

## G20 Toolkit of Voluntary Options for Renewable Energy Deployment

**Background:** Renewable energy use made up more than 18%<sup>1</sup> of total global final energy consumption (TFEC)<sup>2</sup> in 2012. The G20 countries account for the bulk of this, and host 80% of existing renewable power capacity around the world. The share of renewable energy in TFEC rose by 0.17 percentage points per year between 2010 and 2012 worldwide. This represents a significant enhancement compared to previous two decades. Under a business as usual that considers policies in place, the global renewable energy share can reach 21% of TFEC by 2030 with member countries contributing to this growth depending upon national circumstances.

**The G20 value added:** So far the growth in renewables has been particularly pronounced in the power sector. IRENA REmap analysis suggests that G20 countries hold 75% of total global deployment potential of all renewables in the energy sector and around 70% of total global power sector investment potential for renewable energy between now and 2030. If these potentials were to be deployed, renewable power generation would account for about 40% of the total modern renewable energy use in final energy terms that has been identified for the G20 countries by 2030 with the remainder 60% taking place in cooking, cooling, heating and transport applications.

Drivers for renewable energy are diverse and resource availability varies. Therefore, countries require a tailor made approach. Where appropriate and consistent with national circumstances and development goals, new policy initiatives can help enhance renewable energy uptake.

The G20 countries will therefore have a key role to play. Today, the G20 has a leading role in technology development and innovation that can help to accelerate renewable energy deployment. The financing institutions within the G20 represent the bulk of the global financing system.

In November 2014 in Brisbane the G20 Leaders endorsed the G20 Principles on Energy Collaboration, agreeing amongst others to work together to:

- ensure access to affordable and reliable energy for all;
- support sustainable growth and development, consistent with their climate activities and commitments, including by promoting cost-effective energy efficiency, renewables and clean energy;
- encourage and facilitate the design, development, demonstration and widespread deployment of innovative energy technologies, including clean energy technologies.

<sup>1</sup> The World Bank (2015), Global Tracking Framework 2015. May 2015. The World Bank, Washington, DC.

<sup>2</sup> TFEC includes the total combustible and non-combustible energy use from all energy carriers as fuel (for the transport sector) and to generate heat (for industry and building sectors) as well as electricity and district heat. It excludes non-energy use, but includes the consumption in blast furnaces and coke ovens.

The 2030 Agenda for Sustainable Development to be adopted by the UN General Assembly in September 2015 includes the goal of ensuring access to affordable, reliable, sustainable and modern energy for all, and of increasing substantially the share of renewable energy in the global energy mix by 2030. Renewable energy, among other benefits, has the potential to contribute to growth, infrastructure investment and the protection of environment, if the cost of technology maintains its downward trend.

It should be emphasized that the potential for a country to raise its share of renewable energy varies depending on its specific circumstances, as well as its sustainable development national priorities and capital availability.

At its meeting in Antalya, Turkey, 24-25 February 2015, the G20 Energy Sustainability Working Group (ESWG) requested that the International Renewable Energy Agency (IRENA) take the lead in developing a toolkit of voluntary options on renewable energy for discussion in collaboration with international organizations. This toolkit builds on the G20 Principles on Energy Collaboration. The renewable energy toolkit provides voluntary options for the G20 to take an integrated and sustainable approach towards enhanced deployment of renewable energy.

G20 has considered to work on a Toolkit of Voluntary Options for Renewable Energy Deployment. All actions presented in the toolkit are voluntary options for G20 countries to take up as they consider useful in the context of national circumstances and priorities.

The G20 requested IRENA to act as a central coordinator for the **Toolkit of Voluntary Options for Renewable Energy Deployment**, in collaboration with other relevant international organizations.

G20 countries, based on their individual national circumstance, could expand the use and enhance investments in renewable energy technologies significantly, and share their good practices with developing countries. As a practical step towards this, there are a number of potential options on which G20 countries could focus their collaboration. As G20 countries' existing energy systems and renewable resource endowments vary significantly, the potential options on renewables may benefit some, but not all G20 countries.

### ***1. Analysis of renewable technology costs, cost reduction potentials and good practice exchanges***

Cost differentials for renewable technologies across G20 countries are sometimes large and may represent significant cost reduction potentials. An analysis of the current costs for renewable technologies in G20 countries could contribute to identify priority options to focus on cost reduction efforts and the increase of international cooperation, including transfer of technologies and capacity building. The reasons behind the structural differences in costs can be explored and good practices, different national regulatory and market frameworks can be identified, that can help drive down costs.

The transfer of technologies to emerging countries which are already ramping up energy supply, could also hasten the pace of deployment of renewable energy in their energy mix. It needs to be ensured that innovations in such technologies become available to the developing world. In the absence of these technologies, renewable energy may not be considered as a solution to improve access to energy.

The G20 requests IRENA to realize this work in cooperation with other relevant international organizations, such as, IEA and World Bank, and close coordination with participating G20 countries in order to analyse the sources and magnitude of cost reduction opportunities, and the policy options available to unlock them. The G20 also invites IRENA to present the results of this work in a report to the ESWG.

## ***2. Good practice exchanges on (i) enabling national policy framework design and (ii) power systems integration of higher shares of variable renewables***

The exchange of good practices of renewables policy can help ensure efficiency in policy support for renewables. The joint IEA-IRENA database for renewable energy policies could be used to explore trends and good practices in policy design. G20, through discussions within the ESWG, may request relevant international organizations to expand the database to encompass all relevant experiences in G20 countries and reflect possible options for increased investments and better coordination. The work should cover all renewable energy sources, including hydro, bioenergy, geothermal, solar, wind and marine technologies.

Already hosting 80% of existing renewable power generation capacity around the world, G20 countries will be the main drivers for the power sector in the next decade. In this respect G20 countries are well placed to develop and deploy good planning practices to accommodate higher shares of variable renewables and develop possible options for power-sector planning. This would require incorporating the full suite of flexibility options – including demand side management, smart-grid technologies, electricity storage and the use of other fuels – in order to seamlessly, and at least cost, integrate higher shares of variable renewable electricity into the system and if necessary, fill the gaps caused by their output variability.

The G20 requests IRENA, in conjunction with national and regional actors (e.g., State Grid Corporation of China, ENTSO-E, Power Grid Corporation of India Ltd, globally GO15, World Bank ESMAP's Variable Renewable Energy Integration Program) as well as interested countries, to discuss with grid planners, transmission and distribution system operators and grid regulators their experiences.

It is recognized that the electricity sector market design, policy and regulatory frameworks of those countries that aim to incorporate higher shares of variable renewable electricity may need to be adapted. This may be technically challenging and may also require investments in creating stand- by power generation capacities and improvements in the grid. Sharing good practices, and relating those

good practices to the specific conditions within power sector markets as well as more active cooperation among countries and joint efforts for R&D to enable technologies such as smart-grids would allow for a global mapping of market design experiences that will aid the global transition towards renewables. The G20 requests IEA to expand its Grid Integration for Variable Renewables (GIVAR) analysis to a broader range of interested countries in collaboration with IRENA by taking into account countries' efforts in the field.

### ***3. Development of a renewable energy specific risk mitigation facility***

Real and perceived risks for renewable energy technologies can raise the cost of finance and therefore the cost of delivered energy, slowing deployment of renewables. Financial risk mitigation instruments exist to secure access to affordable financing. Interested G20 countries, to take part in accelerating global renewable energy deployment, may opt to promote such risk mitigation instruments mainly in developing countries by designing and launching a renewable energy specific risk mitigation mechanism based on IRENA's research and experience in close cooperation with other international financial institutions.

The mechanism would consist of a risk mitigation facility using structured finance approaches such as guarantee and/or mezzanine finance schemes to finance the project construction stage, combined with technical assistance facilities to address the barriers at the project development stage. This would help to attract capital, including from international investors, into this sector in developing countries.

Based on IRENA's forthcoming report on risk mitigation instruments and in cooperation with interested international and regional financial institutions and G20 countries, without duplicating current efforts that are being carried out, G20 may request IRENA, following discussions within the ESWG, to organize a conference to exchange experiences in the use of risk mitigation instruments (e.g., loan guarantees, off-taker risk guarantees, mezzanine finance schemes, etc.) as an efficient means for public sector finance to mobilize private sector investments and to develop a Toolkit to the use of voluntary risk mitigation instruments within the G20 framework. The work will be closely coordinated with the on-going work under the G20 Development Working Group and Investment and Infrastructure Working Group. Guided by the results of the conference and the priorities of the G20 Presidency in 2016, ESWG may consider how to take this work forward.

### ***4. Assessment of country renewable energy technology potentials and development of roadmaps***

The IRENA REmap programme has assessed renewable energy technology potentials and their cost and benefits for G20 countries.<sup>3</sup> Recognising the importance of this analysis, in particular its coverage of the entire energy sector and the need to update the analysis continuously in light of the changing competitiveness of renewable energy technologies and policies, G20, through discussions within the ESWG, may request IRENA and interested G20 countries, as well as relevant international and regional organizations to review and enhance the deployment of renewable energy, taking into consideration countries' national circumstances and priorities.

### **5. Deployment of modern bioenergy**

Biomass plays an important role in the energy future mix. To realize this, ensuring sustainable and affordable supply of biomass will be key. Without duplicating current efforts that are being carried out in many countries, G20, through the ESWG, may request IRENA, together with interested G20 countries, to consider expanding the use of GBEP sustainability indicators and cost assessment of biomass feedstocks for creating reliable feedstock supply markets; expanding the use of sustainable agricultural and forestry residues and waste and other bioenergy feedstocks (e.g. lignocellulosic biofuels) by prioritizing their increased uptake in a cost-effective manner; and supporting the development of innovative biomass applications including co-production of energy and other products, conventional and advanced biofuels and biomaterials to discover new and economically viable applications of biomass.

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<sup>3</sup> 19 countries of the G20 are covered under IRENA's REmap programme, excluding the European Union (EU) as a whole. In the case of the EU, for the following Member States: Denmark, Germany, France, Italy, Poland, United Kingdom and Sweden, an initial analysis has already been completed, others are in progress.