21 May 2016

INTERNATIONAL RENEWABLE ENERGY AGENCY
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Note of the Director-General

REmap: Roadmap for a Renewable Energy Future, 2016 edition

1. The first thematic programme area of IRENA's Work Programme 2016/17, "Planning for the renewable energy transition", aims to transform countries' energy systems to meet national targets, advance strategies to decrease global emissions and improve energy security. IRENA's REmap programme supports this transformation by assessing how a doubling of the renewable energy share in the global energy mix by 2030 can be operationalized on a country level with the aim of identifying technological pathways for renewable energy deployment, cost and benefits and international cooperation opportunities.

2. The main aim of REmap is to inform policy making in countries to increase renewable energy deployment across all sectors of the energy system. This is achieved by providing policy makers with state of the art information on renewable energy technology options. The bottom-up approach in REmap sets it apart from other scenarios, in that it starts with country analyses, which are aggregated to form a global picture. This process is carried out in partnership with country experts who provide the latest information and data as well as contribute to the formulation of findings and conclusions.

3. In March 2016, IRENA released the 2016 edition of its REmap global report – Roadmap for a Renewable Energy Future. This second edition enlarged the country scope from 26 in the initial release in 2014, to 40 in 2016, representing 80% of the global energy demand. It also provided more detailed findings at sector level, including potentials, costs, externalities and CO2 emission trends.

4. The findings indicate that the renewable energy sector continues to grow in the power sector, but action is needed in other sectors such as heating and transport. Some of the key findings include:

• Significantly scaling up renewables is feasible and affordable, it would result in economic saving that are up to 15 times higher than costs, save millions of lives due to lower air pollution, increase economic growth and employment, and set the world on a pathway to limiting temperature rise to 2 degree Celsius or below when combined with increased energy efficiency.

• In order to achieve these benefits the renewable energy share must significantly increase over today's level of 18%. Half of renewable energy today is traditional uses of bioenergy, with the other half coming from modern renewable technologies. By 2030 the share of modern renewables could reach 36%. However because traditional uses of bioenergy are phased out during the period, the modern renewable energy share would quadruple from 9% today to 36%.

- However according to REmap's 'Reference Case', the share will only increase from 18% today to 21% by 2030 –just around 0.15% increase per year. To reach 36%, the world must achieve 1% per year, therefore a six-fold acceleration is needed.

- Renewables deployment need to take place across all areas, in the power sector, and in heating, cooling and transport. REmap shows that there is significant potential across all sectors.

- REmap finds that doubling the share of renewable energy by 2030 saves up to USD 4.2 trillion annually – 15 times higher than the costs – thanks to avoided expenditures relating to climate change and air pollution.

- A doubling would achieve up to 12 gigatonnes of energy-related carbon dioxide (CO_2) emission reductions compared to the 'Reference Case' in 2030. This is 5 times higher than what countries have pledged to reduce through renewable energy in their nationally determined contributions (NDCs). When coupled with improvements in energy efficiency, it would reduce emissions enough to set the world on a pathway to limit global temperature rise to 2 degrees above pre-industrial levels, as called for in the Paris Agreement.

5. In addition, the report lays out five priority action areas where governments need to act if they want to ensure a transition to a renewable energy future. These five action areas include the following:
- Correcting for market distortions to create a level playing field

- Introducing greater flexibility into energy systems, to allow for the variable nature of some forms of renewable energy

- Developing and deploying renewable energy solutions for heating and cooling in new urban development projects and industry

- Promoting electric transport based on renewable power and biofuels to reduce air pollution

- Ensuring the sustainable, affordable and reliable supply of bioenergy feedstock

6. The REmap programme has also expanded to include in-depth country and regional reports – eight of which have already been released - and specific efforts focusing on emerging technologies, trends and co-benefits that result from higher renewables deployment.

7. Moving forward, the country portfolio is being expanded with additional reports in preparation for ASEAN, Dominican Republic, India, Indonesia, Russia and South Africa. New sectoral deep-dives are focused on key technological solutions, including district heating and cooling, and on the synergies between energy efficiency and renewables. REmap is also one of the five voluntary options in G20's toolkit for renewable energy deployment that was endorsed by the G20 Energy Ministers in October 2015. REmap continues to provide input to the discussions of G20 countries in 2016. Preparation of other deep dive studies and additional country and regional reports are under discussion with new countries expressing interest to join the REmap programme. This is expected to raise the total number of countries participating from 40 to 50.

8. REmap relies on, and benefits from, the Agency-wide work products including programmatic components on power system design for renewable energy integration, renewable energy benefits, technology innovation, costing, renewable energy statistics and the Global Atlas. Coinciding with the timeframe for the implementation of the Sustainable Development Goals, REmap also provides a useful framework for IRENA's work on macro-economic benefits, renewable energy investment trends, and

technology innovation outlook. It also provides powerful messages to support IRENA's engagement in global efforts such as the G20 and SE4All, and at country and regional levels.

Questions for discussion

- Should REmap broaden its technology assessment beyond a renewable energy focus to also include assessments of energy efficiency improvement potential and other technologies that can assist in enabling higher shares of renewables? If so, how should that be done?

- How can REmap expand its focus on power and bioenergy market developments and creating a business case for renewables that are needed to enable accelerate renewable energy uptake?

- What type of measures and policies offer the most effective way to reduce externalities related to air pollution and internalize their costs?

- How can the necessary resources be obtained to continue and grow the REmap programme further?

- How should the Agency use the findings from REmap for international innovation strategy development?

Suggested reading

REmap: Roadmap for a Renewable Energy Future, 2016 Edition

Africa 2030: Roadmap for a Renewable Energy Future

Individual REmap country reports can be found here

Renewable Energy Benefits: Measuring the Economics

Renewables and Electricity Storage – A technology roadmap for REmap 2030

Synergies between Renewable Energy and Energy Efficiency