

Workshop proceedings

REmap – IRENA’s Roadmap for a Renewable Energy Future

5th Annual National Experts Workshop

Pre-Council Day during the Fourteenth meeting of the Council

Abu Dhabi, 27 November 2017

1 Introduction

IRENA's renewable energy roadmap, REmap, is focused on assessing renewable energy technology options for countries, regions and the world to the year 2050. Over the past five years, IRENA has provided a range of insights on possible paths for the transformation of the energy system, spanning multiple geographic areas, sectors and topics. Through an extensive network of country experts, the programme consolidates national energy and climate outlooks and detailed technology information in a single, comprehensive body of knowledge (see section 1.1). With 70 participating countries covering around 90% of global energy use, REmap informs global and regional energy outlooks, roadmaps, and energy investment master plans (see Annex II).

1.1 REmap, overview of activities for 2012-2017

As of December 2017, the REmap analysis covers 70 countries that account for more than 90% of the global final energy demand. Three global reports have been issued, in 2014 and 2016 with a renewable energy outlook to 2030, and in 2017 with a view to 2050. For 14 countries, a comprehensive REmap country roadmap has been prepared, or is in preparation, as shown in the timeline below. These reports are complemented by regional reports for Africa, ASEAN, the EU and the Decarbonisation study for the G20. To date around 40 publications and papers have been produced¹ which are available for download at www.irena.org/remap.²

Deep-dive reports for individual sectors have been produced to provide further information on the role of renewables, in particular for the manufacturing industry, transport, district heating & cooling and cities. Studies for specific technologies or cross-cutting issues have been prepared such as bioenergy, synergies between renewable energy and energy efficiency, and decarbonisation pathways.

REmap builds on the engagement of numerous experts for its analysis and the preparation of its various reports and papers. To this end, countries participating in the programme have nominated experts to liaise with IRENA on data sharing, analysis support and verification. Over the years, the programme has organised over 50 stakeholder meetings and events.

REmap also informs other IRENA activities, such as work on climate, jobs and macro-economic effects, RETHinking Energy, and external efforts such as the Global Tracking Framework of SE4ALL, among others.

¹ For an overview of the completed and ongoing REmap products please consult the slides of the session.

² REmap data is available through a variety of online tables and tools, notably on IRENA's RResource portal here: <http://resourceirena.irena.org/gateway/dashboard/>.

2 The 5th Annual REmap Workshop

IRENA's 5th National Experts REmap Workshop took place on the 27th November 2017, from 09.00 to 11.30 AM, at IRENA Headquarters in Masdar City, on the Pre-Council day of the 14th meeting of IRENA's Council.

The workshop focused on discussing the status of REmap and its future focus. The specific workshop objectives were to:

- Provide updates on the progress of deliverables and a platform for an exchange of experiences and lessons learned;
- Present an overview of the proposed forthcoming REmap work in the context of the Work Programme 2018-2019;
- Examine outcomes from the ongoing external assessment of REmap and discuss how to best shape and focus the programme in the medium- to long term.

The workshop was attended by more than 50 participants, representing more than 30 countries, and an additional 10 IRENA staff that joined the session.

The session started with a presentation from IRENA's Innovation and Technology Centre (IITC) Director, Dolf Gielen, highlighting the key aspects of REmap, its evolution over past five years and its contributions to IRENA's overall activities, including global, regional and country reports, sectoral reports on the linkages between renewable energy and district heating and cooling, energy efficiency and industrial processes.

It was also stated collaborative work has been carried out successfully for combined Renewables Readiness Assessment (RRA) and REmap reports for Thailand and Egypt with the support of Country Support and Partnership (CSP) division, as well as for macroeconomic analysis of REmap results for global studies with the support of IRENA's Knowledge Policy and Finance (KPFC) colleagues. Besides this, REmap benefited from the contributions of the Power Sector Transformation (PST) team, especially for the studies for Dominican Republic report and the European Union. In addition, and as part of the expansion of the analysis for the power sector, IRENA's FlexTool is under development under the lead of the PST team, which will serve to assess the potential technical issues and solutions of power system flexibility for scenarios with high shares of variable renewable energy.

Furthermore, successful engagements with other institutions were presented, such as the collaboration with Dominican Republic, supported by the PST team as a follow-up activity of a REmap country study, and the cooperation with University College Cork to develop a PLEXOS model for the REmap EU study.

IRENA's recent global work on *Perspectives of Energy Transition* carried out under the German presidency of the G20, based on REmap analysis, which was developed in collaboration with the International Energy Agency (IEA) was also presented. The development of this study also entailed the need to expand the work scope to cover longer time frames (to 2050) and aspects beyond renewable energy, including energy efficiency, and other low and no carbon technologies.

Other regional work including the outlooks for ASEAN and for the European Union was referenced as having traction to influence the regional debates on renewable energy target ambition.

It was also expressed that IRENA seeks actively to engage with other international institutions to develop the work, including the existing collaboration with IEA, World Bank, and others.

2.1 REmap Evaluation, preliminary findings

After the overview of REmap activities, IITC's Director introduced R. Andreas Kraemer, Senior Fellow of IASS Potsdam and Founder of Ecologic Institute, conducting an ongoing evaluation of the REmap programme, who presented the preliminary findings of the assessment.

The REmap evaluation examines the REmap programme's development over the last five years, its impact to date, areas for improvement, and proposals for future direction. The assessment has been based on existing documentation of previous consultation with countries, interviews with internal and external experts and a web-based survey. The key points of the evaluation presented at the workshop include:

Establishments and impacts:

- *Highly interesting among member countries* – REmap is regarded as useful IRENA work with high level of quality among countries, which provides useful data and information.
- *Dynamic scope of work due to the shift in expectations of IRENA Members* – REmap has grown beyond expectations, expanding the country coverage, expanding the time horizon and changing its scope as needed based on regional and global expectations and requests.
- *Changes terms of global debate on renewables* – REmap impacts the global debate on renewables, creating credibility for higher levels of ambition and feeding into policy making. The work provides relevant insights for energy access, energy transition and macro-economic benefits.
- *Collaborative engagement and facilitation of dialogue* - For many people the processes and discussions that originate from engaging in REmap activities, are more impactful than the related report itself. This is particularly relevant at regional level.

Challenges to be addressed:

- *Resource constraints (staffing, funding allocation)* – The improvement and expansion of the work requires more staff and funding. As the work is mostly based on voluntary contributions this brings concern for longevity issues. Funding allocation remains a challenge yet to be addressed within the organisation.
- *REmap coverage and scope* – Some countries suggest the country coverage should be wider, but there is a challenge on how to involve more countries while still providing significant level of detail that is insightful.

- *Capacity building* – to have more engagement and training to use REmap tool independently by countries, to scale up the demand and need and to aid in capacity building of national experts.
- *Outreach to further disseminate REmap work* - to continue advertising the product with more involvement in reaching out to people, after the product release.

Future recommendations:

- *Staffing* – to grow IRENA’s REmap team to reach 15 - 20 members depending on external partnerships and work load.
- *Internal collaboration* - REmap work could be further integrated with other IRENA work streams.
- *Structure of REmap team* - technical, managerial, and external outreach and communication tasks could be further differentiated and allocated to specialist members within the team to improve efficiency.
- *Country engagement* - strengthen country engagement, not only with REmap countries but also with other countries e.g. by taking advantage of regional forums.
- *Strategic partnerships in countries and regions* - support the development and dissemination of the REmap work by forming strategic partnerships with technical, national, regional, academic and media organisations.
- *REmap methodology and tools* - upgrade the existing analytical framework to further strengthen existing representation of sectors, technologies, and coverage of additional elements such as grid integration, energy efficiency, etc. Build further expertise in areas such as investment needs and socio-economic impacts.

2.2 Suggestions and Insights from REmap countries

After the presentations, the second part of the session featured a group discussion where countries expressed their views and questions regarding REmap activities and evaluation findings and provided feedback on the following guiding questions for discussion:

- What is REmap for you?
- How has REmap been useful and how do you define its impact?
- Should REmap focus more on providing political messages or more on technical depth?
- What can you contribute to support the REmap work?
- How could we increase REmap’s impact?
- What should the future focus of Global REmap be?

Countries recognised the value of the work carried out so far and encouraged IRENA to continue developing REmap to further increase its impact. Participants provided various valuable suggestions for the future of REmap. The main points raised are summarized below:

- **Political vs technical focus of REmap:** A range of different views were shared during the session. Several participants indicated that both the technical and political perspective are important for REmap. Some countries expressed the need for more targeted political messaging for decision makers. A differentiation between '*policies and politics*' was also proposed during the discussion as a way to define REmap boundaries.
- **Partnerships and collaboration with other institutions:** Several countries encouraged IRENA to collaborate with other international agencies such as IEA or multilateral financial institutions, as well as with other external expert institutions and academia, to optimize the use of internal resources. Recognition of REmap analyses could also improve with thorough external reviews.
- **Implementation support:** Some countries highlighted the importance of the stage after a REmap analysis is completed, suggesting that IRENA could play a role supporting countries in the implementation of REmap findings. It was also suggested that as multiple countries struggle with similar issues, some assistance can be provided remotely e.g. by means of webinars.
- **Leverage of REmap resources through country expertise:** Dominican Republic suggested that the impact of REmap could be leveraged by asking REmap countries to support the application and dissemination of the REmap work with other countries sharing similar conditions. This could be brought in place by establishing a framework in which REmap beneficiaries would commit to contribute to other REmap activities.
- **Regional cooperation:** Sudan suggested to consider potential links between REmap and other initiatives such as the Clean Africa Energy Corridor.
- **Links with climate agenda:** Several countries highlighted that REmap could contribute to the ongoing NDC processes. It was also suggested that REmap should consider the potential links of the analysis not only with mitigation but also with adaptation solutions to address climate issues.
- **Consumer focus:** Yemen suggested that a consumer focus could be added to the REmap assessment, including issues such as having the right quality standards for renewable equipment in place to support social acceptance.
- **Outreach and dissemination:** It was highlighted that given the various energy scenarios that are publicly available, there is a challenge to capture the attention of policy makers. For this reason, it was suggested that REmap could increase the focus on outreach and dissemination. Several countries also recommended capacity building through workshops and training as an important outreach element of REmap.
- **Resource constraints and funding allocation:** Countries acknowledged that REmap needs adequate funding to strengthen staffing and existing analysis tools. The possibility to review the current allocation of funding for REmap – in terms of the distribution between core and voluntary contributions – was discussed.

2.3 Upcoming REmap work and planned activities for Work Programme 2018/2019

Upcoming work to be completed by early 2018 includes REmap EU, RRA/REmap Egypt and the Global 2050 decarbonisation follow-up report, to be presented at the Berlin Energy Transition Dialogue (BETD). New regional work, including for Southeast Europe is also envisioned.

Future interactions of REmap with other lines of work of IRENA were also put forth, including the combined RRA and REmap reports, which is proposed as a new component for the next Work Programme 2018/2019, as Pathways for Renewable Energy Transition (PRET).

Regarding the modelling capability of REmap, the 'REmap tool' – which is the Excel-based framework that is the base for a country analysis – will undergo an improvement process, expanding its scope (e.g. to include longer timeframes, measures beyond renewable energy, etc.). Besides this, an IRENA Energy Transition Model (ETM) framework is proposed, to provide an integrated view of different interactions and complementarities among different work streams of IRENA, including REmap, power sector transformation, costs, macroeconomics, etc.

At the end of the discussion, IITC Director invited workshop participants to communicate to IRENA any opportunity where REmap could contribute to relevant workshops or events, strengthening the outreach efforts, or to specific areas of work:

- IRENA would welcome to be invited to workshops and events where countries can engage with the REmap team to showcase REmap and overall IRENA work.
- Dedicated REmap workshops organised by Members could be also a good opportunity to disseminate the work, preferably at regional level.
- REmap work could be relevant to NDCs framework, and when countries see the opportunity of the REmap work feeding into this discussion, this should be communicated to IRENA.

Furthermore, countries will have the opportunity to discuss further upcoming activities during two REmap side events that will take place on the sides of the 8th IRENA Assembly in January 2018. These sessions will feature the work of RRA/REmap studies and the REmap regional collaboration that can be built based on cases like the European Union engagement.

3 Annexes

Annex I – List of Participants

Country	Name	Organisation
Afghanistan	Ahmad Muhebullah Muheb	Embassy of Afghanistan
Argentina	Esteban Pérez Andrich	Ministry of Energy
Bhutan	Mewang Gyeltshen	Department of Renewable Energy
Colombia	Carlos A. García	Energy Planning Agency – UPME
Colombia	Camilo Ramírez	Embassy of Colombia
Costa Rica	Willian Reuben-Soto	Embassy of Costa Rica
Cyprus	Josif Spirides	Ministry of Energy, Commerce, Industry and Tourism
Denmark	Nickolai Bogeskov	Embassy of Denmark
Dominican Republic	Francisco Cruz	National Energy Commission
Dominican Republic	Amer El Kadi	Embassy of the Dominican Republic
Egypt	Murande	MOFA
Egypt	Rasha Ahmed	NREA
Egypt	Ehab Ismail Amin	NREA
Fiji	Kamlesh Prakash	Fiji Embassy
Fiji	Sensi Seruitanoa	Fiji Embassy
Fiji	Puamau Tagivetaua Sowane	Ministry of Infrastructure and Transport
France	Amélie Lougsami	Embassy of France
France	Said Rahmani	Embassy of France
France	Xavier Rouard	MOFA
Germany	Martin Schöpe	BMW i
Germany	Bilun Müller	BMW i
Germany	Johnny Kramer	German Embassy
Ghana	George Tettey	Power Authority
India	Dilip Kumar Khare	Ministry of New and Renewable Energy
India	A. N. Sharan	Ministry of New and Renewable Energy
Iran	Abolfazl Shiroudi	Ministry of Energy, Renewable Energy and Energy Efficiency Organization (SATBA)
Iraq	Raad Al-Alousi	Embassy of Iraq
Iraq		Embassy of Iraq
Japan	Osamu Ito	MOFA
Japan	Misako Takahashi	MOFA

Country	Name	Organisation
Jordan	Diana Al-Hadid	Embassy of Jordan
Kuwait	Sa'ad Al-Jandal	Kuwait Institute for Scientific Resources
Malaysia	Abdul Rahim bin Ibrahim	Energy Commission
Netherlands	Carmen Hagenaars	MFA
Netherlands	Henry Philippens	MFA
New Zealand	Mike Allen	MFAT
Nigeria	Malah Umar	Energy Commission of Nigeria
Oman	Sulaiman Al-Harrasi	PAEW
Philippines	Mylene C. Capongcol	Department of Energy
Saudi Arabia	Hussain Shibli	KACARE
Spain	Susana Fernández	Ministry of Energy
Sudan	Amal Eldirdiri Omer Babiker Karom	Ministry of Water Resources, Irrigation and Electricity
Sudan	Mustafa Elsharif	Embassy of Sudan
Turkey	Oğuz Can	General Directorate of Renewable Energy
UK	Lia Santis	British Embassy
UK	Kate Travers	Department for Business, Energy and Industry Strategy
UK	Goran Mandic	British Embassy
Yemen	Mohammed Al-ankegi	Embassy of Yemen
N/A	Yong Chen	IRENA
N/A	R. Andreas Kraemer	IASS Potsdam & Ecologic Institute
N/A	Sakari Oksanen	IRENA
N/A	Luis Janeiro	IRENA
N/A	Laura Gutiérrez	IRENA
N/A	Dolf Gielen	IRENA
N/A	Gayathri Prakash	IRENA
N/A	Bishal Parajuli	IRENA
N/A	Michael Renner	IRENA
N/A	Aliz Crowley	IRENA

Annex II – Compendium of reports by type and data/tools of REmap

REmap coverage
<ul style="list-style-type: none"> • 2014 → 26 countries, 75% of global energy use • 2016 → 40 countries, 80% of global energy use • Current → 70 countries (40 REmap country members + 30 additional countries on regional engagements), 92% of global energy use
Global reports
<ul style="list-style-type: none"> • Global REmap report 2014 (June 2014) • Global REmap report 2016 (March 2016) • Global decarbonisation study <i>Perspectives for the Energy Transition</i> (March 2017) • Global REmap report 2018 <i>Investment and Innovation Powering the Energy Transition</i> (forthcoming)
Country reports
<ul style="list-style-type: none"> • Renewable Energy Prospects: China, REmap 2030 (November 2014) • Renewable Energy Prospects: Germany, REmap 2030 (November 2015) • Renewable Energy Prospects: Mexico, REmap 2030 (May 2015) • REmap 2030 Renewable Energy Prospects for Poland, Background paper (October 2015) • REmap 2030 Renewable Energy Prospects for Ukraine, Background paper (April 2015) • Renewable Energy Prospects: United Arab Emirates, REmap 2030 (April 2015) • Renewable Energy Prospects: Dominican Republic, REmap 2030 (November 2016) • Renewable Energy Prospects for India, a working paper based on REmap (May 2017) • Renewable Energy Prospects: Indonesia, REmap 2030 (March 2017) • REmap 2030 Renewable Energy Prospects for Russian Federation, Working Paper (April 2017) • Renewable Readiness Assessment and REmap analysis for Thailand (November 2017) • Renewable Readiness Assessment and REmap analysis for Egypt (forthcoming) • Renewable Energy Prospects: Kazakhstan, REmap 2030 (forthcoming) • Renewable Energy Prospects: South Africa, REmap 2030 (forthcoming)
Regional reports
<ul style="list-style-type: none"> • Africa 2030: Roadmap for a Renewable Energy Future (2015) • G20 Toolkit for Renewable Energy Deployment: Country options for sustainable growth based on REmap (June 2016) • Renewable Energy Outlook for ASEAN: REmap Analysis (2016) • Renewable Energy Prospects: European Union, REmap 2030 (forthcoming)

Sectoral reports

- Renewable energy in Manufacturing (2014)
- Synergies between Renewable Energy and Energy Efficiency (2015)
- Renewable energy in cities (2016)
- The Renewable Route to Sustainable Transport (2016)
- Renewable energy in district heating and cooling (2017)
- Synergies between Renewable Energy and Energy Efficiency (2017)
- Optimization tool to assess power system flexibility with high shares of variable renewable energy (report and tool) (forthcoming)

Technology / cross cutting reports and background analysis/methodology

- Air pollution and CO₂ externalities
- Greenhouse Gas Impact of Bioenergy Pathways
- Global Bioenergy Working Paper: Supply and Demand Projections
- Renewable energy targets and sources for REmap 2030
- Implications for Renewable Energy Innovation of Doubling the Share of Renewables in the Global Energy Mix
- Cost methodology
- Decarbonisation pathways methodology
- Stranded Assets and Renewables
- External cost methodology

Output data publicly available

- REmap analysis results (energy mix and investments) for 40 REmap countries to year 2030 on [REsource](#).
- Commodity price data
- Technology cost data