesses and consumers, stimulating economic growth and job creation, and improving overall health and wellbeing of citizens. The Forum emphasised that cities will be at the forefront of the development and deployment of renewable energy solutions in the transport sector and commercial and residential buildings. Key action areas were outlined in the outcome document, which is being disseminated widely and used to inform IRENA's work in cities.

II. Enabling investment and growth

33. Transforming the energy system is multifaceted, and decreasing costs and increased recognition of the benefits of renewable energy are powerful drivers of change. IRENA continues to provide timely, objective and reliable information on renewable energy costs and benefits. To promote further growth, IRENA is advising on enabling frameworks, assessing the effectiveness of financial structures and working to support project facilitation. Together, these activities aim to create enabling policy and market conditions for accelerated investment in, and deployment of, renewable energy.

Renewable energy costs

34. A shift to a sustainable energy future requires increased awareness of trends in renewable power generation costs and insight into the competiveness of renewable power generation. Such analysis allows for tailored policy recommendations of sector and market needs and the identification of priority areas for policy implementation. In support of new analyses, IRENA continued to strengthen its database on cost and performance data, adding 5000 new projects in 2016, supported by the Renewable Costing Alliance which today has 36 members. A database of auction and tender results has also been compiled to track trends in renewable deployment and costs. This database contains information, where available, on technology, PPA price, contract duration, indexing method, installed costs and capacity factor and allows a tracking of installed costs and levelised costs of electricity (LCOE)'s in support of analysis implied costs of capital.

35. To better understand the prospects of renewable energy deployment, IRENA has conducted in depth analysis of trends in this area. This included the most recent report on *The Power to Change: Solar and Wind Cost Reduction Potential to 2025*, which shows that cost reductions will continue. The report finds that, by 2025, the global weighted average levelised cost of electricity (LCOE) of solar photovoltaics (PV) could fall by as much as 59% and concentrating solar power (CSP) could fall by up to 43%. Onshore and offshore wind could see declines of 26% and 35%, respectively. The report underlines that costs reductions will depend increasingly on balance of system costs (e.g. inverters, racking and mounting systems, civil works, etc.), technology innovations, operations

and maintenance costs and quality project management. The focus in many countries must therefore shift to adopting policies that can reduce costs in these areas. The *Solar PV in Africa: Costs and Markets* report tracks current and near-term costs in Africa and highlights that cost trends are on track, with the right enabling policies, for Africa to be home to more than 70 GW of solar PV capacity by 2030. *IRENA's Quarterly PV Parity Indicators* highlighted the competiveness of residential solar PV in Germany and California, and will be extended to new markets in 2017.

36. Forthcoming costing analyses include onshore wind learning curve, and reports for energy storage and prospects for battery storage cost reductions. An update to the power generation cost report is currently under review.

In Focus: Cost Analysis

Analysis of the costs and performance of renewables has become a sought-after IRENA product. This data is being used by the IEA, World Bank, REN21, UNFCCC, McKinsey, and PWC, among others. Cost data and insights continue to be profiled by the media, which in 2016 included CNN, The New York Times, The Washington Post, The Guardian and The Economist, to name a few. Cost insights are also informing industry players, with briefings on IRENA's analysis and reports sought by senior management at Engie (2nd largest power company in the world) and Trafigura (USD 97 billion in sales). Upon request, advice is provided to Members ranging from the cost reduction potentials to inform research priorities (NEDO Japan), through understanding current cost trends and competitiveness (Albania, Pakistan and Tunisia), to requests for data collaboration (Chile).

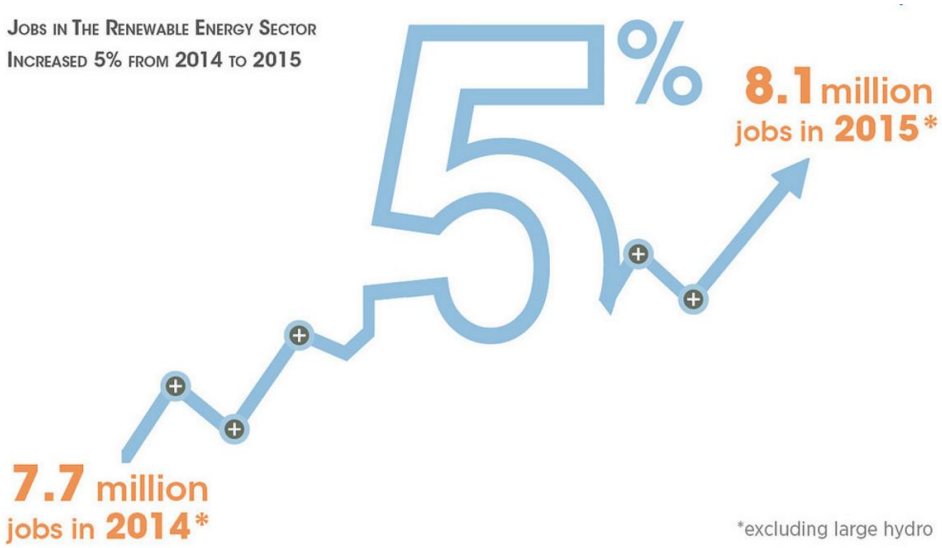
IRENA Cost Analysis Used in Many High Level Reports

Renewable energy benefits

37. Building on its earlier work, the Agency continues to support renewable energy deployment through the analysis of socio-economic benefits. *Renewable Energy Benefits: Measuring the Economics* provides the first quantification of the macroeconomic impact of renewable energy deployment. Analysis shows that doubling the share of renewables in the energy mix by 2030 would increase global GDP by up to 1.1 per cent, improve welfare by up to 3.7 per cent and support over 24 million jobs in the sector. Analysis has had significant reach, with the findings featured in hundreds of news articles and leading media outlets including The Economist, The Guardian, Reuters, Bloomberg, Forbes, the Huffington Post and El Pais. The report has also been cited by academic institutions such as Harvard Kennedy School, IIASA and Potsdam Institute for Climate Impact Research (PIK), and has triggered related work worldwide. For example, a prominent US-based think tank is considering the report's approach as a basis to assess the macroeconomic impact of renewable energy in India. This work stream is expanding as part of IRENA's input to the Germany-led decarbonisation project in preparation for the G20 meeting in 2017.

38. IRENA continues to provide insights on the latest status and trends of employment in the renewable energy sector through its *Renewable Energy and Jobs – Annual Review* series. The 2016 edition placed the global figure at 8.1 million. This represents a 5% increase from 2015, which is in stark contrast with depressed labour market trends in the broader energy sector. In 2016, the review had two thematic focusses: jobs in off-grid applications and the gender dimension of employment in renewables. The opportunities for job creation in off-grid solar, small hydropower and biogas were explored based on national and project-level employment data. The gender dimension of renewable energy employment was illustrated in findings from an IRENA-conducted survey, which showed that the sector offers greater opportunities for women compared to the broader energy sector. The *Annual Review* series has gained extensive traction in the renewable energy community and in print and electronic media. Since its launch last May, the 2016 edition has been cited in close to 1000 online news articles, including coverage by media outlets such as Bloomberg, the Financial Times, France 24, The Guardian, and the Huffington Post. The findings of the *Annual Review* were also well received on social media with tweets from institutions and industry experts.

39. While the Jobs Annual Review provides an overview of the status and trends in renewable energy employment, IRENA's study *Renewable Energy Benefits: Leveraging Local Industries* explores how benefits such as income generation and job creation can be maximised through leveraging existing industries to develop a local sector for renewables. It analyses the conditions to create a domestic sector that can enable new opportunities in solar and wind as well as the pre-requisites to undertake activities locally, in terms of manufacturing capacities, skills, availability of raw material, access to finance and the enabling conditions. Several IRENA Member countries expressed great interest in this line of work and offered to integrate their own country experiences in the forthcoming reports. These include: incentives for local content in Argentina's Renewables Program (RenovAR); higher FiTs when using locally manufactured solar panels in Malaysia; and requirements for local sourcing of operation and maintenance services in Uruguay's auctions.



Policy options to accelerate deployment

40. As the costs of renewable energy technologies continue to fall, there is a growing need for policies to adapt to rapidly-changing dynamics. In this context, an in-depth review of the most recent auction results is underway, which provides an analysis of the factors contributing to the record-breaking prices seen in auctions globally. This forms part of IRENA's study on the design of deployment policies to facilitate the integration of large-scale renewable generation in support of the ongoing transformation of the power sector. IRENA's guide on the design of auctions is being used by policy makers, and development banks. Policy makers in Israel, Kazakhstan, Philippines and Zambia, for example, have used the guidebook to inform discussions on the design of their auctions and International Development Banks have used it in their procurement programs (e.g. the International Finance Corporation-IFC for the Scaling Solar programme), in their recommendations to their member countries (e.g. the Asian Development Bank), and to train professionals on best practices in the design of auctions (World Bank, European Wind Energy Association).

41. To provide access to the most up-to-date information on policy developments, IRENA continues to collaborate with the IEA to expand and enrich the IEA/IRENA Policies and Measures Database. In 2016, IRENA used the information gained through Member outreach and research to add 17 new countries and more than 240 new policy entries to the database.

42. Published in January 2016, *Renewable Energy Market Analysis: The GCC Region* provides in-depth insights on best practices in policy making, project development and financing that are driving the transition towards more sustainable energy systems in the region. Record low prices for solar PV in Dubai have renewed enthusiasm for an accelerated uptake of renewable energy in the Gulf Co-operation Council (GCC). Report findings have been presented at several platforms, such as the World Future Energy Summit (WFES 2016), the Clean Energy Business Council, the Middle East Solar Industry Association, MENAREC 2016 and Chatham House. The findings have also enriched the public discourse on renewable energy in the GCC region, earning over 100 mentions in local and international media.

43. Latin American renewable energy policy developments bring valuable insights for energy markets around the world. Themes of specific relevance to the region, such as the complementarity between hydropower and other renewable energy technologies, are paving the way for a greater share of renewables in the energy mix. IRENA's report *Renewable Energy Market Analysis: Latin America* captures the wealth of knowledge and experience embedded in the region and identifies emerging renewable energy trends and themes at the intersection of public policy and market development. The report has benefited from input provided by Members and regional experts. The report was launched in Santiago de Chile in November 2016, at the Economic Commission for Latin America and the Caribbean's VII Regional Policy Dialogue on Energy Efficiency, which focuses on sustainable energy in the context of the United Nations' 2030 Agenda for Sustainable Development. The event was attended by a number of Ministers of Energy, Mining and Public Works, as well as senior level experts from regional energy institutions, academia, private sector and international organisations. IRENA was identified as a key partner to monitor renewable energy developments in the region, in particular to report on renewable energy statistics.

44. At present, IRENA is conducting preparatory work for a regional market analysis on Southeast Asia. The analysis will encompass broader economic and energy sector trends as well as renewable energy investment and policy developments in the region. IRENA has initiated discussions with several regional stakeholders, including country focal points, the ASEAN Centre for Energy, the Asian Development Bank, GIZ and UNESCAP to gather inputs on knowledge gaps to be addressed in the analysis. In this context, a dedicated event on "Enabling Policy and Financing Frameworks for Accelerating Renewable Power Deployment" was organised on June 15th in Bangkok, Thailand.

45. Large-scale deployment of variable renewable energy technologies, such as PV and wind, are a critical focus area for policy design and adaptation. They require adequate policy and regulatory measures for all stakeholders, including policy makers, grid operators at the transmission and distribution levels, regulators, utilities, consumers, etc. In this context, IRENA is finalising a study on adapting market design and renewable energy policies to the changing ownership structure in the electricity sector. The report analyses the main challenges, and identifies lessons learned and best practices to provide recommendations on how governments can adapt their policies and take into consideration the evolution of the ownership structure in the electricity sector.

Financing renewables

46. With the goal of increasing knowledge of, and access to, reliable and transparent investment information, IRENA has made available online, and continues to update, key information on renewable energy investment trends. Data on public investment flows highlights the international financial flows for renewable energy projects from selected financial institutions since 2009. This data set has also been proposed as one of the supplementary indicators for measuring progress on SDG 7. In addition, the latest datasets for *Global Trends in Renewable Energy Investment 2016*, provided by the Frankfurt School - UNEP Collaborating Centre and Bloomberg New Energy Finance are being incorporated online.

47. A key renewable energy finance report, *Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance*, has been published in 2016. Report recommendations were developed in consultation with experts and stakeholders through a series of meetings during the last two years and focus on policies, tools and instruments to reduce risks and barriers to investment.

48. Following the publishing of the report, IRENA and partners have shifted focus to implement the five action areas identified in the report: project initiation, development and facilitation; supporting local financial institutions; risk mitigation instruments; mobilizing capital market tools; and dedicated financing facilities. In this context, a discussion of recommendations was held during an event at the Global Green Growth Week hosted by the Global Green Growth Institute in Jeju, Republic of Korea in September 2016.

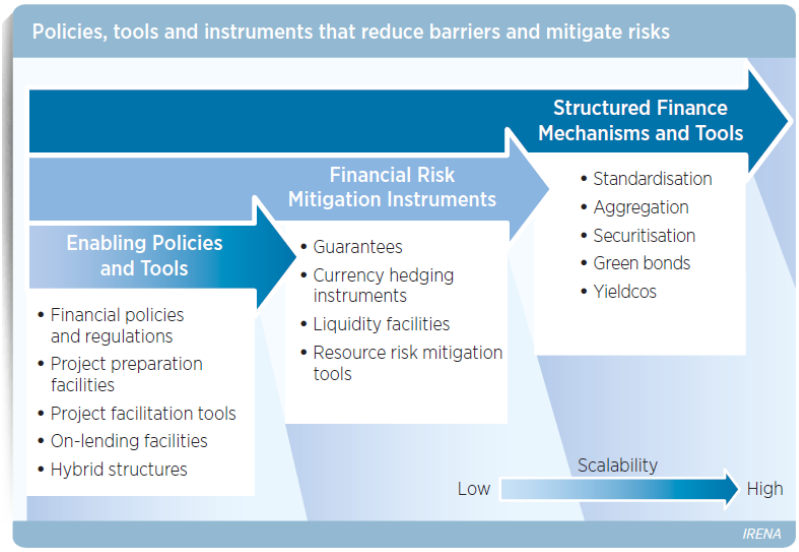


Figure 4: Policies, tools and instruments that reduce barriers and mitigate risks

49. A key activity identified for follow-up was the standardisation of contracts for solar PV projects to help streamline solar PV project preparation procedures. To advance this work, IRENA and the Terrawatt Initiative launched the 'Solar Energy Standardisation Initiative' on the margins of Intersolar in Munich, Germany, in June 2016. The Initiative focuses on eight work streams or types of contracts, namely Power Purchase Agreement; Development Service Agreements; Supply Agreements; Feed in Tariff (FiT) & Commissioning Agreements; Operation and Maintenance (O&M) Agreements; and Finance Facility Agreements / Guidelines; Implementation Agreements; Project Development Guidelines. The initiative has attracted participation of some 15 law firms to draft contract templates and some 20 public and private finance institutions to review the drafts. At a workshop held in London, United Kingdom on 3-4 November 2016, participants agreed on the basic assumptions to be applied across the eight working

streams. These assumptions determine the risk allocation set through the legal documents and provide the basis for the term sheets that are now available in draft form.

50. IRENA is working with climate finance institutions such as the Green Climate Fund (GCF), the Climate Investment Funds (CIFs) and the Global Environment Facility (GEF) to advance and facilitate funding for renewable energy programmes and projects. IRENA also visited the GCF in Songdo, Republic of Korea, in September 2016, to discussed options for collaboration such as the provision of advice on programmatic matters relating to renewable energy; becoming a readiness partner of the GCF, through the use of IRENA's programmatic activities such as Renewable Readiness Assessments (RRAs) and REmap country work; and supporting project development and implementation in collaboration with implementing entities. In October 2016, IRENA participated in the first GCF Structured Dialogue with Africa held in Cape Town, South Africa, where governments and international finance institutions discussed country-driven renewable energy project portfolios and ways to support National Designated Authorities (NDAs). IRENA's contribution provided a starting point for African countries to consider linking IRENA's readiness work with GCF readiness activities. A similar dialogue has been initiated at a GCF workshop for the Pacific. In this context, collaboration was also initiated with the Asian Development Bank (ADB) to prepare for a renewable energy facility funded by the GCF for the Pacific SIDS.

IRENA at COP22

IRENA actively participated in the 22nd session of the Conference of the Parties (COP22) to the United Nations Framework Convention on Climate Change (UNFCCC), to raise awareness on the potential of renewable energy as a means to decarbonise the global economy and reach the climate objectives laid-out in the Paris Agreement.

The COP22 Renewable Energy Track, an initiative hosted by IRENA to promote various renewable energy activities at COP22, attracted over 30 renewable energy events gathering a large number of leaders, decision makers and other key stakeholders to discuss renewable energy solutions. The COP22 Energy Day, which IRENA co-organized with Morocco and SE4ALL, showcased the broad scope of initiatives underway to implement the Paris Agreement as part of the Global Climate Action Agenda.

In addition to the engagement of IRENA experts in various events, IRENA organised seven dialogues on the topics of the African Renewable Energy Initiative (AREI); corporate sourcing of renewables; decarbonisation of the global economy; and acceleration of renewable energy deployment in Small Island Developing States.

Main highlights

- *Renewable energy, underpinned by energy efficiency, was again recognized as the most effective, immediate means to significantly decarbonise the economy to reach climate objectives;*
- *A number of companies committed to power their operations from renewable energy continues to grow and are taking an active role in advancing renewable energy objectives (e.g. RE100 and the Renewable Energy Byers Alliance);*
- *A range of energy-related initiatives most notably in Africa and SIDS saw renewed commitments to implementation of renewable energy;*
- *48 countries of the Climate Vulnerable Forum announced the target of 100% renewable power between 2030 and 2050;*

51. As part of the Paris Agreement, a total of 187 Parties submitted initial Nationally Determined Contributions (NDCs), or Intended Nationally Determined Contributions (INDCs). Most of these set specific targets and refer to renewables as a means of decarbonising the economy and building climate resilience. The implementation of the NDC-based renewable energy targets offers an opportunity to attract public climate finance to the energy sector. At present, IRENA is quantifying the cumulative contribution (unconditional and conditional) of the (I)NDCs for Africa (53 countries), Latin America (20), and SIDS (30). Taking into account other existing national renewable energy targets and plans of these countries, IRENA will quantify the level of investment needed for implementation of NDC-based renewable energy targets, as well as assess the amount of climate finance needed to incentivize required investments.

Project facilitation

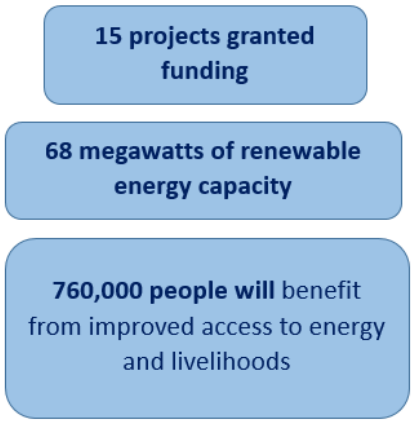
52. The Sustainable Energy Marketplace, an online service launched in December 2015, has expanded rapidly, attracting project sponsors and developers, financial institutions and service and technology providers. The Marketplace currently encompasses more than 150 projects seeking funding of approximately USD 7 billion covering countries in Africa, Latin America and the Caribbean. IRENA established strategic partnerships with the Inter-American Development Bank (IDB), Power Africa and the Private Finance Advisory Network (PFAN) to further support the development and funding of projects. For example, IDB and IRENA issued a call for proposals, which resulted in the allocation of project development grants totalling USD 300,000 for project developers in Latin America and the Caribbean.

53. Further partnerships are being implemented with a view to establish the Marketplace as a "pipeline aggregator" bringing together and making visible project portfolios, and matching projects with required support. As of today, four different projects in several countries in Africa have been linked with project preparation facilities and development banks. The Sustainable Energy Marketplace is now moving to a second phase of development to improve the usability of the platform by making adjustments to current, and adding new features. At the same time, the platform will be expanded to cover Asia and will gradually expand to all developing country regions to become a global marketplace.

54. To assist with the development of bankable projects, IRENA continues to implement the Project Navigator, an online platform service which provides comprehensive, easily accessible and practical information, tools and guidance. Seven new renewable energy technologies (on-shore wind, utility-scale solar PV, solar home systems, bioenergy, small hydropower, geothermal power and mini-grid applications) are now covered by the Project Navigator. As an example, the new solar PV module provides eight interactive tools to evaluate the viability of utility-scale solar PV power plant projects. The bioenergy module offers a detailed performance and financial model designed to facilitate decision making in the woody biomass sector. Additionally, customised tools have been designed and added to the platform with the objective of supporting project developers applying for funding through the IRENA/ADFD Project Facility. The modules on solar home systems and mini-grid applications are part of the Navigator's island module which features guidelines and tools designed to enable the deployment of renewable energy projects in SIDS.

55. The Navigator user base rose by 60% in 2016 with more than 2,300 registered users from 190 countries, and training on its use is provided upon request. For instance, at the request and in close cooperation with the Government of Djibouti, a five-day training programme to identify common challenges faced by local developers and to disseminate guidelines to improve the bankability of projects was organised in July 2016. The training was attended by 40 representatives from the Ministry of Energy and Mineral Resources, national public agencies and private sector entities. The training programme saw the development of an initiative to establish a national renewable energy project incubator, based on the IRENA Project Navigator, to mobilise and engage additional local capacities. Participants of the training also stressed the importance of translating Project Navigator content into other languages to ensure a more comprehensive dissemination across the African continent.

56. Other relevant outreach activities include: an online training for African Development Bank (AfDB) officials on project development and bankability related aspects of different technologies; coaching 20 project developers on bioenergy projects identified by the African Union Commission in an UNECA-AUC-NPCA project pipeline across Sub-Saharan Africa; and a webinar on the Project Navigator's utility-scale solar PV module which gathered over 300 attendees. Additional train-the-trainer workshops to build local capacity and amplify impact are being discussed with various Members, including with Ethiopia, Ghana, Micronesia, Namibia, and Zimbabwe, and preparations are underway for a workshop on solar home systems in Egypt in early 2017. Renewed efforts are being placed on further strengthening on-site national and regional capacity building programs as well as regular webinars to reach out to and engage project developers and other stakeholders.



57. The IRENA/ADFD Project Facility continues its financing of renewable projects in developing countries, with successful completion of three project cycles. The Facility has enabled the allocation of USD 333 million in funding to 15 projects in 14 countries; of this total amount of funding, USD 144 million represents ADFD concessional loans, with the remaining USD189 million through co-financing. The fourth cycle is due to be completed by the end of 2016, with 79 projects submitted for consideration. The results will be announced in January 2017 at the seventh session of the Assembly.

58. A cooperation and support agreement was signed between the ADFD and IRENA in April 2016 that included funding for the Facility. The additional funding was directed to related agency operations, including the running and improvement of the selection process, engagement of co-funding bodies, showcasing of projects and to support IRENA's work with the Facility. Efforts are also being made to establish linkages between the Facility and IRENA activities such as the Project Navigator, the Global Atlas and the Sustainable Energy Marketplace.

59. Extending support to project post-selection is becoming an increasing priority for the IRENA/ADFD Facility. In August 2016, the ADFD and IRENA successfully carried out a first joint onsite appraisal missions for two projects located in Senegal and Burkina Faso, which had been selected in the third cycle. Onsite appraisal missions provided a valuable opportunity for IRENA to see first-hand the impact of projects supported by the Facility and to build up "on-the-ground" contacts to allow effective showcasing of projects and their impact.

III. Renewable energy access for sustainable livelihoods

60. Universal access to modern energy services is key to alleviating poverty and stimulating economic growth. There is an opportunity to design an efficient new energy system based on the modular and decentralised nature of renewable energy, which can have a multiplier impact in terms of reduced health effects, improved livelihoods, poverty alleviation, job creation, gender equality and enhanced access to water and food.

Decentralised solutions for access

61. IRENA continues to analyse policies and regulatory frameworks to promote mini-grid development in cooperation with the private sector. Stakeholder feedback on this work has highlighted several needs, including dedicated policy and regulatory frameworks for the mini-grid sector, clarity on the role of mini-grids in electrification strategies, regulations that allow the adaptation of mini-grid business models to local conditions,

and measures to de-risk the transitory phases. Partial risk guarantee schemes and tailored debt funds were highlighted as possible instruments for mini-grid project financing. The importance of moving towards regional harmonisation of equipment and technology standards was noted, along with the need to focus on building local capacities.

62. IRENA organised the 3rd International Off-grid Renewable Energy Conference & Exhibition (IOREC) in Nairobi, Kenya, from 30 September to 1 October 2016. The event, which witnessed record participation, was organised in partnership with the Kenyan Ministry of Energy and Petroleum and the Alliance for Rural Electrification (ARE), and attracted stakeholders from government, rural electrification agencies, the private sector, financing institutions, development agencies and academia. IOREC 2016 hosted representatives from 20 rural electrification agencies in Africa as well as over 130 private sector stakeholders, including local entrepreneurs.

SELECTED MESSAGES FROM IOREC 2016

- A paradigm change is needed in the way off-grid solutions are deployed – away from kWs and kWhs towards livelihoods and services (e.g., lighting, cooling, milling). In this manner, sustainability and benefits of solutions can be maximised towards meeting multiple SDGs.
- The business case for deploying off-grid renewable energy solutions to expand rural electricity access has strengthened thanks to rapid cost declines and technology innovation.
- Private sector interest and participation in the sector is growing as innovative business models are being tried, tested and demonstrated.
- Dedicated and stable policy and regulatory frameworks are needed for the development of both stand-alone and mini-grid solutions. These should be formulated in close consultation with sector stakeholders.
- Access to finance needs to be facilitated to ensure sector growth. Mismatch between available financing and off-grid renewable energy project needs raises the importance of dedicated funds and de-risking tools. Public financing will need to be complemented by private financing through innovative models, including public-private partnerships.
- Technical assistance and capacity building are central to ensure human capacity and sustainability of off-grid renewable energy deployment. Dedicated measures are needed to identify skills needs and how to meet those.

Figure 5: About 600 off-grid renewable energy practitioners and leaders from the public and private sector gathered in Nairobi, Kenya for the third International Off-Grid Renewable Energy Conference (IOREC).

63. The business case for deployment of off-grid renewable energy solutions, strengthened by cost reductions, technological innovation and innovative business models was at the centre stage of the two-day conference. Participants examined how the deployment of these solutions, including stand-alone and mini-grid systems, could be further accelerated. The discussions covered a wide range of issues such as policy and regulations, business and financing models, technology innovation, and socio-economic impacts and provided a platform for sharing best practices and experiences among stakeholders from different regions. Key findings from IOREC discussions will be analysed and synthesised into an outcome paper, and integrated into IRENA's future work.

64. On the side-lines of IOREC 2016, several key events took place, including a business-to-business Off-grid Matchmaking organised by Africa-EU RECP and ARE, the joint IRENA-IEC and IRENA-GIZ side-events, IRENA events on Standards and Quality Assurance, the Project Navigator and Sustainable Market Place, as well as site-visits for conference participants. Several institutions used the IOREC Platform to launch their initiative and knowledge products, including AfDB Green mini-grid helpdesk and WBESD's study on private sector mini-grids.

65. IRENA launched three major reports at IOREC 2016: *Policy and Regulations for Private Sector Renewable Energy Mini-Grids Development*; *Renewable Energy Benefits: Decentralized Solutions in the Agri-food Chain*; and *Mini-grids: Innovative Technologies Outlook*. Renewable energy-based mini-grids will play an important role in achieving universal electricity access by 2030. A key message from IOREC to date has been that dedicated policy and regulatory frameworks are needed to catalyse private sector involvement in the mini-grid sector and accelerate deployment. In this context, the IRENA report *Policy and Regulations for Private Sector Renewable Energy Mini-Grids Development* analyses general and technology-specific policy and regulatory measures needed to support mini-grid deployment. Report findings address issues of licencing provisions, tariff regulation, offsetting main-grid arrival risk and access to finance. Developed in close consultation with key stakeholders from the sector, the report provides insights on effective policy and regulatory measures to deploy various types of mini-grids and establishes an information bridge between private sector practitioners, policy makers, regulators and financing institutions. Since its launch at IOREC 2016, the findings from the report were presented during a half-day discussion alongside the IRENA 12th Council Meeting in November 2016.

66. In rural areas, agriculture and related agri-food activities are at the heart of the economy and a large portion of households generate their income from employment in harvesting, agro-processing, transporting and marketing produce. However, rural communities usually struggle with the lack of access and affordability of energy resources, and are therefore often limited to producing low quality goods with little diversity. Granting those areas access to affordable, secure and sustainable energy can support the development of communities through job creation, poverty reduction, improved health, enhanced access to water and food, better livelihoods, and gender equality. In this context, IRENA has analysed the socio-economic impacts of adopting decentralised renewables along the stages of the agri-food chain to support the realisation of the full potential of renewable energy in improving livelihoods in rural areas. The report *Renewable Energy Benefits: Decentralised Solutions in Agri-food Chain* is IRENA's first interactive digital publication.

67. Across the world, renewable energy companies work by engaging with national and local governments, civil society groups and local residents in response to specific local social and environmental conditions, which differ widely between countries. While the analysis of environmental impacts of renewable energy technologies and projects is gaining momentum, their social impacts on communities or specific human groups, in particular in developing countries, remain largely unregulated and little understood. In its global report on policies to maximise socio-economic benefits of off-grid applications IRENA is analysing current practices and policies that aim to maximise social impacts of renewable energy deployment. The report puts a specific focus on gender impacts and local community engagement, as the inclusion of gender dimensions in renewable energy strategies can multiply renewable energy co-benefits, both for social and productive uses in access settings, where women are primary actors.

Applied decentralised solutions

68. To strengthen the capacity of small and medium-sized enterprises to provide decentralised solutions, and in promotion of the use of innovative decentralised solutions, the ECOWAS Renewable Energy Entrepreneurship Support Facility's Technical Committee has finalised the second call for proposals and selected successful entrepreneurs. In cooperation with ECREEE, the Centre for Renewable Energy and Industrial Maintenance (CERMI) and the International Institute for Water and Environmental Engineering (2iE), the first workshop for the 23 selected entrepreneurs from 12 countries was held in September 2016 in Ouagadougou, Burkina Faso, on business plan and project proposal development. A second workshop focusing on solar PV mini-grids was held in November 2016 in Praia, Cabo Verde and was attended by the same 23 entrepreneurs and 6 bankers from the region. Some of the entrepreneurs had the possibility to present their project proposals and business plans and receive individual feedback on improvements needed to secure financing for project implementation.

IV. Regional action agenda

69. Regional cooperation is a key element to bring about efficiencies and economies of scale in deployment, in order to facilitate a diverse mix of renewable energy sources, overcome technology barriers, increase security of supply and meet growing demand. Common regional action agendas also empower countries in their pursuit of development and climate objectives. IRENA supports these goals at the regional level by linking national plans and potential through Clean Energy Corridor initiatives, and at the country level through targeted advisory support and services.

Africa clean energy corridor

70. IRENA continues its work to increase the integration of renewables in Eastern and Southern Africa power pool countries. Zoning work is being deepened at national levels, and used in IRENA planning models to allow a more accurate assessment of renewable energy deployment potential within each country. Working with key stakeholders, IRENA is translating results of this work into projects to be considered in the revision of the Programme for Infrastructure Development in Africa (PIDA), which currently includes only large hydro-based renewable energy projects. Based on zoning outcomes, IRENA is assessing specific site suitability to guide renewable investments in selected ACEC countries. Accordingly, the process for an assessment of the financial viability of selected zones in three ACEC pilot countries has been initiated for finalisation early 2017.

71. The West Africa Clean Energy Corridor (WACEC) focuses on supporting an accelerated development of utility-scale, renewables-based electricity and promoting cross-border trade in the region in line with regional renewable energy targets through regional and national action plans, as well as the national SE4ALL Action Agendas. An action plan for the implementation of the WACEC has been developed and validated at the technical level through a stakeholder consultation process with the governments and key regional partners in April 2016 in Dakar. Scoping work for the solar component of the WACEC was initiated in August 2016 in coordination with ECREEE, WAPP, ERERA, and the European Union Energy Initiative's Technical Assistance Facility. The WACEC action agenda was endorsed at the ECOWAS Energy Ministers' meeting in December 2016 in Guinea.

72. IRENA has continued to provide advisory services to a number of African countries, focusing on regulatory decision makers considering their key role in advancing the regional deployment of renewables, with pilot schemes in Namibia, and Zimbabwe. The first stakeholder consultation workshop in Namibia in April 2016 identified key issues to enhance the role of renewables in long-term power system planning. In-depth interviews are currently being conducted with global best practice leaders and local stakeholders to feed into a best practice guidebook on long-term electricity sector planning.

73. IRENA and the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), in collaboration with the International Atomic Energy Agency (IAEA) and the United Nations Framework Convention on Climate Change (UNFCCC), have initiated a six-month capacity development programme, to build and enhance long-term energy planning capacity in 10 members of the Economic Community of West African States (ECOWAS): Benin, Burkina Faso, Cabo Verde, Gambia, Guinea, Liberia, Niger, Senegal, Sierra Leone, and Togo. The programme uses IRENA's system planning tool for West Africa, SPLAT-W, which helps users assess economic, technical and environmental perspectives in the future energy mix. The results of the capacity development programme are currently being incorporated in updates of IRENA's 2012 publication "*West African Power Pool: Planning and prospects for renewable energy*".

74. To promote the Africa portal of the Sustainable Energy Marketplace, a webinar targeting financing institutions and project developers from the West and Central African regions was organised in July 2016 jointly with the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) and the Secretariat of the Economic Community of Central African States (ECCAS). Participants were informed of the features of the marketplace, and feedback was gathered to continue to respond to the needs of users.

75. IRENA is also collaborating closely with the Africa Renewable Energy Initiative (AREI) to support the advancement of AREI objectives through the implementation of programmatic activities, and to leverage respective strengths to accelerate the deployment of renewables in Africa.

Central America clean energy corridor

76. Following the endorsement by Energy Ministers of the Clean Energy Corridor of Central America (CECCA) initiative strategy in December 2015, IRENA is translating the strategy into actionable activities. In close consultation with regional and national stakeholders and development partners, scoping of "technical enabling" and "regulatory enabling" components are being finalised. A regional workshop was organised in October 2016 in Panama to kick-start the work under both components for implementation at regional and national level and Panama has been identified as a pilot country. The consultative workshop – co-organised with EOR and the Economic Commission for Latin America and the Caribbean (ECLAC), with support from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the Inter-American Development Bank (IDB) and other regional institutions – will further define the scope and implementation of the policy/regulatory and technical components of the initiative. Based on the input received at the regional workshop, a set of activities has been formulated to be implemented under the CECCA umbrella to accelerate the integration of renewables into the regional grid SIEPAC.

Emerging regional corridors

77. As part of IRENA's deepening engagement in Southeast Asia in support of the greater integration of non-hydro renewables in the evolving ASEAN Power Grid (APG), and the achievement of ASEAN renewable energy targets for 2025, IRENA has initiated a consultative process to adapt the corridor concept to the regional context (Greening APG). This process will help devise an action agenda for the effective implementation of the initiative. IRENA collected preliminary feedback, mainly from the ASEAN power utilities, during the first consultative workshop organised in collaboration with the ASEAN Centre for Energy as part of the HAPUA (Heads of ASEAN Power Utilities and Authorities) meeting in Kuala Lumpur, Malaysia in 2015. A second consultation workshop took place in June 2016 in Thailand, which helped gain a better understanding of the specific needs and priorities of the region. The combined results from these workshops helped to define the scope of IRENA's regional approach in Southeast Asia. They also informed the development of an implementation plan for the Greening APG initiative, formed in consultation with senior officials from the region and the regional organisations such as the Asian Development Bank (ADB), the Economic and Social Commission for Asia and the Pacific (ESCAP) and ACE. The draft implementation plan will be submitted for further discussion and

approval at a technical level prior to its submission to the next ASEAN high-level meeting on energy for endorsement.

78. Amid rising demand for cleaner energy sources in Northern Asia, the Agency is collaborating with regional countries and development partners in the formulation of the Asian Super Grid (ASG) initiative, facilitated by the Asian Development Bank (ADB). Among other things, this work will assist Mongolia in implementing one of the important renewable readiness assessment (RRA) recommendations to leverage its vast solar and wind resources in the Gobi Desert.

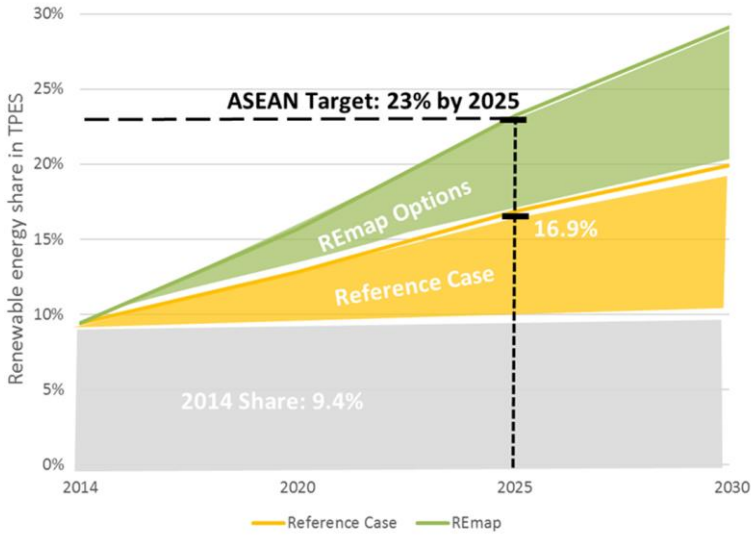


Figure 6: REmap ASEAN

<u>Enabling regional action</u>

79. As part of the implementation of the Pan-Arab Renewable Energy Strategy 2030, IRENA is finalising the preparatory phase of the Pan-Arab Clean Energy (PACE) initiative to promote the integration of a greater share of renewable electricity in regional power systems. A comprehensive gap analysis report on the Maghreb region is being finalised. Based on its findings, the Agency will conduct regional stakeholder consultations in the first half of 2017 to identify key pillars for the implementation of the initiative in the Maghreb region. A stakeholder consultation will be organised on the margins of the World Future Energy Summit 2017 in partnership with the League of Arab States, the Regional Centre for Renewable Energy and Energy Efficiency and the World Bank. This consultation will aim to identify priority areas for accelerating integration of renewables into national power systems, potentially forming the basis for future regionally-coordinated programmes and projects in the Arab region.

80. A project to assess the technical potential for cost-competitive renewable energy generation in South East Europe (SEE) by 2020 and beyond has been finalised with the launch of the report on *Cost-competitive renewable power generation: Potential across South East Europe*. The report highlighted the region's vast renewable energy potential amounting to some 740 GW, out of which almost 130 GW can be implemented today in a cost-competitive manner. The results of the report are expected to provide input for countries in the implementation of the National Renewable Energy Action Plans and in designing new renewable energy targets.

Figure 7: South East Europe Regional Consultation Meeting

81. As part of the preparation of the Action Plan for IRENA's engagement with South East Europe, IRENA and the Ministry of Energy of Romania organised a regional consultation meeting in Bucharest on 6-7 October 2016. The meeting gathered representatives of governments, TSOs, energy regulatory authorities and key

regional stakeholders to discuss the opportunities and challenges to accelerate the uptake of renewables, and to identify needs and priorities and IRENA's role in this regard. Feedback contributed to the formulation of the key elements of IRENA's strategic approach for engagement in Southeast Europe, which will be further discussed at the pre-Assembly High-Level Meeting on Southeast Europe in January 2017.

82. In Central Asia, IRENA organised a Regional Consultation Meeting, which took place in Baku, Azerbaijan, in October, 2016 on the margins of the 7th International Forum on Energy for Sustainable Development. The Forum explored how to deliver on national commitments such as the (Intended) Nationally Determined Contributions. Regional experts provided feedback on challenges and opportunities in the region, which will assist IRENA to identify priority action areas and develop partnerships. Furthermore, in the context of IRENA's support to the organisation of the EXPO-2017 in Astana and to strengthen the Agency's presence in the region, IRENA participated in the Second International Participants Meeting in February in Astana with a view to devising activities that the Agency could contribute to the EXPO.

Country support and advisory services

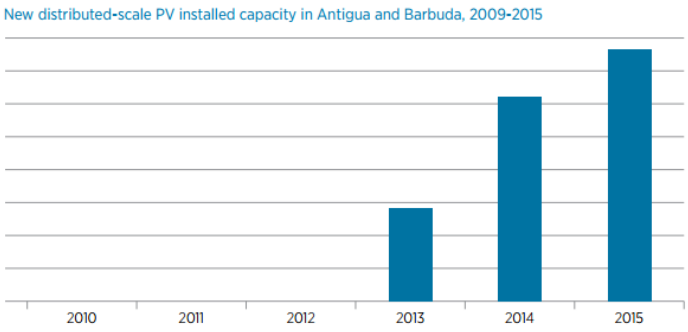
83. IRENA continues to support countries in assessing policies, resource potential and technologies for renewable energy deployment. Such support includes facilitating Renewables Readiness Assessment (RRA) consultations and providing targeted advisory services for the implementation of RRA recommendations. In March, the RRA Mongolia was launched jointly by IRENA and the Ministry of Energy on the margins of the Northeast Asian Energy Connectivity Workshop and in the presence of national and regional media. The Mongolian Ministry of Energy is considering to implement several recommendations made in the RRA report such as the grid infrastructure assessment, and training for grid operators at the National Dispatch Center.

Figure 8: Northeast Asian Energy Connectivity Workshop

84. The RRA Antigua and Barbuda was launched jointly with the Ministry of Tourism, Economic Development, Investment and Energy on the margins of the CARICOM Energy Week in November 2016, in the presence of national and regional media. In addition to the RRA process, IRENA has completed a grid-integration study, which underlines the potential for Antigua and Barbuda to adopt solar photovoltaic (PV) power at large scale. It shows that the existing grid system could integrate at least 37.5 megawatts (MW) of on-grid PV, equivalent to three quarters of current electricity consumption. RRA Panama was initiated in June 2016 through and reports are being finalised for Pakistan, Philippines, Tanzania, Tunisia and Zimbabwe.

85. To further refine the methodology and adapt to the fast-changing renewable energy sector, the Agency is undertaking a pilot implementation of the RRA and REmap in Egypt and Thailand through a single integrated process. The final products will consolidate RRA's recommendations aimed at short- to medium-term measures for enabling conditions with REmap's technology-focused analysis with a longer-term vision for renewables deployment. The consultation workshop took place end of November 2016 in Thailand and such a workshop is envisaged for Egypt in early 2017 as well.


Solar panels provide clean power at V.C. Bird International Airport



86. In cooperation with the German Government and regional partners, IRENA supported the organisation of the sixth edition of the Middle East Renewable Energy Conference (MENAREC 6) hosted by Kuwait in 4-6 April 2016 on "Renewable Innovations towards Sustainable Energy". With broad participation from international, regional and national renewable energy stakeholders, the Conference highlighted the Middle East and North Africa (MENA) region's high renewable energy potential which could help secure energy supply, meet strong energy demand growth, and contribute to decarbonisation of the energy sector. On the margins of the Conference, a MENA-focused expert workshop on power purchase agreements for renewable energy was held. Participants discussed how regulatory and policy measures influence project risks. Workshop findings are now available, highlighting the key considerations for policy makers in the design of bankable power purchase agreements.

87. In line with strategic priorities, IRENA has continued to engage with a broad range of partners to provide comprehensive and long-lasting support and advice to countries and regions. Following a joint study by IRENA and the European Investment Bank (EIB) to assess renewables manufacturing potential in Egypt, Morocco and Tunisia, IRENA has expanded assessments to include Jordan, Lebanon and the UAE in collaboration with the United Nations Economic and Social Commission for Western Asia (UNESCWA). The report will be finalised in the first quarter of 2017.

V. Islands: Lighthouses for renewable energy deployment

88. Islands are showing increasing ambition in the transformation of their energy systems, with some aiming for a complete transition to renewables in the immediate future. To support this transformation, IRENA is providing knowledge, tools, services and a platform for cooperation to facilitate the planning for, and implementation of, renewable energy solutions.

SIDS Lighthouses

89. IRENA continues to support and manage the SIDS Lighthouses Initiative, which now has 36 Small Island Developing States (SIDS)[2] as members, as well as 19 development partners and other entities[3]. Through the Lighthouses Initiative, IRENA is carrying out resource assessments, grid integration studies, energy transition

[2] Antigua & Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Cabo Verde, Cuba, Comoros, Cook Islands, Dominican Republic, Federated States of Micronesia, Fiji, Grenada, Guyana, Kiribati, Republic of Maldives, Republic of the Marshall Islands, Mauritius, Montserrat, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, St. Lucia, St. Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Solomon Islands, Tonga, Trinidad and Tobago, Turks and Caicos, Tuvalu, and Vanuatu.

[3] European Union, France, Germany, Italy, Japan, New Zealand, Norway, United Arab Emirates, United States of America, Indian Ocean Commission, IRENA, Association of the Overseas Countries and Territories of the European Union, UNDP, World Bank, ENEL, Clean Energy Solutions Center, Clinton Climate Initiative, Rocky Mountain Institute - Carbon War Room, and SE4ALL.

plans and capacity building activities within the Atlantic, Indian Ocean, Mediterranean and South China Sea (AIMS), Caribbean and Pacific regions. With support from the Association for Overseas Countries and Territories of the EU (OCTA), IRENA is also engaging with additional islands to provide valuable insights, support and transfer of knowledge and experience.

90. Targeted advisory services, such as through roadmaps and grid studies, have been key for islands to integrate larger share of renewables into energy mix. Studies on renewable energy desalination opportunities for Kiribati and Cabo Verde were completed, in addition to the Kiribati Integrated Energy Roadmap (KIER) and a roadmap for Barbados. The Barbados roadmap made use of the recent in-house capacity boost with the modelling software PLEXOS, which can provide dispatch analysis and capacity expansion planning. This expanded in-house capacity, acquired with the support of the Government of Germany, strengthens the IRENA toolbox and enables further detailed analysis upon request from members.

91. An important part of island work relates to the integration of variable renewables into the existing grid for which IRENA is providing timely and practical support and capacity-building services. For example, following IRENA's recommendations, Samoa is implementing the necessary infrastructure upgrades to allow for reliable grid operation with planned PV projects. A grid study for the Cook Islands has supported the development of Cook Islands Renewable Energy Charts for the island of Aitutaki. A grid integration study in Antigua has given policy makers and the public utility insights on the amount of variable renewable energy that can be implemented on the island without major infrastructure upgrades.

92. An important part of transferring knowledge to tackle information gaps and build capacity, IRENA has continued to provide training in collaboration with a range of SIDS Lighthouses partners. In this context, the Government of Japan and IRENA coordinated a training workshop for nine Pacific SIDS and the Maldives to further explore the enabling environments in support of the wide scale deployment of renewable energy.

93. In recognition of the importance of the integration of variable renewables, IRENA held three technical workshops in Saint Maarten, Tonga, and Cuba. The Saint Maarten workshop, held in July 2016 and organised in cooperation with CARILEC, facilitated peer-to-peer exchange between i) network planners and operators, which had successfully implemented approaches to operate and plan electricity systems with high shares of variable renewables worldwide and with ii) technical experts of utilities in small island states in the Caribbean. The workshop in Tonga, organised in cooperation with the International Climate Initiative (IKI), focused on facilitating the exchange of technical knowledge and learning activities for utility engineers in Pacific Islands by presenting specific outcomes of the IKI project and facilitating a technical exchange of knowledge on planning the operation of islands power systems and energy storage solutions. The Cuba workshop, held in August 2016, gathered participants from the national utility, the national university and the Ministry of Energy and Mines and facilitated knowledge exchanged between Cuban technical experts, international planners, and operators on key issues and challenges to be addressed to reliably operate Cuba's electricity grid, including the management of high shares of renewable energy. The workshop, organised in close co-operation with the government of Cuba and with the support of Germany, facilitated the exchange of knowledge between Cuban technical experts and international planners and operators, and identified key issues and challenges of Cuba's electricity grid.

IN FOCUS: SIDS LIGHTHOUSES QUICKSCAN

The Small Island Developing States (SIDS) Lighthouses initiative was launched at the 2014 United Nations Climate Summit in New York to create a cooperative framework that would bring together SIDS and development partners in the unified goal of accelerating the transition to renewable energy in all SIDS.

An integral part of the SIDS Lighthouses initiative, IRENA and SIDS developed the Quickscan, a simple but robust methodology to assess the readiness of SIDS to deploy renewables within the power sector. The Quickscan is a questionnaire on the comprehensive process required for a successful transition to renewable energy. The questionnaire focuses on seven critical elements of the transitions process Institutional Framework, Knowledge Base, Planning, Financing, Deployment, Capacity Building, and Cooperation. Each of the seven Quickscan elements is elaborated through questions designed to uncover the specific challenges to renewables deployment of the SIDS. The Quickscan is completed by SIDS governments with assistance from IRENA or other SIDS partners. In this way, it increases local awareness regarding the need for a comprehensive approach to renewables deployment and highlights areas where support would be most effective. For example, by undertaking the Quickscan process, Palau and the Federated States of Micronesia (FSM) identified the need for comprehensive roadmaps to support the deployment of renewables. Palau and FSM are now working with IRENA to develop these roadmaps. Results of the Quickscan are shared with SIDS and Lighthouses members to increase awareness of the challenges faced by SIDS and to support the coordination of development efforts to target areas critical to a successful transition to renewables.

A total of 39 Quickscans have been completed to date, helping to uncover areas where specific support is needed. Quickscan analysis has been supported by voluntary contributions from Germany, New Zealand and Norway, and carried out in cooperation with SIDS governments. The European Union's Association of the Overseas Countries and Territories (OCTA), a SIDS Lighthouses member since 2015, also provided funding for an additional 19 Quickscans the results of which will be added to the IRENA website.

Quickscans have also helped reveal valuable insights on the deployment of renewables in SIDS, including:

- Political leadership for a transition to renewable energy is present in almost all SIDS;
- Access to energy data remains a major challenge in planning for the energy transition of SIDS;
- The majority of SIDS have developed grid studies;
- Access to finance is a general challenge in SIDS - local equity and government funding are insufficient to achieve the renewable energy deployment envisioned;
- Capacity to operate a power grid with large shares of solar and wind needs to be built in most SIDS;
- The multitude of development partners and projects in each SIDS calls for governments to set up a coordinating unit inside the government.

Enabling projects in islands

94. Building upon previous work on islands, IRENA has refined its methodology for the assessment of grid stability for isolated power systems and is completing three technical guidelines on 1) variable renewable energy grid integration issues, 2) operational and investment planning, and 3) island specific issues in close cooperation with the University of Darmstadt, Energinet and Tractebel. Methodology results informed the development of the technical workshop referenced in the previous paragraph.

95. Another workshop on financing renewable energy in SIDS was held in Nadi, Fiji in December 2016, in collaboration with the U.S. Department of State and Department of Energy, Ministry of the Environment of Japan, the Pacific Community (SPC), with the support of the Asian Development Bank (ADB) and the World Bank. This workshop aimed at providing greater clarity on the process for accessing resources for renewable energy programmes and projects from international financial institutions. IRENA supported island countries in identifying new project opportunities and ideas and exploring practical steps to develop them into bankable proposals.

BARBADOS ENERGY ROADMAP

The government of Barbados and IRENA have developed an energy roadmap to assist Barbados transition its energy sector from current dependence on fossil fuels to a greater reliance on indigenous renewable energy resources, while reducing the cost of energy supply for the people of Barbados.

Roadmap analysis used PLEXOS software to develop a cost optimal capacity expansion plan for the electricity sector covering the period 2015 to 2030. The model considered the deployment of PV, wind, biomass, battery storage, demand response and replacement of existing thermal generation with units that can better integrate renewable energy. PLEXOS software was also used to analyse unit commitment and economic dispatch of the cost optimal 2030 electricity system to ensure technical feasibility and determine operational impacts on overall system cost. Analysis results showed that renewables, particularly PV, are already the cost optimal generation option in Barbados and that a cost optimal capacity expansion leads Barbados to a 2030 electricity system with an annual renewable energy share of 76% with lower costs and higher reliability than the current system.

The roadmap considered specific aspects of the energy sector development including:

- Energy efficiency: Roadmap analysis determined that the energy efficiency measures over the next 10 years would easily pay for themselves and contribute an overall cost reduction of the electricity system. These measures would reduce the need for investment in renewable generation while still maintaining a high share of renewables in annual generation.
- Electric vehicle (EV): the scenario examined the impact on the electricity system of deployment up to ca. 27,000 EVs in the passenger car market. The analysis showed daytime charging aligned with solar generation increased system stability, allowed for additional PV capacity and supported a 75 per cent renewable energy share for EV charging.
- Low oil price: the scenario determined that lower oil prices would encourage less deployment of renewables in the near to medium terms. In the long run this would lead to an electricity generation system with less renewable capacity, higher generation costs and more exposure to oil price volatility.

IN FOCUS: LIGHTHOUSES ACROSS REGIONS

Atlantic, Indian Ocean, Mediterranean and South China Sea (AIMS)

Within the AIMS region, with support from the Lighthouses Initiative, IRENA's Global Atlas team is developing new wind site assessment models. This assessment process is currently being tested on two sites in Cabo Verde and three in the Comoros Islands. The screening of prospective wind sites began in August 2016 and features wind power production and financial models developed to assess how suitable a site is for wind energy deployment by highlighting its energy potential and simulated financial performance.

Figure 9: Prospective wind site in Maio Island, Cabo Verde

The process also involves a preliminary screening of potential environmental issues. After validation, these models will be used to assess other potential sites in Comoros and will be utilised to support work in IRENA's Africa Clean Energy Corridor. Results from the assessment models will contribute to preparations for the coming rounds of auctions in the region. Development of these models is scheduled for completion in October 2016.

The image and charts shown here represent initial results for one of the sites in Maio Island, Cabo Verde.

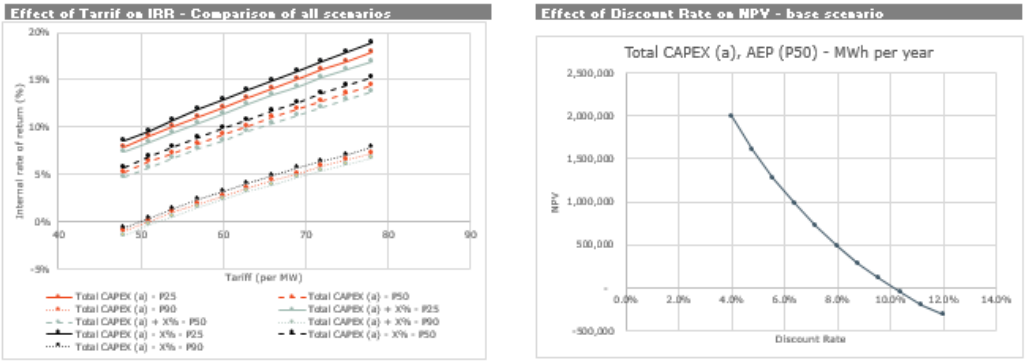


Figure 10: Sample results: sensitivity graphs relating potential tariffs to expected internal rate of return, accounting for uncertainties on the parameters used for the simulation (for example. P90).

In addition to these resource assessments, capacity building webinars on the financing of energy storage systems were held in March 2016, covering key concepts, barriers and possible solutions to barriers met when financing energy storage in renewable energy systems in remote areas and islands in the AIMS, Caribbean and Pacific regions. Through these activities, IRENA is working towards supporting increased renewable energy deployment in the AIMS regions.

Caribbean

In the Caribbean, grid integration studies, renewables readiness assessments (RRAs), energy transition plans and capacity building activities are being facilitated under the umbrella of the Lighthouses Initiative.

As an example, IRENA completed a grid integration study along the RRA for Antigua and Barbuda, which was launched in November in Antigua. Additionally, IRENA is finalising an energy roadmap with Barbados.

Figure 11: CARILEC capacity building workshop on achieving high shares of renewables on islands

In St. Maarten in July 2016, CARILEC (under the umbrella of the CARILEC Renewable Energy Community (CAREC)) held a capacity building workshop on achieving high shares of renewables on islands via grid operation and expansion. The two-day technical workshop built on ongoing technical support provided by the Lighthouses Initiative.

Training on Energy Service Companies (ESCOs) in coordination with CARICOM, the Caribbean Community Climate Change Center (5Cs) and SIDS DOCK, was also held in St. Lucia in July. The three-day training session focused primarily on building capacity within the public and private sectors, and on increasing utilization of ESCOs to increase RE deployment in the island context. Through these planning and capacity building activities, the initiative aims to facilitate the completion of more successful Caribbean renewable energy projects in the future.

Pacific

Across the Pacific, resource assessments, energy transition plans and capacity building activities have also been completed. In Samoa, for example, a grid integration study found that a combination of hydro, solar and wind power can supply over to 55% of the island's electricity demand if a few measures are incorporated into the existing power system and if water supply remains steady. The study found that a significant increase in renewable energy capacity is possible and can reduce the island nation's dependence on costly fossil fuels, while helping achieve the government target of 100% renewables by 2017. If an additional 8 MW of biogas projects are implemented, then 100% renewable energy electricity could be potentially achieved. The study also found that ridding the island of its dependence on imported diesel will require extensions to the current infrastructure. The report therefore recommends a series of measures, including battery energy storage and voltage control systems to close the gap. New Zealand is aiming to continue similar support in Samoa, building on IRENA's grid stability work. The Agency also completed grid studies for the Cook Islands and further grid integration support and studies are in progress in Fiji, Kiribati and Vanuatu. Energy transition plans for the Federated States of Micronesia, Kiribati and Palau are also underway.

A regional capacity building workshop on ESCOs, similar to that in the Caribbean, was held in Fiji in July. These training sessions focused on ways ESCOs can be utilised to boost renewable energy deployment successfully in tandem with energy efficiency and conservation measures. Grid integration studies, energy transition plans and capacity building activities are contributing to IRENA's efforts within the Pacific region.

VI. Gateway to knowledge on renewable energy

96. Dissemination of objective, timely, and authoritative information to reach a global, targeted audiences has centred in 2016 on expanding and publishing renewable energy statistical information, resource potential and standards and quality infrastructure analysis, supported by the further development of the IRENA online knowledge portal.

RE Statistics

97. A second edition of *Renewable capacity statistics* was published in March 2016, and a more comprehensive review, *Renewable Energy Statistics 2016*, was published in June. The latter includes global data on renewable energy capacity and generation since year 2000, public investments in renewable energy for 2009-2014, and renewable energy balances for 100 countries and areas for the years 2013 and 2014. IRENA's statistics cover the period 2000 to 2015 and contain 13,546 data points from more than 200 countries and territories, covering all sources of renewable energy. Most recent statistics show that global renewable energy capacity increased by some 150 GW (+8.6%) in 2015 and that generation from renewables in 2014 was 5,295 TWh – an increase of 255 TWh or 5% on 2013. All statistics can now be viewed and downloaded through REsource webpages and a tool for offline data queries was also released in September 2016.

98. To help build local capacities in data collection, IRENA published *A guide to statistical capacity needs assessment* and *A field guide to measurement of small-scale biogas capacity and production*. Three training workshops on renewable statistics were held in South Africa, Hungary, and Thailand. A total of 115 statisticians and national energy experts from 45 countries were trained in energy statistics during the year. IRENA continues to receive enquiries from national statistical offices about methods for measuring renewable energy and is responding by producing technical notes on measurement techniques and organising further training workshops.

The Global Atlas

99. The increased momentum of renewables deployment has led to a repositioning of the IRENA Global Atlas to provide services that support accelerated project feasibility analysis. IRENA has also completed detailed suitability analyses of the technical potentials for grid-connected and off-grid wind and solar technologies in Latin America, the GCC, Southeast Europe and West Africa. Preferential zones are identified in partnership with IRENA Members through the Corridors and Islands programmes. For these zones, IRENA illustrates potential LCOE depending on financial scenarios. IRENA carried out such analysis in two sites in Cabo Verde and four sites in Comoros.

Figure 12: Suitability analysis for West Africa. Suitability scores for grid-connected solar power, not further than 75 km from the nearest grid. A suitability analysis looks at resource potential, distance to grid infrastructure, population density, topography, land cover and protected areas and ranks technical suitability to develop a project, ranked between 0 and

100. IRENA's support to assessing potentials is also being improved with recent release of a global bioenergy simulator for 14 crops, 30 residues types, 9 livestock waste types, 52 species for forest plantations, 25 production processes and 3 end uses. The simulator provides energy production estimates for

any area, and highlights major sustainability challenges. It was released for crowdsourcing validation, in order to assess biases and uncertainties on the final results. Finally, IRENA released the global wind LCOE calculator that can simulate wind farm production and LCOE for a large number of wind turbine types, at any point on the globe.

Quality and infrastructure, standards and patents

101. IRENA has continued its work on standards and quality infrastructure. Analysis was initiated for technical quality infrastructure for utility-scale solar PV to support policy makers and regulators responsible for solar energy programmes. This programmatic activity is being expanded based on the feedback received, as countries, private sector and other stakeholders use IRENA's work to better inform local policy making. For example, analysis on Quality Infrastructure for Solar Water Heaters and Small Wind Turbines (2015) is guiding work on standards and quality control for technologies in Mexico, Tanzania, and South Africa. IRENA is also strengthening private sector engagement in this area. In May 2016, IRENA participated in a side event at the Annual Meeting of the Asian Development Bank, organised by the German Metrology Institute, to discuss the use of quality control and standards to mitigate technical risk. This event provided a unique opportunity to showcase the role of quality control and standards in risk mitigation, promoting increased financial flow to renewable energy projects.

102. In May 2016, IRENA launched a report on standards for grid connection of variable renewable energy: *Scaling up Variable Renewable Power: The Role of Grid Codes*. The report guides countries in implementing technical requirements to enable a high share of renewable energy in power systems while ensuring the security of the system. Analysis draws on case studies, including from Barbados, Germany and Ireland.

103. IRENA is also strengthening the interactive INSPIRE platform on renewable energy standards and patents, which has been updated with data from 2015. The platform enables countries to access up-to-date information on technology trends and technical specifications. The study has become a reference for the development of grid codes, with requests to disseminate this work in specialised fora, such as the Colloquium of the Council on Large Electric Systems (CIGRE) and the International Solar Integration Workshop in Vienna in November 2016.

104. Partnerships continue to be strengthened. For example, IRENA provided advisory services to the International Electrotechnical Commission (IEC) on addressing key issues for renewable energy in international standards, to the GIZ in developing a quality control strategy for Mexico for solar water heaters, and to the government of Tunisia for solar power. Further advisory services have been extended to Latin American countries on quality infrastructure for renewable energy in cooperation with the German Metrology Institute (PIB), Latin American Energy Organization (OLADE), Organization of American States (OAS), The Pan American Standards Commission (COPANT) and the Institute for Advanced Architecture of Catalonia (IAAC).

Enhancing environmental and resource sustainability

105. In March 2016, IRENA and China Water Risk jointly published a brief on *Water Use in China's Power Sector: Impact of Renewables and Cooling Technologies to 2030* that examines the impact of China's power sector on water and climate in 2030. China has announced its plan to reduce carbon emissions by sourcing 20% of primary energy consumption from non-fossil fuels by 2030. The analysis shows that a 26% share of modern renewables, which by 2030 is both technically and economically feasible, would not only reduce emissions-intensity of power generation by 37%, but also reduce water-intensity by 42%, largely due to the water saving potential of solar PV and wind. The magnitude of these effects reaffirms the importance of integrated water and energy decision-making in the power sector. The brief adds to an expanding knowledge base on the water-related benefits of renewable energy, further strengthening the business case for renewables in water-scarce countries and regions.

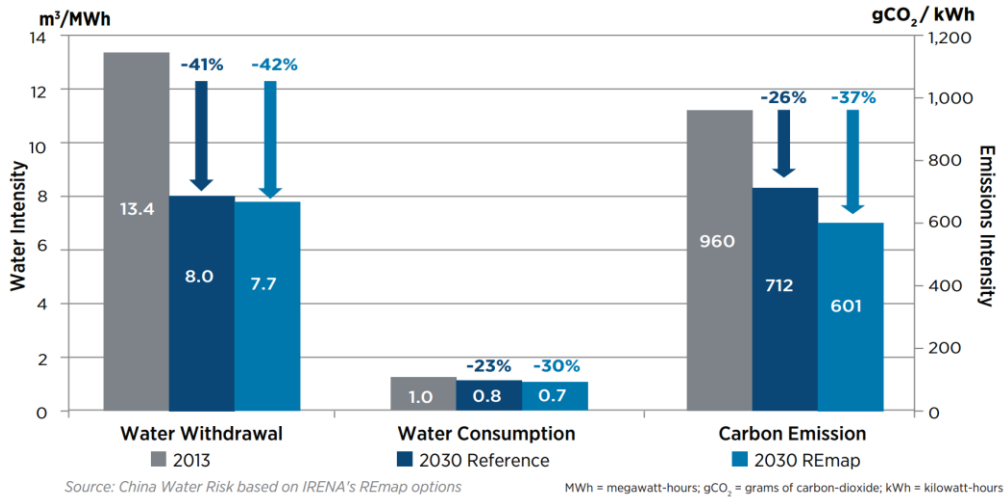
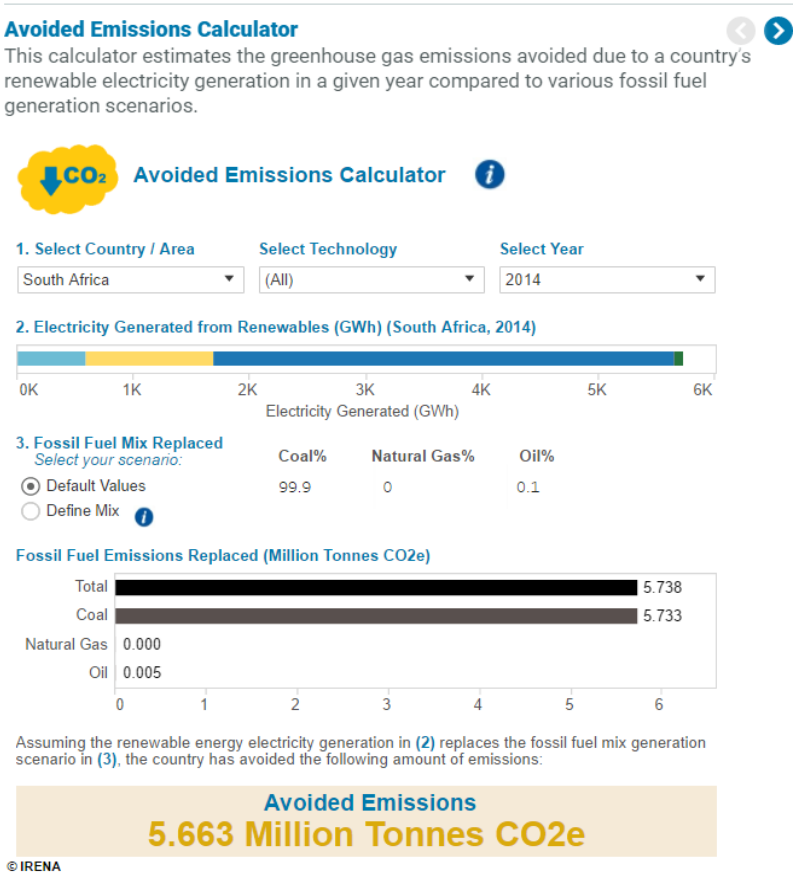


Figure 13: Water and carbon intensity of power generation (2013-2030)

106. In June 2016, IRENA and IEA-PVPS published an analysis on the end-of-life management of photovoltaic panels. Report findings underline that recycling PV panels at the end of their life can unlock a large stock of raw materials and other valuable components. The recovered material injected back into the economy can serve for the production of new PV panels or be sold into global commodity markets, thus increasing the security of future raw material supply. Preliminary estimates suggest that the raw materials technically recoverable from PV panels could cumulatively yield a value of up to USD 450 million (in 2016 terms) by 2030. This is equivalent to the amount of raw materials currently needed to produce approximately 60 million new panels, or 18 GW of power-generation capacity. By 2050, the recoverable value could cumulatively exceed USD 15 billion, equivalent to 2 billion panels, or 630 GW. The report was launched at a workshop at PV-SEC in Munich, Germany, on 21 June 2016.



107. In June 2016, IRENA also launched a *Policy Brief on Solar pumping for irrigation: Improving livelihoods and sustainability* at the Off-Grid Forum at Intersolar. The brief analyses diverse case studies where solar irrigation solutions have been deployed and brought substantial benefits for farmers and governments. Analysis also brings to the forefront the cross-sector aspects that should be considered in programme design and implementation to maximise socio-economic benefits of renewable energy deployment. The brief was

developed in close consultation with stakeholders across the sectors and is part of a broader work stream focusing on renewable energy opportunities in the agriculture and water sector.

Knowledge hub

108. IRENA's online knowledge hub REsource integrates the most recent and accurate content data and analysis on various aspects of the renewables agenda. The data section was expanded to become the Agency's interactive data centre, comprising the latest statistics on renewable energy power capacity, finance, costing, employment, and education. Most recent additions include a full update of all data sources for 2015, all REmap country roadmap data, energy balances for 100 countries, and a simulator for CO2 emissions avoided by renewable energy. To continuously improve the REsource platform, and provide transparent, easily accessible data and information on renewable energy, IRENA has developed the Renewable Energy Tagger, a tool that creates connections between related words and their definitions, building a universal basis for renewable energy terminology across the international community. The Tagger facilitates dialogue among stakeholders, allows for increased efficiency when learning or searching information online and improves flow and understanding of renewable energy information worldwide. The Renewable Energy Tagger was launched in September 2016 in collaboration with REEEP and with the support of voluntary resources from the government of Germany

Multi-stakeholder engagement

109. Facilitated by IRENA, the Coalition for Action has continued its work under the guidance of a steering group in three work streams. Its members currently include 17 members from civil society, 13 industry associations, nine companies, four international entities, and one public-private partnership. Coalition activities include support for the development of an index for corporate sourcing of renewable energy, a REmade Index. The Remade Index was made possible thanks to a voluntary contribution from the Government of Germany. This work will also contribute to the CEM corporate sourcing campaign. The Coalition has also benefited from a new communication approach, which will improve joint communication and outreach activities among its members. To promote further engagement of private sector actors, a webinar series addressing current important topics for the private sector is being put in place. A newly created solar energy task force will contribute to IRENA's work on renewable energy cost reductions.

VII. Enhancing international cooperation and communication and outreach

110. The 2016-2017 biennium offers the opportunity to deepen and broaden IRENA's external engagement, communication and outreach efforts to achieve greater impact and reach wider audiences. IRENA's communication and outreach strategy in 2016 focused on positioning renewable energy as the solution to a host of economic, social and environmental issues, in addition to building on the momentum of the climate "solutions agenda".

111. In 2016, IRENA continued to strengthen its role as the global voice of renewables in a number of key international settings. Within the UN context, the Director-General took an active part in COP22 in Marrakech, Morocco, leading IRENA's delegation to the meeting. He also attended the signature ceremony of the Paris Agreement in April, the SE4ALL Advisory Board in June, and the high level meetings of the UN General Assembly in September. The Director-General also participated in meetings of country groupings, such as the G7 in Japan in May, and the seventh Clean Energy Ministerial in San Francisco in June, where IRENA joined the Corporate Sourcing of Renewables initiative. In October, he took part in the 2016 International Forum on Energy Transitions in Suzhou, co-hosted by IRENA and China, which reaffirmed the need to strengthen international cooperation to advance the global energy transition. In Europe, the Director-General took part in the Berlin Energy

Transition Dialogue in March, the Iceland Geothermal Conference in April, the Italy-Africa Ministerial Conference in Rome in May and the EU Sustainable Energy Week in Brussels in June. In terms of engagement with the private sector, the Director- General made keynote remarks at the World Energy Congress in Istanbul in October and at the Goldman Sachs Low Carbon Economy Forum in London in November.

Facilitating international co-operation

112. In 2016, the 6th Assembly session, 11th Council meeting and the 12th Council meeting were convened in January, June and November respectively. Preparations are currently underway for the 7th session of the Assembly to be held in January 2017.

113. Held only six weeks after the adoption of the Paris Agreement, the sixth session of the Assembly was the first inter-governmental meeting after COP21. It presented an important platform for countries to discuss how to meet the ambitions resulting from the Agreement and the adoption of the Sustainable Development Goals (SDGs), in particular Goal 7 on Energy. The Assembly was attended by over 1000 delegates from more than 150 countries, representing the IRENA membership, and representatives from 140 international entities working in the renewable energy sector. Preparations are currently underway for the seventh session of the Assembly due to be held on 14-15 January 2017, covering a wide range of strategic, programmatic and institutional issues of direct relevance to Member States in support of their efforts to deploy renewable energy, including innovation, energy access, NDCs implementation, project development and facilitation etc.

114. On the day preceding the sixth session of the Assembly, IRENA held its first meeting of legislators, the "Legislators Forum 2016", which was attended by 21 legislators from around the world. Legislators exchanged best practices and experience on the deployment of renewable energy and solutions that enable countries to meet their domestic energy needs. The debate focused on appropriate support mechanisms to deploy renewable energy. Legislators also discussed how the Agency could support their work and concluded the meeting with defining key enablers that support an accelerated deployment of renewable energy worldwide. Many legislators also attended the sixth Assembly and received a comprehensive overview of the Agency's activities and initiatives. Engagement with parliamentarians has since been strengthened as the Agency has continued to present its work at meetings of legislators and to issue the *REview for Parliamentarians*, a periodic brief compiling targeted information on renewable energy for members of parliament. The brief was produced in English, French and Spanish. Building on the results of the 2016 Legislators Forum, the Agency will be hosting the 2017 Legislators Forum on 13 January 2017, one day prior to the seventh Assembly.

115. Both the 11th meeting of the Council and the 12th meeting of the Council saw the attendance of about 300 participants from around 100 countries. The focus of the Council meetings in 2016 was to discuss and guide the implementation of the Agency's work programme, hold strategic discussions towards the adoption of a new Medium-term Strategy in 2018 and to examine a number of programmatic, institutional and administrative matters.

116. The Fund for Developing Country Representatives (FDCR) was established by the Assembly at its second session in 2012 to enable, subject to available funds, participation of delegates from Least Developed Countries (LDCs) and Small Island Developing States (SIDS) in IRENA governing body meetings. Since the beginning of the year, the FDCR supported the participation of 62 delegates in different meetings of the governing bodies. The Fund is facing shortfalls prior to the seventh session of the Assembly. In order to ensure a high-level of inclusiveness and participation of all IRENA Members in the Agency's governing body meetings, the Secretariat seeks the support of Members to ensure the replenishment of the fund which is exclusively based on voluntary contributions.

117. IRENA continues to encourage Members to accredit Permanent Representatives and to facilitate engagement through regular meetings and discussions. The first 'IRENA Introductory Meeting' for newly-appointed diplomats and other Member representatives in the United Arab Emirates (UAE) was held to introduce IRENA, its mission and mandate, as well as to present possible avenues of engagement with the Agency. Other meetings were held where the Director-General provided an update on the Agency's activities and initiatives to the diplomatic community in the UAE and to Permanent Representatives in particular. In 2016, the number of Permanent Representatives accredited to the Agency increased from 37 to 43. In addition, nine Members accredited a new Permanent Representative following the end of tenure of a preceding Permanent Representative. Several Members are in the process of finalising accreditation procedures for their Permanent Representatives to IRENA.

118. Since the sixth session of the Assembly, the following countries have joined the Agency as new Members: Afghanistan, Bhutan, Botswana, Saint Lucia, Thailand and Afghanistan, bringing the total number of Members to 150 (149 States and the European Union). 27 States are in the process of accession to the Agency and one is an applicant for membership.

Dissemination of knowledge, data and analysis

119. The Agency has stepped up systematic communication with membership on ongoing and planned programmatic initiatives, activities, events and publications. The aim is to facilitate consistent, timely and tailored communication between the Secretariat and the membership to ensure Members are well informed about, and can benefit from, the Agency's work and can engage with, and contribute to, the Agency's activities and initiatives.

120. In this context, the 'IRENA Bulletin', an e-newsletter including a comprehensive yet brief update on upcoming and past IRENA events, activities and publications, is now issued on a regular basis. Both the 'In Focus' briefs, which provide a concise introduction to one IRENA activity or programme at a time, as well as the 'Publications Update', a comprehensive overview of all publications released by IRENA during a given month, are now regularly produced and circulated. The Agency also stepped-up its communication around major events organised by IRENA, such as the Innovation Week or the International Off-grid Renewable Energy Conference (IOREC), as well as around IRENA events held in the context of other major conferences, such as the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) or the United Nations Conference on Housing and Sustainable Urban Development (Habitat III).

121. In January, the Agency launched a communication strategy focused on positioning renewable energy as the solution to a host of economic, social and environmental issues including climate change, energy access, meeting growing energy demand, creating sustainable economic growth and social prosperity, air pollution, etc. The strategy employs the use of planned major campaigns, smaller campaigns, and sustained social media and media relations activities, to align with relevant international events for maximum exposure and amplification.

122. In 2016, the strategy was first deployed to support the sixth Assembly and its related activities and publications. These included multi-lingual press releases, press events, an #IRENA6A social media campaign, infographics, promotional materials, and a hosted media programme with members of the international press. In the context of the sixth Assembly, the Agency also co-hosted the IRENA-Financial Times Question Time Debate at the IRENA Headquarters. The event, attended by over 300 international stakeholders focused on how to take climate action to the next level by scaling up renewables and included a special address by UN Secretary General Ban Ki-moon.

123. Since January 2016, the Secretariat has launched on average one focused communication campaign per month, allowing sufficient time to support targeted outreach efforts and conduct smaller-scale communication efforts concurrently. Full strategies were designed and implemented for:

- IRENA's 6th Assembly
- REmap 2030
- IRENA's 5th Anniversary
- IRENA Innovation Week
- the Renewable Energy and Jobs Annual Review 2016
- RE-energising Cities (for Habitat III in Quito)
- The Power to Change: Solar and Wind Cost Reduction Potential to 2025
- the 7th Clean Energy Ministerial
- InterSolar Europe
- International Off-Grid Renewable Energy Conference
- COP22

124. In April, the Agency began the celebration of its 5th anniversary by highlighting renewable energy successes over the past five years. This included a multi-lingual press release, the launch of an international photo competition, a call for submissions for Member renewable energy success stories, and the launch of a 5th anniversary data dashboard and associated #REthenandnow social media campaign. Smaller campaigns have also been conducted for the launches of different IRENA reports and briefs, and such campaigns have become an integral part of the programmatic output. The Secretariat then conducted a "Summer of Solar" campaign, using the findings of four IRENA publications to highlight the pivotal role of solar in the ongoing energy transition.

125. To highlight a few impact metrics from the above mentioned communications campaigns, IRENA's Renewable Energy and Jobs Annual Review 2016 garnered more than 700 articles in media outlets around the world and was mentioned/recommended by Al Gore on Twitter – who has roughly 3 million followers; A social media campaign was launched for IRENA's biennial International Off-grid Renewable Energy Conference (IOREC) with the #IOREC hashtag on Twitter reaching almost 900,000 accounts, and creating 1.9 million impressions. The conference, its associated publications and content were further promoted on Facebook, LinkedIn, and Instagram. As a final example, IRENA 2016 REmap report was downloaded more than 25,000 times in the three months following its launch.

126. As a part of the Agency's various communication campaigns thus far in 2016, the Secretariat has distributed press releases in eight different languages (Arabic, Chinese, English, French, German, Japanese, Spanish and Portuguese) and conducted numerous press events. These efforts have resulted in about 11,000 news pieces on IRENA in media outlets in almost 140 countries, including Agence France-Presse, Associated Press, Bloomberg, China Daily, CNBC, CNN, Deutsche Welle, the Economist, El País, Financial Times, Huffington Post, Le Monde, O Globo, Rai, Reuters, Time Magazine, the New York Times, the Guardian, the Wall Street Journal, Valor Economico and Xinhua. This represents a 75% increase in media coverage over the same period in 2015, and reflects increased recognition of IRENA as a reliable and credible source of renewable energy information, data and statistics. Countries with the most IRENA coverage in 2016 include the United States, China, the United Arab Emirates, Australia and the United Kingdom.

127. Throughout 2016, websites continued to be one of the Agency's principal vehicles for communications and outreach. IRENA websites have attracted over 330,000 visitors and 1.6 million page-views, growing by about 100,000 page-views over the previous year. Currently undergoing a revamp to better reflect its rich substantive content, the IRENA website has attracted readers from all over the world as the Agency continues to grow as a recognised source of reliable renewable energy information for stakeholders. IRENA publications and knowledge products were downloaded over one million times over the course of the year.

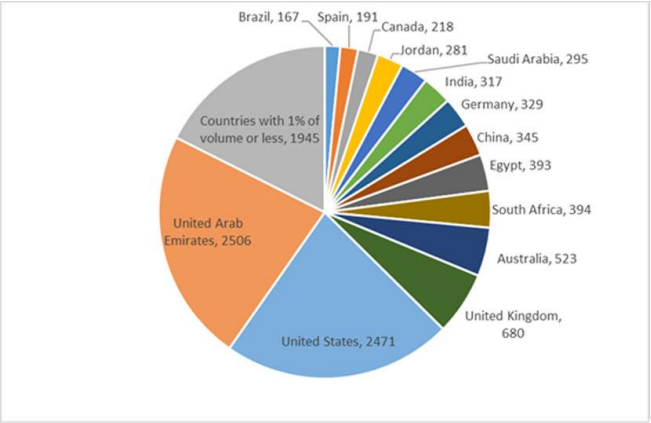
128. IRENA has also continued to increase its activity and grow its communities across its digital and social media platforms. Since the beginning of 2016, regular and timely activity promoting both Agency activity as well as global developments in renewable energy enabled the Agency's followers to more than double on Twitter, and grow by 46% and 38% on Facebook and LinkedIn respectively. In addition, hundreds of images were added to IRENA's Flickr photo album, allowing public access to IRENA's high quality photos for use by stakeholders and

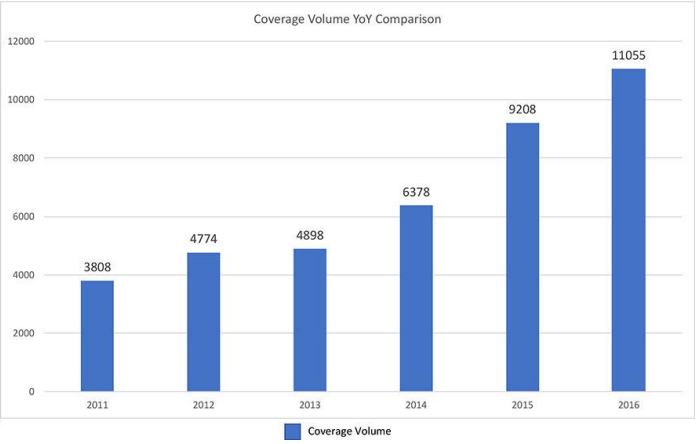
the general public. Contributing to this total, IRENA developed info graphics featuring key statistics and messages in support of and to track the global energy transition. In addition, institutional videos were created for dissemination on platforms including the Agency's YouTube channel. IRENA's Instagram account, launched in March, focus on images that visually tell the story of the global energy transition as well as Agency activities. The account continues to grow in terms of popularity and engagement.

129. The IRENA Newsroom, featuring about 80 articles in 2016, expanded in scope to cover human impact stories and other renewable energy developments. The Newsroom has had 48,000 people visiting it 78,000 times, reflecting an increase of 42% and 37% respectively. This increase in visits may be attributed to its expanded scope, consistent publication schedule, focused promotion and increased recognition as a source of reliable renewable energy knowledge and information,

130. In an effort to expand and amplify its reach, IRENA continues to strengthen existing and establish new strategic communications partnerships and networks. New partnerships with multiplier organisations have significantly contributed to the impact of IRENA's global media relations activities, improving press coverage for select reports in Europe, China, Australia, and the Americas. In addition, work continues on the development of communications networks through the Coalition for Action and IRENA membership.

131. Multilingual versions of key reports and summaries also, increasingly, ensure that IRENA's key messages and findings are available in official UN languages and other relevant languages. Wider dissemination has been achieved by ensuring the availability of key release, messages and findings in multilingual formats. The latest REmap global report summary was released in eight languages. Targeted regional or country-specific translations in 2016 have included a joint brief with China Water Risk in Chinese as well as Latin America market analysis and REmap Dominican Republic summaries in Spanish. Member countries are recognised as an essential source of advice and guidance to further strengthen translation process.





132. Along with its international communications efforts, the Agency has taken several steps to enhance its outreach in its host country, including hosting the 5th Anniversary event at Headquarters and receiving several visits by high level officials, international private sector entities, academic and research institutions. These have included Biberach University (Germany), American University (USA), Thai Public Company limited, (Thailand), Texas A&M University and Khalifa University (USA and UAE), Masdar Institute (UAE), Tokyo University (Japan), Siemens AG (Germany), Eon (Sweden) and New York University Abu Dhabi (UAE). Substantive participation in several conferences and seminars in the UAE have also taken place, including Intersolar Middle East, the World Green Economy Summit and the World Future Energy Summit.

133. To ensure engagement with youth, IRENA piloted a 'Summer Trainee Programme' targeting undergraduate students, providing them with an opportunity to work at the headquarters and to learn more about IRENA. The programme was successful and well-received, setting the stage for potential replication in the future. Further engagement with universities is also being planned.

134. Publications highlighting the challenges and opportunities of the energy transition are an essential element in IRENA's work to promote the widespread adoption and sustainable use of renewables worldwide. Accordingly, the Agency has released over 40 new reports and briefs between 1 January and end-November 2016, each of which has benefited from reader-friendly web content and targeted communications activities. Each new release receives global, regional, national, thematic or interest-specific press and social media support, depending on the intended target audience and relevance of the material

135. To further increase the visibility and impact of published works, ISBN designations have been adopted for all reports and papers. This has required reviewing and updating established publishing practices, in order to ensure a transparent, cohesive process that ensures timely information-sharing and continues to strengthen IRENA's brand as a publisher. Dissemination channels are being progressively expanded, following evaluations during 2016 of the suitability of various content-provider and digital-library platforms for IRENA publications.

136. Since the beginning of the year, the management of IRENA's programmatic meetings has been consolidated and streamlined to facilitate efficient organizational delivery in implementation of the Work Programme as well as the process of meeting planning and organizing. The meeting planning and implementation process focuses on the most efficient and cost-effective use of available resources. A regularly updated global renewable energy events calendar is being maintained, comprising meetings hosted by IRENA as well as events hosted by other organisations.

Strengthen institutional structures and accountability

137. Internal audits continue to be carried out to ensure internal controls are in place and effective across all divisions. During 2016, this included the audits of the Cash and Treasury Functions, and the audit of the administrative and related aspects at the IRENA Innovation and Technology Centre in Bonn. Internal audits are carried out in an independent and objective manner to help management enhance governance, risk management and internal control systems, and shall continue to be reported to the membership through specific reports.

VI. Administration and Management Services

138. The Administration and Management Services Division continued its efforts to provide support to the Agency to implement the biennium work programme, while seeking and providing solutions and enhancements to current processes. In this regard, the implementation of the Oracle ERP system is underway and, when fully implemented, will further enhance the business processes of the Agency, while increasing efficiency.

Finance and budget

139. Finance and budget services continue to support the Agency's full compliance with its Financial Regulations and Procedures as evidenced in the recent clean audit received from the external auditor. Financial services and budgetary services are provided to staff, Members, and other internal and external stakeholders in accordance with international accounting standards and budget practices. The services include preparation of the financial statements for the Agency and the Staff Provident Fund, issuance of annual bills and regular follow up with Members for the collection of outstanding assessed contributions, registering and allotting voluntary

contributions, settlement of vendor and supplier invoices, and regular internal support services including payroll, budget utilisation updates and general advice to support the sound financial management of the Agency. Additional activities include support for the selection of the new external auditor, as presented in document C/12/6, addressing internal and external audit recommendations, preparation of the 2017 Indicative Scale of Contributions as presented in document C/12/7 and other financial services.

Information and Communication Technology

140. In addition to core ICT services including data processing, communication and collaboration tools, ICT solutions for the Work Programme implementation were provided, such as the capturing and dissemination of data, application development, and information and knowledge transfer made available to stakeholders through external and internal portals.

141. As a knowledge-based organisation operating in an increasingly digital environment, ICT has become a strategic enabler and tool for the Agency in the implementation of its work programme. To lower the operational risks and reduce cost related to ICT support, many of the out-sourced services has been in-sourced thus strengthening internal capacity. Further, to enhance the availability and resilience of ICT services, IRENA has adopted hybrid Cloud-based and on-site infrastructure and services, which provide increased operational flexibility with no major capital investments needed for ICT infrastructure. Comprehensive reviews are being carried out to identify the right technology and deployment models for IRENA while keeping in mind current and future requirements of the Agency.

Human Resources

142. The human resource functions of the Agency span administrative, operational and strategic activities. In the course of 2016, special efforts have been made to strengthen the performance management system and to gain a greater understanding of the Agency's human resource trends to develop a longer term workforce planning strategy.

143. Attracting, retaining and developing staff remains a priority. In this respect, the Agency continues its outreach activities to attract more qualified candidates. Between 1 January 2016 and 1 December 2016, 42 vacancies for fixed-term and temporary appointments and Junior Professional Associate (JPA) positions were advertised for which over 13,000 applications were received. Out of 90 core posts, 81 are filled or under recruitment (66 filled and 15 under active recruitment) and 9 are vacant [Table 1 and Figure 14]. The 66 staff with fixed-term appointments are from 39 nationalities [Figure 16] out of which 52 per cent are women and 48 per cent are men [Figure 15].

Table 1: Approved and filled/under recruitment posts by level as of 1 December 2016

Level	Approved	Filled or Under Recruitment
ASG	**1**	**1**
D-2	**1**	**1**
D-1	**5**	**5**
P-5	**17**	**14**
P-3/4	**37**	**34**
P-2/1	**3**	**3**
Sub-total Professional and above	**64**	**58**
General Services	**26**	**23**
Total	**90**	**81**

Figure 14: Staffing status as of 1December 2016

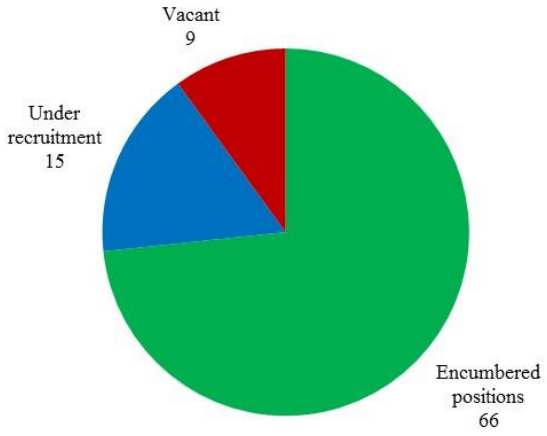


Figure 15: IRENA staff gender distribution as of 1 December 2016 (based on filled posts)

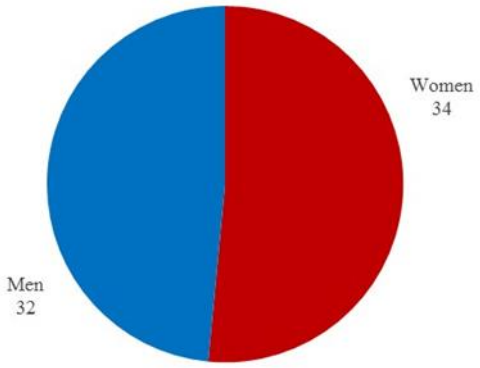


Figure 16: IRENA staff nationalities as of 1 December 2016 (based on filled posts)

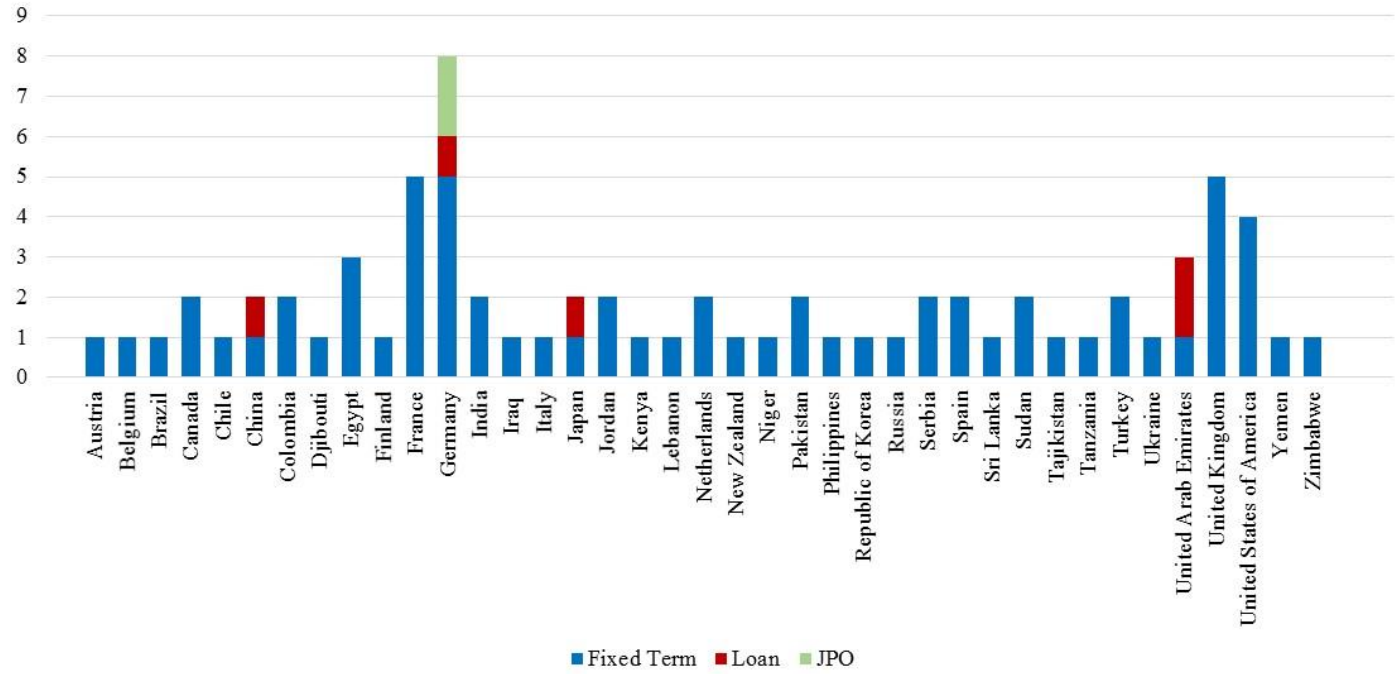


Table 2: Loaned Personnel

Division	Title	Loaned from
SMED	Liaison and Protocol Officer	UAE
SMED	Advisor - Outreach and Communications	UAE
IITC	Bioenergy Analyst	Japan
IITC	Programme Officer - REmap	China
IITC	Programme Officer – Quality Assurance and Standards for Renewable Energy	Germany

Table 3: Junior Professional Officers (JPO)

Division	Title	JPO from
KPFC	Associate Programme Officer - Policy	Germany
IITC	Associate Programme Officer - Energy Planning	Germany

Procurement

144. The Agency continues to implement its procurement planning to ensure cost-effective solicitation of goods and services. To ensure transparency, fairness, openness and competitiveness, procurement opportunities are being posted on IRENA's website as well as disseminated to the vendors registered with IRENA. Through continuous market research and a recent call for Expression of Interest (EOI), IRENA's vendors' database has been further developed and includes more than 350 new vendors specialized in renewable energy consulting services worldwide, this has improved competition. More than 450 contracts were awarded and 16 long-term agreements (LTA) for various services were entered into or renewed.

General services and travel

145. Through the Agency's Abu Dhabi and Bonn Offices, the General Services and Travel Section continue to facilitate travel services provided to staff members, delegates, participants to conferences and workshops, including travel and accommodation reservations and management, workshops and events arrangements covering all IRENA events during 2016.

146. The General services function of the agency continues to provide facility management services for IRENA headquarters and staff. Facility Management is an important function which contributes to a healthy and productive work environment while delivering continuous day to day services for staff. As part of these ongoing services, General Services has implemented Health and Safety programmes, such as evacuation plan of Headquarters, establishment of the warden system and training of staff in these areas to further guarantee staff safety. Further training of staff in providing first aid to enhance health and safety practices are planned. Additional activities in these areas is planned.

Biennial budget overview

Table 4: 2016-2017 Biennium Budget Utilization by funding source (in USD Thousands)

	2016-2017 Biennium Budget	Utilisation as at 27 November 2016	
		Commitment and Expenses	Proportion of 2016-2017 Biennium Budget
Assessed Contributions (Core Budget)	**42,934**	**17,490**	**41%**
Core Non-Assessed UAE Contribution:			
UAE Support	5,000	1,367	27%
Governing Body Meetings	3,200	1,308	41%
Subtotal UAE Contributions	**8,200**	**2,676**	**33%**
Core Non-Assessed Germany Contribution:			
Innovation and Technology	10,000	3,466	35%
Subtotal Germany Contribution	**10,000**	**3,466**	35%
Total Core Non-Assessed	**18,200**	**6,106**	**34%**
Grand Total	**61,134**	**23,632**	**39%**

Table 5: 2016-2017 Biennium Budget Utilization by Thematic Areas (in USD Thousands)

	Combined Core Assessed and Core Non- Assessed		Budget Utilization as at 27 November 2016	
Division/Thematic Area	**Amount (USD)**	**Proportion of Total**	**Amount (USD)**	**Proportion of Biennium Budget**
A. Strategic Management and Executive Direction	**14,037**	**23%**	4,457	32%
Governing Body Meetings	3,200	5%	1,251	39%
Subtotal	**17,237**	**28%**	**5,708**	**33%**
B.Thematic Programme Area				
Planning for the renewable energy transition	5,771	9%	2,867	50%
Enabling investment and growth	8,871	15%	3,335	38%
Renewable energy access for sustainable livelihoods	2,060	3%	1,426	69%
Regional action agenda	8,004	13%	2,706	34%
Islands: lighthouses for renewable energy deployment	911	1%	458	50%
Gateway to knowledge on renewable energy	7,105	12%	2,141	30%
Subtotal	**32,723**	**54%**	**12,933**	**40%**
C.Administration and Management Services	**11,174**	**18%**	4,990	45%
Total Estimated Requirements	**61,134**	**100%**	**23,632**	**39%**

Figure 17: Core non-assessed and other Voluntary Contributions, as of 27 November 2016 in USD

Core Non-Assessed Contributions		
	2016	
	Budgeted	**Received**
GERMANY		
IRENA Innovation and Technology Centre	4,900,000	4,900,000
United Arab Emirates (UAE)		
UAE Support	2,500,000	1,250,000
Governing Body Meetings	1,600,000	1,600,000
Subtotal UAE Contributions	**4,100,000**	**2,850,000**
Total Core Non - Assessed Contributions	**9,000,000**	**7,750,000**

Other Voluntary Contributions		
	2016	
Donor	**Committed**	**Received**
European Commission	326,087	-
Germany	4,846,596	2,365,042
Japan	666,441	585,000
Kingdom of the Netherlands	108,696	-
United Arab Emirates (UAE)	1,769,575	1,769,575
Subtotal	**7,717,395**	**4,719,617**

Fund for Developing Countries Representatives		
	2016	
Donor	**Committed**	**Received**
United Arab Emirates (UAE)	200,000	200,000
Subtotal	**200,000**	**200,000**
Total Additional Voluntary Contributions	**7,917,395**	**4,919,617**

Figure 18: Received and outstanding assessed contributions for 2016 core budget (as of 27 November 2016)

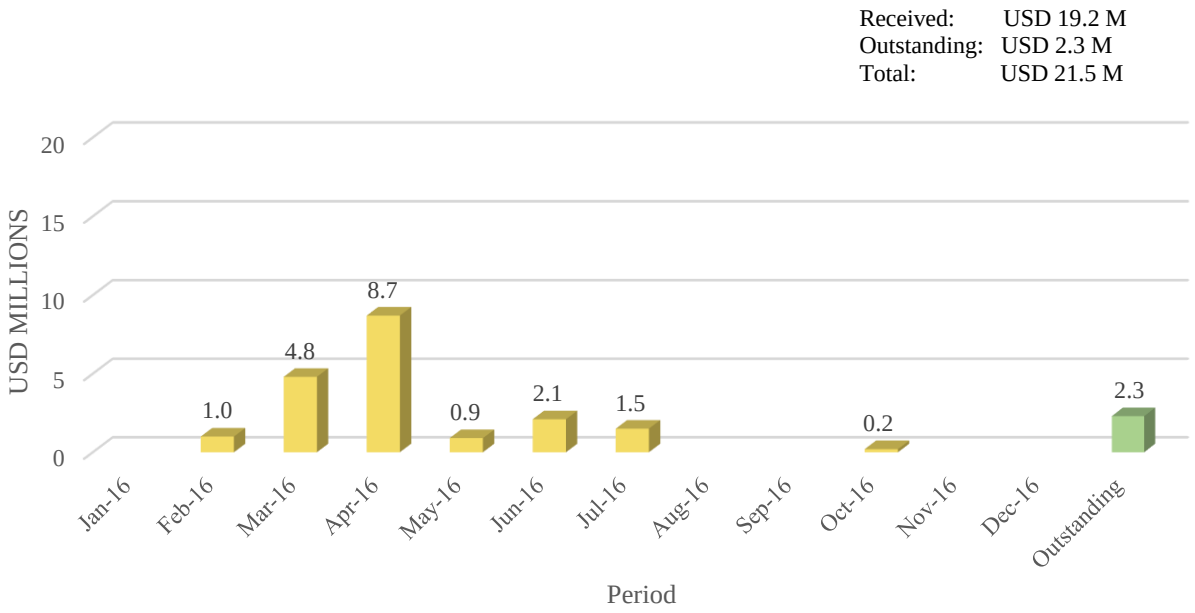
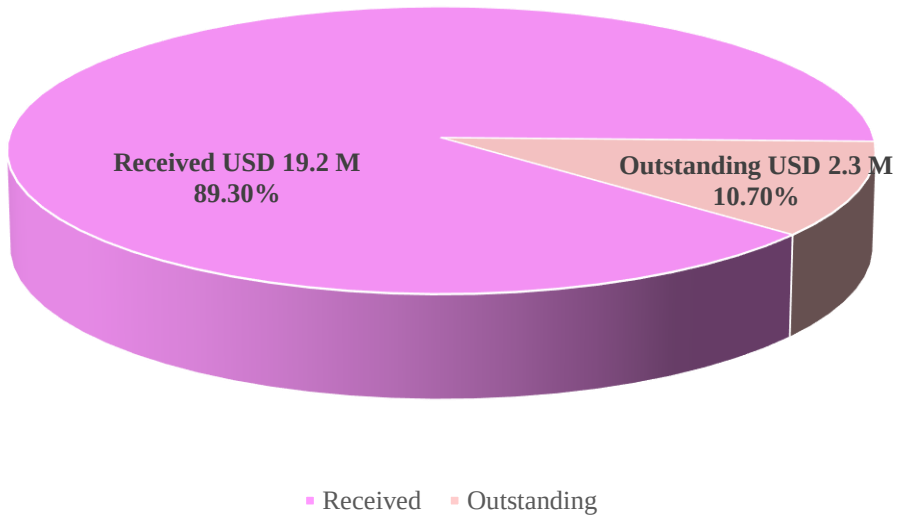


Figure 19: Number of Members with received and outstanding assessed contributions to the 2016 core budget (as of 27 November 2016)



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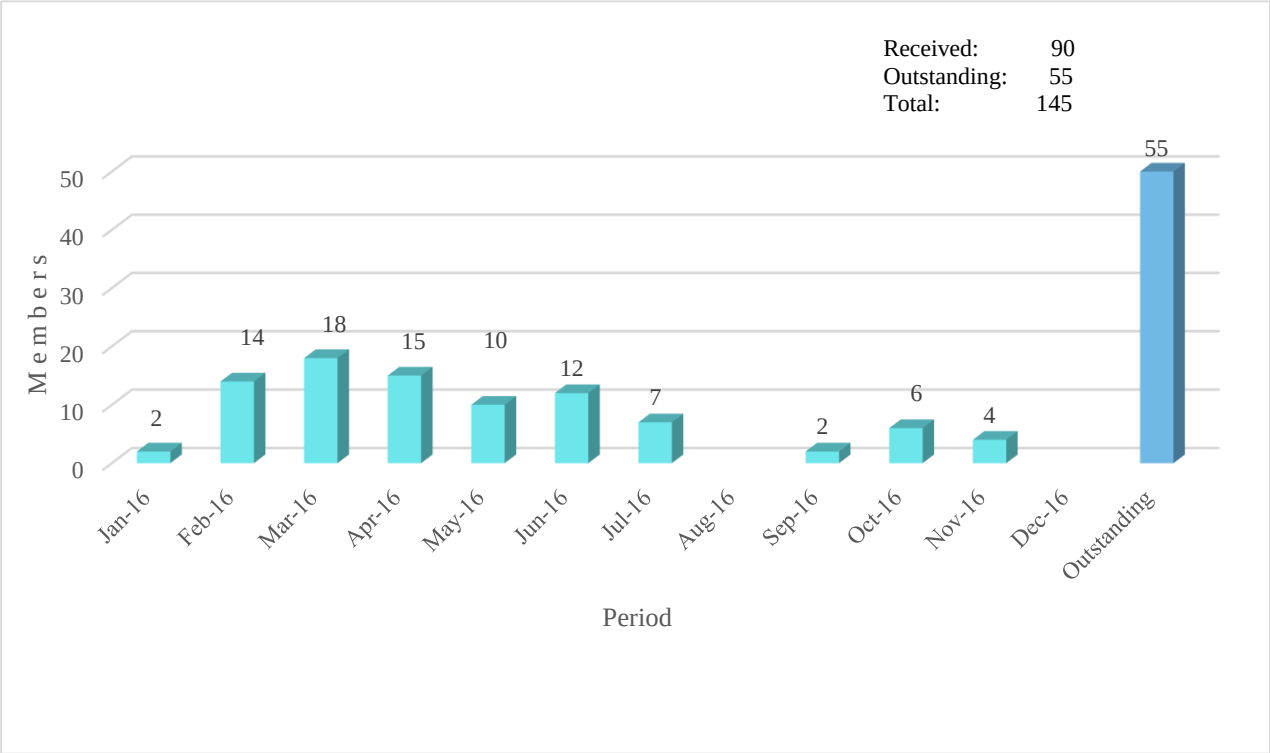
Received: 90
Outstanding: 55
Total: 145
Members
50
40
30
20
10
0
2
14
18
15
10
12
7
2
6
4
55
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16
Outstanding
Period

Thematic Programme Areas - Matrix

Programme activities

Thematic area: Planning for the Global Energy Transition					
Objective: Countries successfully transform their energy systems to meet national targets and strategies to decrease global emissions and improve energy security					
Resources (core assessed, non-assessed and other sources): 12,356 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
REthinking Energy	• Global Report: Completion of the Third Edition of REthinking Energy.	**In progress.** • An outline of the theme and content of the next REthinking has been prepared and agreed. Collection of basic information for the analysis has commenced.			Q3 2017
Power system design for RE integration	• Methodology for grid integration planning.*	**Completed.** • AVRIL report on tools for planning under development.	• Deployment of methodology for grid integration planning.	**In progress.** • Deployment of ACEC zoning work into SPLAT model. *VC from the Government of Norway. Additional resources required.*	Q2 2016 Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Power system design for RE integration (continued)	• Workshop on methodology for integration planning.*	**Completed.** • The IRENA Innovation Week, May 2016 included a workshop for integration planning. • Workshops for Technical Experts on Planning and Operating Systems with high shares of renewable energy held in August 2016 in Tonga, Cuba and St. Maarten.	• One additional workshop on integration planning.	**Resources not identified.**	Q2 2016 Q2 2017
	• Advice on use of established industry simulation tools for planning.*	**Completed. Ongoing.** • Comparative study on modelling tools finalised, released and applied to Europe. Advice on use of tools ongoing.	• Simulation tools applied.	**Resources not identified.**	Q4 2016
	• Latin America country studies on integration of VRE into long-term planning.*	**In progress.** • Pilot study for grid integration planning in Panama is currently underway.	• Training programme on the use of long-term planning tool in Africa.	**Completed.** • First and second session of training completed for Swaziland. *In kind contribution from Swaziland* • ECREEE training for 10 countries - held third training session in January 2016. *In kind contribution from ECREEE.*	Q1 2016 - Q4 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Power system design for RE integration (continued)	• Indicator system for flexibility assessment of power systems.*	**In progress.** • The IRENA Innovation week provided input into the development of the indicator system.	• Deploy indicator system including two dialogue events for grid planners, transmission and distribution system operators, grid regulators; evaluation of flexibility and adequacy options. • Two workshops to collect input and feedback on grid integration methodologies.	**Resources not identified.**	Q2 2016 Q4 2017
			• Guidelines on EVs, interconnectors and electricity storage as flexibility measures.	**In progress.** • Terms of reference prepared. *VC from Government of Japan.* *Additional resources required.*	Q4 2016
			• Country application of innovative grid and market design guidelines and methodologies, upon request.	**In progress.** • Grid methodology for energy storage valuation for South Africa. *VC from the Government of Japan.* *Additional resources required.*	Q1 2016 - Q4 2017
			• Advisory services on the development of power sector transition plans.	**Resources not identified.**	Q1 2016 - Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Transforming Energy	• REmap global technology roadmap analysis - third edition (40 countries).*	**In progress.** • Update of country reports to feed into the third edition.	• REmap - third edition covering an additional 10 countries, five individual country reports; energy efficiency & renewables action team and transport action team; Socio-economic briefs; two national expert workshops; regional and sectoral roadmaps and REmap information platform.	**Completed.** • REmap India • REmap Dominican Republic • REmap Indonesia • REmap ASEAN • REmap G20 • REmap Energy Efficiency • REmap District Heating and Cooling • 30 new countries have been included in the global framework **In progress.** • REmap Russia • REmap South Africa • REmap EU • REmap Kazakhstan • REmap/RRA Egypt • REmap/RRA Thailand *VC from the EU and Governments of Germany and Japan*	Q1 2017 Q4 2017
			• Analysis of the impacts of REmap 2030 options on water use in the power sector for different countries.	**Resources not identified.**	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Transforming Energy (continued)			• Country analysis (5 countries) on policy frameworks, energy sector transformation and market design.	**Resources not identified.**	Ongoing
			• System for characterisation and selection of bioenergy technology pathways to be deployed for a bioenergy Navigator module.	**In progress.** • Work has started for solid biomass combustion for power generation. *VC from the Government of Japan.*	Q1 2016 - Q4 2017
			• Bioenergy cost-supply report.	**Completed.** • Analysis finalised and realised in May 2016. *VC from the Government of Japan.*	Q4 2016
			• Data on processing residue availability to support project development.	**In progress.** • Biomass residue data collection and analysis completed for 4 other African countries are underway. *VC from the Government of Japan*	Q2 2016 - Q2 2017
			• A bioenergy assessment tool for Global Atlas to include costs and other parameters.	**In progress.** Bioenergy tool on resource assessment (technology only) is close to completion. *VC from PRIMAFF and the Government of Japan and in kind resources from the Government of Belgium.*	Q4 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Transforming Energy (continued)			• Advisory services on bioenergy technology options, upon request.	**Potential resources identified.** • Workshop on bioenergy project development under preparation. • Development of G20 toolkit for bioenergy. *VC from the Governments of Germany and Japan.*	Q1 2016 - Q4 2017
Technology status & outlook	• Report: *"The Innovation Landscape for RE Technologies".**	**In progress.** • Background scoping study completed. • A report on "*Letting in the Light*" on how solar PV will revolutionise the electricity system was completed and will contribute to the Innovation Landscape report.	• Two preparatory workshops for the Innovation report.	**In progress.** • A first workshop held during Innovation Day on May 26th following the IRENA 11th Council.	Q2 2016 Q4 2017
	• Status briefs for five technologies.*	**In progress.** • Geothermal • Logistics of biomass **Completed.** • Wind power • Electric vehicles • Biofuels for aviation • Biogas for transport sector	• Additional technology briefs.	**Resources not identified**	Q1 2016 Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Technology status & outlook (continued)	• Outlook report for heating and cooling energy storage.*	**In progress.** • Data collection process has started.	• Outlook report for 1) offshore wind and 2) electric vehicles	**Completed.** • Offshore wind Report launched at the World Wind Energy Conference on November 1st 2016. **In progress.** • Electric vehicle analysis pending.	Q4 2016 Q4 2017
	• IRENA Energy Week to support Innovation Landscape report.*	**Completed.** • IRENA Innovation Week took place on May 11-13 2016.	• IRENA Energy Week (2018).	**Resources not identified**	Q2 2017
			• Global report on status and trends of hydropower.	**Resources not identified**	Q2 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Technology status & outlook (continued)			• Country advisory services in designing and implementing renewable energy technology innovation strategies.	**Ongoing.** • Country advisory services provided to Member states during the IRENA Innovation Day event on innovation strategies for an energy system transformation. • Support to UNFCC Technology Executive Committee on technology transfer mechanisms for renewable energy. • Support to VITO on research strategy on renewable energy technologies. • Advice to Repsol on projections for renewable energy to integrate more renewables into their 2050 market strategy.	Q1 2016 - Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Global Geothermal Alliance	• Establish a GGA platform for communication.	**In progress.** • GGA action plan finalised through an intensive consultative process with GGA member countries and partner institutions. • The first Call for Activity Proposals launched inviting GGA members and partners to submit proposals for activities seeking implementation support from GGA.	• Advisory services on enabling frameworks and capacity building workshop to raise awareness and strengthen capacity of public stakeholders in the Pacific.	**In progress.** • The concept note of geothermal energy technical assistance and capacity building initiative for the Pacific under finalisation. *VC from the Government of Japan.*	Ongoing Q3 2017
			• Methodology for geothermal capacity needs assessment applied in one region.	**In progress.** • The IRENA geothermal capacity needs methodology will be applied to a region yet to be identified. *VC from the Government of Switzerland.*	Q4 2016
			• Additional advisory services and training to GGA member countries to help create necessary enabling frameworks to promote investments.	**Resources not identified**	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Global Geothermal Alliance (continued)			• Partnerships with expert institutions to deliver targeted capacity building activities related to geothermal energy.	**Resources not identified**	Q2 2017
			• Stakeholder outreach to feature geothermal energy prominently at major events of relevance.	**Resources not identified.** • While additional resources are required, IRENA is leveraging its presence at different events for this purpose.	Ongoing
REpowering Cities			• Methodology for and application of building stock assessments for identifying renewable energy potential in cities.	**In progress. Adjusted to Q4 2017.** *VC from the Government of Germany to be received Q1 2017.*	Q4 2016
			• Report on renewable integration options and enabling electricity and heat/cold distribution infrastructure in cities.	**Completed.** • The report, *Renewable Energy in Cities*, was launched at Habitat III 2016.	Q4 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
REpowering Cities (continued)			• Workshops and outreach, including Habitat III • Disseminate results to build knowledge and share best practice.	**In progress.** • *Habitat III outreach supported by the Governments of Ecuador, Germany and the UAE.*	Q4 2017
			• Methodology and capacity building to support the monitoring of renewable energy impact on the carbon footprint of cities.	**In progress.** *VC from the Government of Germany to be received Q1 2017.*	Q4 2017
			• Methodology on biomass resource assessment customised to the Latin America context and training for its effective implementation.	**In progress.** • Geographical focus expanded beyond the LAC. *VC from the Government of Germany to be received Q1 2017.*	Q2 2017
			• Map stakeholders and urban settings for identification of commonalities.	**In progress.** *VC from the Government of Germany to be received Q1 2017.*	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
REpowering Cities (continued)			• Briefs on innovative policy, regulatory and financing approaches to incentivise renewable energy deployment and energy efficiency measures in cities.	**Possible resources identified. In progress.** • Scope and possible partner identified as part of VC application.	Q4 2017
			• Outreach to UNFCCC Workstream 2.	**In progress.** • Attendance at and reporting on UNFCCC workshops.	Q4 2017

Thematic area: Enabling investment and growth					
Objective: Improving policy frameworks and creating enabling market conditions for accelerated deployment of renewable energy					
Resources (core assessed, non-assessed and other sources): 12,762 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
Renewable energy costs	• Expanded and refined IRENA Renewable Costing Alliance.*	**Completed. Ongoing.** • 5000 new projects added to the cost database. Database now has LCOE data for 14,500 projects.	• One report on grid parity in the power sector.	**Resources not identified.**	Q1 2016 Q4 2017
	• Costing report on Biofuels for Transport.*	**Not started. Delayed to 2017.**	• One renewable energy investment volume report.	**Resources not identified.**	Q4 2016
	• Papers on cost or competitiveness topics including power generation updates in 2016 and 2017, renewable energy finance costs, wind learning curve decomposition, energy storage and self-consumption.*	**In progress.** • Finalisation of wind learning curve analysis. • Collection of publically available analysis and data underway for the energy storage report. • Data for 2016 power generation costs update has been finalised. Peer review underway.	• Renewable energy competiveness indicators by country and application.	**In progress.** • Data collection including on PPAs in progress. *VC from the Government of Germany.*	Q4 2016 Q4 2017
			• Global Atlas on economic solar PV applications.	**Resources not identified.**	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Renewable energy costs (continued)	• Quarterly PV Parity Indicator tool applied.*	**In progress.** • PV parity tool has been developed. First quarterly report covering California and Germany completed.	• Regional analysis on cost reduction opportunities for solar and wind technologies.	**Completed.** • Cost reduction potential for solar and wind to 2025 released in June. *VC Government of Germany.*	Ongoing
			• Cost data collection methodology developed and applied for renewable energy in China and other countries.	**Resources not identified.**	Q4 2016
Renewable energy benefits	• Global report on Renewable Energy and Jobs - Annual Review 2016 and 2017.	**In progress.** • Annual Review 2016 launched at the 11th Council. • Annual Review 2017 to be launched in May 2017.			Q2 annually
	• Report on maximising value creation from one renewable energy technology.	**In progress.** • Scope defined and report under preparation.	• Global report on maximising value creation from geothermal deployment (web-based).	**Resources not identified.**	Q4 2017
			• Guide for policy makers to disseminate lessons learnt on maximising value creation from other renewable energy technologies and applications.	**Resources not identified.**	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Renewable energy benefits (continued)			• Global report on maximising value creation for renewables-based heating and cooling applications (web-based).	**Resources not identified.**	Q4 2016
	• Global report on the structural and distributional economic dimension of renewable energy deployment.	**In progress.** • Scope defined and report under preparation.			Q4 2017
			• Regional report on socio-economic impacts of renewable energy deployment (web-based).	**Resources not identified.**	Q4 2016
			• Analysis of the socio-economic impacts from renewable energy deployment by 2030 in selected countries.	**In progress.** • Analysis expanded to 2050. *VC from the Government of Germany.*	Ongoing
			• Report: the potential role of RE for energy security and resilience, including the impact of renewables on electricity security.	**Resources not identified.**	Q4 2017
Policy options to accelerate deployment	• Global report on state-of-the-art analysis of innovative policy design and practice.	**In progress.** • Concept identified and work started on analysing innovative design elements of instruments to support deployment.	• Policy guide on analysis of growth in decentralised generation on decision-making in the power sector.	**Resources not identified.**	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Policy options to accelerate deployment (continued)			• Country analysis (4 countries) of policy and institutional frameworks, selected socio-economic impacts, the nexus of water-food and energy.	**Resources not identified**	Q4 2017
	• Update of the policy and measures database.	**In progress.** • First biannual call to update the database sent in April. In 2016, 15 new countries and 220 new entries have been added.	• Regional report on policy status and trends based on policy and measures database.	**Possible resources identified.**	Q4 2017
	• Regional report on market analysis of policies and trends for renewable energy in Southeast Asia.	**In progress.** • Scope defined and regional stakeholder consultation ongoing.	• Report on good practices in policy design.	**Resources not identified.**	Q4 2017
			• Two thematic briefs providing in-depth analysis of emerging regional policy themes.	**Resources not identified.**	Q4 2017
Financing renewables	• IRENA's country-level public-sector investment statistics as an authoritative dataset and basis for analytical work.	**In progress.** • Annual data collection concluded and published as part of statistics publication. • Dashboard on public renewable energy investments updated and available through REsource.	• Analysis of financial structures for RE projects.	**In progress.** • Public finance database has been expanded to capture financial instruments used. *VC from the Government of Norway.*	Ongoing Q2 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Financing renewables (continued)	• Analysis of the linkages between policies, incentives, public investments and achievement of renewable energy targets.	**In progress.** • Ongoing data evaluation and literature review.	• Two high-level expert meetings to feed into the process of the report writing/study.	**Resources not identified.**	Ongoing Q2 2017
	• Global report on the state-of-play of financial instruments and structures to mobilise institutional investors in the RE sector.	**In progress.** • Concept under development.	• Conference and working papers on financial risk mitigation instruments.	**Resources not identified.**	Q4 2017
	• Collaboration with the GCF.	**In progress.** • Focus on GCF readiness support and links with GCF secretariat.	• Expert meetings on public finance for RE.	**Resources not identified.**	Ongoing
Project facilitation	• Regional Marketplace portals for RE projects in Africa, LAC region and SIDS also open to energy efficiency projects.	**Completed.** • Regional marketplace portals for RE in Africa, LAC and SIDS added to marketplace. • Energy Efficiency project types added and eligible to register on all portals.	• Renewable energy project facilitation activities expanded to include all of the developing world and expanded active facilitation.	**In progress.** • Expansion of SEM is underway. *VC from the governments of France and Germany and through partnerships with MDBs/IFIs etc.*	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Project facilitation (continued)	• At least six events focused on capacity building.*	**Not started.**	• Capacity building workshops and webinars to support project preparation and capturing results.	**Ongoing.** • Leveraging IRENA's presence at various events. *Additional resources still required.*	Ongoing
			• Selection of projects for the 4th and 5th cycle of the IRENA/ADFD Project Facility.	**In progress**. • 4th cycle completed, to be announced in January 2017. *VC provided by ADFD.*	Q4 annually
	• Two technical concepts for Project Navigator.*	**In progress.** • In the process of defining concept.	• Two additional technical concepts for Project Navigator.	**Resources not identified.**	Q4 2017
	• Project development assistance through Project Navigator.*	**Completed.** • Training sessions in Djibouti and Addis Ababa. • Online Training for AfDB. • Webinar on Utility-scale PV Projects. • Trained over 120 workshop participants, reached over 600 people through other outreach activities. **In progress.** • Planning for "Train-the-trainer" workshop in Egypt. • Webinars to provide guidance for island projects.	• Additional Project development assistance through Project Navigator.	**Resources not identified.**	Q4 2017

Thematic area: Renewable energy access for sustainable livelihoods					
Objective: Improved livelihoods through access to renewable energy					
Resources (core assessed, non-assessed and other sources): 4,323 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
Decentralised solutions for access	• Third International Off-grid Renewable Energy Conference and Exhibition and associated follow-up activities to promote an enabling environment.	**Completed.** • IOREC took place from 30 September to 1st October 2016. The event was organised in partnership with the Kenyan Ministry of Energy and Petroleum, and ARE.	• Regional thematic workshops on specific deployment barriers and issues identified during IORECs.	**Resources not identified.**	Q4 2017
	• Development of the framework for the Off-Grid Renewable Energy Policies database.	**In progress.** • Scoping exercise of existing databases being conducted to define framework.	• Inclusion of off-grid policies from at least 20 countries in the Off-Grid Renewable Energy Policies database.	**Resource not identified.**	Q4 2017
	• Global report on policies to maximise socio-economic benefits of off-grid applications.	**In progress.** • Scoping in progress, discussion of potential case studies with potential partners ongoing.	• Working papers on innovative business models to accelerate financing of off-grid solutions.	**Resources not identified.**	Q2 2017
	• Develop and apply methodologies on decentralised renewable energy system planning.*	**Not started.**			Q4 2017
	• In-depth technical guide for mini-grids and their characteristics.*	**Completed.** • Launched at IOREC.	• Briefs on policies and regulatory measures to support renewable energy-based mini-grid deployment.	**Completed.** • Launched at IOREC.	Q4 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Applied decentralised solutions			• Technical reports to assess resource data on decentralised potentials within the Africa Clean Energy Corridor RE Zoning work.	**Resources not identified.**	Q4 2017
			• Additional advisory services on policy frameworks, business models and technology solutions, with regional and country-specific approaches on decentralised electrification solutions.	**Resources not identified.**	Ongoing
	• Advisory services to identify capacity needs and develop a regional action plan on RE mini-grids in the ECOWAS region.	**In progress.** • Capacity Needs Assessment for the deployment of renewables-based mini-grids ongoing, in collaboration with ECREEE.	• Additional advisory services in the ECOWAS region to identify capacity needs and develop a regional action plan on RE mini-grids.	**Resources not identified.**	Q4 2016
	• Advisory services to strengthen RE enterprises to develop bankable projects under the ECOWAS Renewable Energy Entrepreneurship Support Facility.	**Completed.** • The second call for proposals for the Facility finalised. Technical Committee meeting held in June 2016, Steering Committee meeting held in August 2016 and two technical training workshops held in September and November 2016.	• Additional advisory services to explore the replication of the ECOWAS Renewable Energy Entrepreneurship Support Facility in other regions.	**Resources not identified.**	Q4 2017
			• Training for small and medium scale entrepreneurs and financial institutions on renewables-based electrification solutions in sub-regions of Africa and in Asia.	**Resources not identified.**	Q4 2017

Thematic area: Regional action agenda					
Objective: Regional integration with increased shares of renewables to meet energy needs					
Resources (core assessed, non-assessed and other sources): 16,250 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
Africa Clean Energy Corridor	• Workshop to validate identified wind, solar PV and CSP zones.	**In progress.** • Consultations underway with regional partners on ground validation of identified zones.	• Additional workshops and partnerships to validate identified wind, solar PV and CSP zones and enable incorporation into national and regional energy planning processes.	**In progress.** • Projects of regional importance are being developed for submission to the power pools and PIDA. Incorporation of the zoning work into the national energy master plan in Swaziland. *VC from the Government of Norway.*	Ongoing
			• Advisory services to enable ACEC countries independently develop the identified zones.	**Resources not identified.**	Ongoing
			• Regional technical guide of good practice for calculating cost reflective tariffs and establishing sufficient investment incentives into renewables.	**Resources not identified.**	Q1 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Africa Clean Energy Corridor (continued)	• Advisory services on policy and legislative support through Renewables Readiness Assessments.	**In progress.** • The RRA process completed in Zimbabwe; the report is under finalisation.	• Additional advisory services on policy and legislative support through Renewables Readiness Assessments.	**In progress.** • The RRA process completed in Tanzania. The report will be published in January 2017. *VC from the Government of Norway. Additional resources required*	Ongoing
	• Workshop for stakeholder consultation to update the zoning study.	**In progress.** • Consultations underway with national and regional partners on methodology for updating.	• Additional workshops for stakeholder consultation to update the zoning study.	**Resources not identified.**	Q4 2016 Q4 2017
	• Training for regulators on power systems operating with higher shares of VRE.	**Completed.** • The first stakeholder consultation workshop took place in Namibia, 18-19 April.	• Additional training for regulators on power systems operating with higher shares of VRE.	**Resources not identified.**	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Africa Clean Energy Corridor (continued)	• The ACEC Consultative Forum to facilitate partnerships and dialogue.	**In progress. Adjusted.** • This deliverable was adjusted to align with the new framework for all energy related initiatives in Africa. An existing platform such as the African energy Leaders Group will be used.	• Regional guide of good practice for power system development and technical report for application in a pilot country.	**In progress.** • Interviews with global practitioners and pilot country stakeholders currently ongoing. *VC from the Government of Norway.* *Additional resources required.*	Ongoing Q1 2017
	• Partnerships and advisory services for ACEC action agenda development and implementation in West Africa.	**In progress.** • An action agenda adopted at the West Africa Energy Ministers' Meeting in December 2016. • Development of joint work programme with the West Africa Power Pool. • The RRA process has started in Mali. • Scoping work for the solar component of the WACEC initiated in partnership with ECREEE and EU TAF.	• Additional advisory services to implement the action agenda for ACEC West Africa.	**In progress.** • Analysis and detailed maps of technical potentials produced for solar, wind on- and off-grid. *Additional resources required.*	Q2 2016 Ongoing
			• Training in the areas related to the implementation of the action agenda for ACEC West Africa.	**Resources not identified.**	Q3 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Central America Clean Energy Corridor	• Advisory services to finalise the action agenda by the governments.	**Completed.** • CECCA strategy endorsed by regional Energy Ministers.			Q2 2016
	• Platform to establish partnerships and operationalise dialogue.	**In progress.** • Detailed activities of the CECCA strategy implementation developed in coordination with relevant regional, national and development partners, incl. IADB, USAID, GIZ.	• Advisory services to support SICA/SIEPAC.	**Resources not identified.**	Q2 2016 Q4 2017
	• Training for national and regional system operators on RE grid integration.	**Not started.**	• Technical report on the identification of maximum penetration levels of variable renewable energy under secure conditions in the regional system.	**Resources not identified.**	Q3 2017 Q4 2017
	• Technical report for an assessment of the monitoring and control system, control room tools and operating practices currently in place	**In progress.** • Technical enabling component of the initiative under finalisation. • A technical stakeholder workshop organised in October 2016 as part of the scoping of the work for pilot implementation of the VRE integration study in Panama.	• Training for national and regional regulators on regulatory governance frameworks for RE grid integration.	**Resources not identified.**	Q4 2016 Q3 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Central America Clean Energy Corridor (continued)	• Advisory services for the implementation of regulatory governance frameworks for RE grid integration.	**In progress.** • Regulatory enabling component of the initiative under finalisation.	• Additional advisory services for the implementation of regulatory governance frameworks for RE grid integration.	**Resources not identified.**	Q4 2016 Q4 2017
			• Workshop for scoping of activities in line with the CECCA strategy.	**In progress.** • A stakeholder workshop held in Panama on 26-27 October 2016 as part of policy and regulatory scoping for the regional implementation as well as piloting of the national implementation in Panama. • A technical stakeholder workshop organised in Panama on 28 Oct 2016 as part of the scoping of the work for pilot implementation of the VRE integration study in Panama. *Resources provided by GIZ and Economic Commission for Latin American countries (ECLAC).*	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Emerging Clean Energy Corridors	• Advisory services to develop and implement the action agenda for ASEAN Clean Energy Corridor by the governments.	**In progress.** • The first consultation workshop held in collaboration with ASEAN Center for Energy. • The second consultation workshop took place in Thailand in mid-June. • The action agenda focusing on greening ASEAN Power Grid under development.	• Additional advisory services to implement the action agenda for ASEAN Clean Energy Corridor by the governments.	**Resources not identified.**	Q2 2016 Ongoing
	• Platform to establish and operationalise dialogue, cooperation and coordination among the key ASEAN regional and national stakeholders.	**In progress.** • Cooperation with ASEAN institutions (ASEAN Secretariat, ACE, and HAPUA) as well as key regional partners established. • Preparations of a joint initiative to facilitate the integration of renewable energy into the regional power mix under development in collaboration with the ASEAN Renewable Energy Sub-Sector Network.	• Training in the areas related to the implementation of the action agenda for ASEAN Clean Energy Corridor.	**In progress.** • A workshop on technology, policy and finance was held in Thailand in mid-June. • An ASEAN wide capacity building workshop under preparation covering the key elements in the draft action plan for Greening APG. *VC from the Government of Japan.*	Ongoing
Enabling regional action	• Advisory services to develop the PACE action agenda by governments.	**In progress.** • Gap Analysis for Maghreb region under finalisation.	• Additional advisory services to implement the PACE action agenda.	**Resources not identified.**	Q4 2016 Q4 2017

Component	Activities	Timeframe**

	Core	Status	Other sources	Status	
Enabling regional action (continued)	• Platform for dialogue, cooperation and coordination among the key PACE regional and national stakeholders.	**In progress.** • Regional stakeholder consultations under preparation schedule for January 2017.	• Additional training to help key stakeholders in PACE countries advance the action agenda.	**Completed.** • A workshop on Power Purchase Agreement for RE organised in conjunction with MENAREC6 outlining key aspects for developing bankable PPAs. *VC from the Government of Germany.* *Additional resources required.*	Q2 2017[4] Q4 2017
	• Action plan for IRENA's engagement in the South-eastern Europe.	**In progress.** • Regional meeting with Embassy representatives held in the IRENA HQ. • South East Europe regional consultative meeting took place in Romania in October 2016. • Regional gap analysis study conducted to identify needs and priorities of the region in the development of RE.	• Workshops for stakeholder engagement and technical reports on potential for RE integration in national plans in South-eastern Europe.	**In progress.** • Reports under finalisation to assess cost-effective potential for RE generation in SEE. • A joint IRENA-Energy Community workshop held in Austria in March 2016 on preliminary findings. *VC from the Government of Germany.*	Q4 2016 Q4 2017

[4] Timeframe adjusted.

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Enabling regional action (continued)	• Develop an action agenda for a regional approach for RE development in Central Asia.	**In progress.** • First round of consultations has taken place in Baku on 20 October, where feedback was received from experts in the region on the needs and challenges in the development of renewables in Central Asia.			Q4 2016
	• Platform for dialogue, cooperation and coordination among the key Central Asia regional and national stakeholders.	**In progress.** • Regional meeting with Embassy representatives held in the IRENA HQ. • Mission to Kazakhstan in February to discuss support to the EXPO-2017.	• Advisory services in the areas related to the implementation of the action agenda for Central Asia.	**Resources not identified**	Q4 2016 Q4 2017
Country support and advisory services	• 6 RRA Country Reports.	**In progress.** • RRA Egypt, Thailand, Tunisia, Mali, Panama.	• Additional RRA Country Reports.	**Completed.** • RRA Mongolia • RRA Antigua and Barbuda **In progress.** • Pakistan, Philippines and Tanzania and Zimbabwe Additional RRAs are reported under SIDS Lighthouses, in Thematic Area V. *VC from the Governments of Japan and Norway.*	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Country support and advisory services (continued)			• Incorporate the integrated resource approach in IRENA's Renewables Readiness Assessment methodology and country reports.	**Resources not identified**	Ongoing
			• Advisory service for the implementation of RRA recommendations including technical advice on statistics, energy planning, resource assessment, finance, etc.	**Completed.** • Post RRA support to Mozambique in the area of RE investment. Workshop held in November. **In progress.** • Post RRA support to Mauritania planned. *VCs from the Governments of Norway and the UAE.*	Ongoing
			• Advisory services for Indonesia REmap/RRA pilot.	**Adjusted.** • Process initiated to develop a combined REmap/RRA for Thailand. • RRA consultative workshop envisaged in November 2016. *VC from the Governments of Germany and Japan.*	Q1 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Country support and advisory services (continued)	• Advisory services and training for post-RRA implementation upon country requests.	**In progress.** • A workshop on project development and resource assessment was held in July in Djibouti.	• Additional post RRA services.	**Resources not identified.**	Ongoing
			• Advisory services for the development of an implementation plan based on the recommendations from the RE manufacturing report for three North African countries.	**Resources not identified**	Q4 2017
			• Methodology of renewables manufacturing potential applied in additional countries.	**In progress.** • An additional study for Lebanon, Jordan and UAE under development in collaboration with UNESCWA. *VC from the Government of Germany.*	Q1 2017 - Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Country support and advisory services (continued)			• Advisory services in support of the design and implementation of power system governance structures.	**Resources identified.** • Work initiated in Mexico in support of power sector reform. • Work initiated in South Africa to explore the scaling of the REIPPP approach. Workshop held in Cape Town in November. *VC from the Government of Germany.*	Q2 2017
			• Technical assistance and training to the key stakeholders in the formulation of ASEAN renewables target implementation plans.	**Resources not identified.**	Q4 2017
			• Additional advisory services upon request.	**Resources not identified.**	Q1 2017
			• Technical report and support for MENAREC 6.	**Completed.** • MENAREC6 successfully implemented. *Support provided by the German Government and support by regional partners (LAS, UNESCWA, RCREEE).* *VC from the Government of Germany.*	Q2 2016

Thematic area: Islands: lighthouses for renewable energy deployment					
Objective: Island energy systems transformed through renewable energy					
Resources (core assessed, non-assessed and other sources): 3,743 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
SIDS Lighthouses	• Grid studies support (2 island studies).*	**In progress.** • VC leveraged core resources. See status under other sources.	• Support to and management of the SIDS Lighthouses Initiative.	**In progress.** • Support and management of the SIDS Lighthouses Initiative. • Grid studies are under development. Support to Kiribati and Samoa is being provided in parallel to study development. *VC from the Governments of Germany, New Zealand and Norway.*	Q4 2017 Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
SIDS Lighthouses (continued)			• Advisory services including Quickscans, Renewable Readiness Assessments, Roadmaps, Resource Assessments, Grid Integration Studies and Transition Plans.	**Completed.** • RRA for Antigua and Barbuda • Kiribati and Barbados Roadmaps • SIDS Lighthouses technical workshop in Cuba • Grid integration study for Antigua and Barbuda and Cook Islands • Follow-up grid integration study for Samoa • Supported the grid study for Kiribati • Power sector assessment of the Dominican Republic **In progress.** • Roadmap for Palau and Federated States of Micronesia • Grid integration study for Vanuatu and Fiji • Methodology report *"A Methodological Guide for Technical Studies"* • Guide on *"Electricity systems in small island developing states with variable renewable energy"* • Dominican Republic has joined the SIDS Lighthouses Initiative. Scoping work on power system analysis for Dominican Republic. • Scoping of follow up collaboration with Cuba *VCs from Governments of Germany, Japan, New Zealand, and Norway. Additional resources required.*	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
SIDS Lighthouses (continued)			• Training workshops to address legal, regulatory, institutional, human resource and other constraints supported	**Completed.** • A training workshop coordinated with government of Japan for nine Pacific SIDS and the Maldives to further explore enabling environments necessary to support the widescale deployment of renewable energy (February). • Technical workshop in St. Maartin on grid integration and planning (July). • Technical Session in Pacific Power Association Conference on grid integration planning and storage, in Tonga (August). • Training workshop on RE investment for Pacific SIDS conducted in coordination with the government of Japan, government of the U.S., and the Pacific Community (December). *VCs from Government of Germany, Japan, The Netherlands, and New Zealand.*	Q4 2017
			• Tools for monitoring, evaluating, communicating progress of the initiative, and sharing knowledge developed	**In progress.** *VC from Government of Germany*	Q4 2016
Global Renewable Energy Islands Networks (GREIN)			• GREIN platform continuously updated for the sharing of best practices and case studies related to the GREIN cluster areas.	**Adjusted.** • GREIN consolidated under the Lighthouses umbrella. *VC from the Government of Germany*	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Global Renewable Energy Islands Networks (GREIN) (continued)			• Dissemination of information through cluster-specific webinars, newsletters, etc.	**Completed.** • Finalised a study on renewable energy desalination opportunities for the country of Kiribati. Workshops held in St. Lucia and Fiji on use of ESCOs in tourism sector held in July 2016. **In progress.** • A study on the use of ESCOs in the tourism sector in the Caribbean is under review. • A study on RE desalination opportunities for the country of Cabo Verde is under review. • Case studies on the use of RE in the tourism sector in the Caribbean are under review. *VC from the Government of Germany and Norway.*	Ongoing
			• Regional workshops and other meetings to facilitate dialogue across and among regions and islands.	**Adjusted.** See reporting under Lighthouses.	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Enabling projects in islands			• Development and execution of at least 3 bankable RE projects in partner countries.	**In progress.** • Site suitability assessment ongoing with Global Atlas. Projects identified and screened through the Sustainable Energy Marketplace. *VC from the Government of Germany.*	Q4 2017
			• Partnerships developed with expert institutions to provide targeted support in planning, identifying, structuring, and executing viable renewable energy projects in SIDS.	**In progress.** • Call for proposals for project preparation grants in Caribbean in cooperation with IADB. *VC from the Government of Germany.*	Ongoing

Thematic area: Gateway to knowledge on renewable energy					
Objective: Renewable energy knowledge accessible to all					
Resources (core assessed, non-assessed and other sources): 11,658 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
RE Statistics	• RE Statistics Database: Provisional estimates of RE capacity on REsource six months after year-end, with final figures for capacity and energy balances within 18 months.	**Completed.** • Capacity data published March. Complete dataset published June 2016. **Not started.** • Data update for 2017.	• Working paper: lessons learnt from case studies in renewable energy data collection	**Resources not identified.**	Q4 2017
	• Statistics training: two training courses held in countries and regions where renewable energy data is relatively weak, leading to improved response rate to IRENA annual statistics questionnaire.	**Not started.** The use of VC resources prioritised.	• Two additional training courses and further capacity building support to improve quality and completeness of renewable energy statistics, including for decentralised off-grid solutions.	**Completed.** • Training course held in South Africa in September 2016. *In kind contribution from Denmark.* **In progress.** • Planning training course for East and South east Asia region, for end November in Bangkok. • Planned training workshop in Eastern Europe, in Budapest in December 2016. *VC from the Government of Germany and funding from FAO.*	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
The Global Atlas	• Maintenance of solar and wind Atlas, including demonstration for measurement data collected by governments, donors and public finance entities.	**In progress.** • Measurement data adjusted. • Development of an approach for site characterisation (wind).	• Technical infrastructure assessments, *e.g.* cities, highly-populated areas in developing countries, etc.	**Resources not identified.**	Ongoing Q4 2016
			• Refinement and completion of new data set of marine & hydro, including zoning tools and working papers.	**Resources not identified.**	Ongoing
	• Completion of bioenergy and geothermal, including zoning methodology and tools.	**In progress.** • Bioenergy tool is near completion. • Development of a wind costing service.	• Global Atlas training sessions (webinars and workshops) and constantly updated training module on how to use maps and data in the policy formulation process.	**Resources not identified.**	Ongoing
			• Preliminary high potential renewable energy zones identified based on zoning methodology.	**In progress.** • Zoning (suitability analyses) for South America, GCC, West Africa, South East Europe.	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Quality infrastructure, standards and patents	• INSPIRE platform refinement, outreach and dissemination.*	**In progress.** • INSPIRE Patents database updated with 2015 data.			Ongoing
	• Technical QI analysis report for 1) utility-scale PV and 2) smart-grids or mini-grids. *	**In progress.** • Utility-scale PV.	• QI analysis reports for additional technologies upon request	**Resources not identified.**	Q4 2016 Q4 2017
			• Advisory services and two workshops on the development and implementation of Q1 frameworks for renewable energy technologies for two countries/regions.	**In progress.** • Advisory service to Latin American countries on quality infrastructure for RE, and contribution to Mexico solar water heaters quality control strategy.	Q4 2017

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Quality infrastructure, standards and patents (continued)			• Advisory services and workshop on Accreditation and Certification of training institutions and their programmes based on established and new regional certification schemes.	**Resources not identified.**	Q2 2016 - Q3 2017
	• Workshops with selected training institutions for the implementation of a regional certification scheme for solar PV installers.	**In progress.** • The second phase of the certification scheme for solar PV installers under development.	• Advisory services and workshop on the international accreditation of selected training institutions and their programmes.	**Resources not identified.**	Q2 2017 Q4 2017
	• Advisory services and workshop for the international accreditation of the certification scheme.	**Not started.**	• Advisory services and workshop for the establishment of the regional certification scheme.	**Resources not identified.**	Q4 2017 Q4 2016
			• Advisory services and workshop for the creation of the administrative structure of the programme.	**Resources not identified.**	Q4 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Enhancing environmental and resource sustainability	• Policy guide on best practices to enable a sustainable scale-up of renewable energy applications that positively impact water and food security.	**Not started.**	• Reports on environmental impacts of solar, wind and geothermal technologies.	**Completed.** • Publication on *End of life management of PV panels*. In collaboration with IEA PVPS. *VC from the Government of Germany.*	Q4 2017 Q4 2016
			• Working paper quantifying the environmental impacts and benefits relative to other energy technologies.	**Resources not identified.**	Q4 2016
			• Public guidelines for renewable energy environmental impact assessment for public financial institutions. Workshop with financial institutions.	**Resources not identified.**	Q2 2017
			• Eight briefs (case studies) to showcase the benefits of renewable energy in the water, energy and food nexus.	**Resources not identified.**	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Knowledge Hub	• Maintenance and expansion of the REsource platform.	**In progress.** • Integration of all IRENA data into a single knowledge hub.	• Creating "specialised" mini-REsource platforms for other IRENA projects.	**Resources not identified.**	Ongoing
			• Making REsource multi-lingual, *i.e.* making the platform available and searchable in several languages.	**Resources not identified.**	Ongoing - Q4 2016
			• Further expansion of REsource by validating and integrating reliable external content of third parties.	**In progress.** • Limited external content integrated in the data section with in-house human resources. *To integrate larger external content additional funding is required.*	Ongoing
			• Advisory services to countries and public entities seeking to develop similar knowledge platforms.	**Resources not identified.**	Ongoing
Multi-stakeholder engagement	• Expand and operationalise the IRENA Coalition for Action.	**In progress.** • Overall support to the Coalition, engagement with additional partners and identification of opportunities for collaboration.	• Support work to develop a consumer label in cooperation with industry and civil society organisations.	**Adjusted.** • Initial step will be the development of RE Corporate Index. *Seed resources identified.*	Ongoing Q2 2016

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Multi-stakeholder engagement (continued)			• Organise an annual high-level meeting of the Coalition.	**Resources not identified.**	Q2 2016 Q1 2017
			• Maintain and moderate the public debate on the IRENA Community.	**Adjusted.** • Phasing out of the IRENA Community.	Ongoing
			• Maintain and expand the four databases of the IRENA Learning Platform.	**Adjusted.** • Streamlining IRELP to a single course database.	Ongoing
			• 'Model IRENA' simulations, including extensive preparatory trainings.	**Resources not identified.**	Ongoing
			• Regular university and school visits in the Host Country.	**Resources not identified.**	Q4 2017
			• Design, maintain, coordinate and launch the IRENA renewable energy e-learning initiative.	**Adjusted.** • Focus on RE skills gap.	Q2 2016
	• Hosting of legislators' meeting on the side-lines of the Sixth Assembly and the preparation of the second legislators meeting*.	**Completed**. • The first forum successfully completed on 15 January 2016. **In Progress.** • Preparations for the second legislators forum, to take place on the sidelines of the 7th Assembly.	• Outreach to legislators and other parliamentary stakeholders and dissemination of tailored RE information.	**Resources not identified.**	Ongoing

Thematic area: Enhancing international cooperation and communications and outreach					
Objective: Actively engage Members, leverage strategic partnerships and communicate with stakeholders and the public					
Resources (core assessed, non-assessed and other sources): 17,237 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
Facilitating international cooperation	• Ongoing support to Members.	**In progress.**			Ongoing
	• Two Assembly meetings and related events.*	**In progress.** • 6th session of the Assembly successfully held. • Preparations for the 7th Assembly in progress.			Ongoing
	• Increased number of IRENA Members.	**In progress.** • Six new Members in 2016 to date.			Ongoing
	• Four Council meetings and related events.*	**In progress.** • 11th and 12th meetings11th meeting of the Council successfully held.			Ongoing
	• Meetings of subsidiary bodies, as necessary.*	**In progress.** • Meetings of subsidiary bodies at the 11th and 12th Council meetings successfully held.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Facilitating international cooperation (continued)	• IRENA booth at WFES. *	**In progress.** • 14 programmatic meetings held during WFES 2016. • Preparations for WFES 2017 in progress.			Ongoing
	• Increased programme-related communication to Member States.*	**In progress.** • 6 Bulletins, 6 In Focus briefs, 7 'Publication Updates' and additional information messages on IRENA activities circulated.			Ongoing
	• Further development of content and functionalities of online portal for Members.*	**In progress.** • REmember updated as required.			Ongoing
	• Facilitate engagement of Permanent Representatives in the Agency and heightened outreach to other Permanent Missions at Headquarters.*	**In progress.** • 14 new Permanent Representatives in 2016. • 5 Permanent Representative meetings held.			Ongoing
	• Development of a Member communication network.	**In progress.** • Contact made with IRENA focal points to connect with national communication counterparts.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis.	• Communications strategies.	**In progress.** • Developed 2016 communications strategy, including a series of thematic campaigns. • Conducted major campaigns for IRENA 6th Assembly, REmap 2.0, IRENA's 5th Anniversary, IRENA Innovation Week, Renewable Energy and Jobs Annual Review, The Power to Change, Clean Energy Ministerial, Intersolar Europe and the Summer of Solar, and IOREC. • Campaigns for Habitat III and COP22 completed. • Conducted focused campaigns for a range of products and events.	• Educational videos and infographics to simplify complex renewable energy concepts.	**Resources not identified.**	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis (continued)	• Social media campaigns and digital platforms to support IRENA's initiatives and expand knowledge on renewable energy.*	**In progress.** • Conducted social media campaigns on IRENA 6th Assembly (#IRENA6A), REmap 2.0 (#REmap) and IRENA's 5th Anniversary (#REthenandnow), Summer of Solar (#summerofsolar); COP22 (#REenergise). • Twitter followers increase by 101% (year to date). • Facebook increase by 46% and LinkedIn followers increase by 38%. • Started new Instagram account.			Ongoing
	• Editorial maintenance of IRENA web properties and digital media.	**In progress.** • Revamping of irena.org website underway. • Search Engine optimisation of web pages underway. • Website content updated weekly.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis (continued)	• Digital media production and distribution.*	**In progress.** • Designed and disseminated 184 infographics based on IRENA events / products / data. • Created 56 promotional videos. • Distributed 39 press releases in seven languages. • Developed 79 Newsroom articles. • Regular op-eds by Director-General on his Huffington Post page.			Ongoing
	• Press conferences, webinars.	**In progress.** • Conducted 13 press events. • Garnered coverage via 10,900 articles in +130 countries.			Ongoing
	• Strengthened media and stakeholder lists.	**In progress.** • Consistently update global media lists based on coverage/media queries. • Procured new tool to gain access to 2.5 million journalists worldwide.	• Increase language-specific capacity and production of language-specific communications materials.	**Resources not identified.**	Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis (continued)	• Agency-wide publications coordination, planning, production and communications support.	**In progress.** • Release of 39 reports and briefs in 2016 to date (30 November) with reader-friendly web content and targeted communication. • ISBN designations to increase global visibility and impact. • Global, regional, national, thematic or interest-specific press and social media support for IRENA publications.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis (continued)	• Editing, translation, proofreading and graphic design to support programmatic publishing outputs.*	**In progress.** • Released REmap global report summary in seven languages. Key findings or • Agency messages in all UN and other languages. • Targeted regional or country-specific translations, such as joint brief with China Water Risk in Chinese and Latin America market analysis and REmap Dominican Republic summaries in Spanish. • Collaboration with Kazakhstan to translate key recent publications for Astana EXPO 2017. • Dialogue with Members and specialist institutes to further strengthen translation process.			Ongoing
	• Planning and implementation of programmatic events in support of the Work Programme.*	**Ongoing.** • Support provided for IRENA programmatic events.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Dissemination of knowledge, data and analysis (continued)			• Conduct RE training programmes for journalists, media organisations and spokespersons.	**Resources not identified**	Ongoing
			• Develop strategic media partnerships and engagements to expand coverage of IRENA activities.	**Resources not identified.**	Ongoing
			• Conduct media relations events in target markets.	**Resources not identified**	Ongoing
Strengthen institutional structures and accountability	• Facilitating the full implementation of the Headquarters Agreement and the Agreement on the IITC Seat.	**In progress.** • Discussions with the Government of the UAE on a supplementary agreement to govern IRENA's occupancy of its permanent headquarters in Masdar City. • Regular meetings with Host Countries to address issues of mutual interest.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Strengthen institutional structures and accountability (continued)	• Outreach to increase the number of Members granting privileges and immunities to IRENA.	**In progress.** • IRENA continues to engage with States to encourage them to take actions for the implementation of Assembly decision A/3/DC/5 on an Agreement on Privileges and Immunities for IRENA. • Egypt, Germany, Poland, Spain and the United States have implemented this decision.			Ongoing
	• Further enhancing the protection of IRENA and its interests.	**In progress.** • Continuous provision of the necessary legal support.			Ongoing

Thematic area: Administration and Management Services					
Objective: Support the Agency's programmatic work through comprehensive and efficient business processes that foster accountability and transparency.					
Resources (core assessed, non-assessed and other sources): 11,174 (in USD thousands)					
Component	**Activities**				**Timeframe****
	Core	**Status**	**Other sources**	**Status**	
Finance	• Comprehensive finance support to the Agency.	**In progress.** • Timely processing of Payroll and Payment; Funds invested and monitored; Accounts prepared and updated. Monthly and year-end financial closure.	• Voluntary Contribution Reporting.	**In progress.** • Reporting system for voluntary contributions institutionalised. *Resourced by Programme Support Costs.*	Ongoing
	• Audited IPSAS compliant Financial Statements.	**In progress.** • Financial Statements for Agency and Staff Provident Fund for 2015 prepared and audited; preparation for 2016 audit ongoing.			Q2 2016 - Q2 2017
	• Streamlined, efficient and accurate business process.	**In progress.** • Advice and Support provided to internal and external stakeholders; Annual billing of assessed contributions completed; collections follow-up ongoing.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Budget	• Comprehensive budgetary support to the Agency.	**In progress.** • Annual 2016 core budgetary allotments prepared and issued. • Preparing for issuance of 2017 allotments. • Voluntary Contributions allotments prepared and issued; Funds availability certified and reported upon.			Ongoing
	•Streamlined, efficient and accurate budgetary process.	**In progress.** • Advice and support provided to different Agency stakeholders. • Enhancement and monitoring of updates to budgetary systems and applications. • Monitoring and update of funds reservations and requests.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Information and Communication Technology	• Comprehensive IT services to the Agency in all of its physical locations.*	**In progress.** • Global connectivity and 24 x 7 communication services. • Email services and collaboration support. • Technology support for knowledge management. • Helpdesk support. • Operational support for ICT portals and websites.			Ongoing
	• ERP for IRENA in supports of integrated resources management and controls.	**In progress.** • Comprehensive review of the technology and deployment modalities as well as the review and adaptation of business processes.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Information and Communication Technology (continued)	• Streamlined, efficient and accurate business process.*	**In progress.** • In-sourcing of ICT support is completed. • Business process optimisation ongoing.			Ongoing
Human Resources	• Comprehensive HR support services.	**In progress.** • Ongoing administration of staff benefits and entitlements. • Performance evaluation system refined and new Performance Appraisal Forms and Guidelines completed. • 42 vacancies for fixed-term and temporary appointments and Junior Professional Associate positions were advertised for which over 13,000 applications were received.			Ongoing
	• Development of the workforce planning strategy.	**In progress.** • A thorough review of vacancy rates and turnover trends completed.			Q2 2016
	• Facilitate work-life balance	**In progress.** • Review of proposals for work-life balance.			Ongoing
	• Systematic induction programme designed and implemented in all IRENA offices, including ethics training.	**In progress.** • Regular induction sessions held. Participant feedback fed into development of induction material.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
Human Resources (continued)	• Periodic staff training and development programs, including on performance management.	**In progress.** • Needs assessment underway.			Ongoing
	• Streamlined, efficient and accurate human resource process.	**In progress.** • Ongoing review, evaluation and revision of the HR rules, policies and processes, manuals and templates, as required.			Ongoing
Procurement	• Comprehensive procurement support.	**In progress.** • Call for expression of Interest EOI for Renewable Energy Consultancy services and market research to expand the vendor's database for competitive bidding.			Ongoing
	• Master Procurement plan for increased efficiency.	**In progress.** • Completed for 2016.			Q1 2016 - Q1 2017
	• Streamlined, efficient and accurate procurement process.	**In progress.** • Procurement SLAs were developed, and procurement forms/templates are under review.			Ongoing

Component	Activities				Timeframe**
	Core	Status	Other sources	Status	
General services & Travel	• Comprehensive travel processes and support including for governing body meetings, programmatic events and staff travel.*	**In progress.** • Preparation and support of the Council meetings, and programme related travel.			Quarterly
	• Key Asset Management System.	**In progress. Ongoing.** • Facility Management support for IRENA Headquarters and staff. • Fixed Asset System procured and data uploaded, ongoing fixed assets management, control, tracking and reporting.			Ongoing
	• Health and safety plans in all IRENA offices.*	**In progress.** • Health and Safety Plan implemented. More enhancements in the health and safety practices are planned for IRENA HQ and staff.			Q4 2016[5]
	• Streamlined, efficient and accurate business process.*	**In progress.** • Continuous review.			Ongoing

[5] Timeframe adjusted