Renewable Energy and Jobs - Annual Review 2021

The Need for a Just Transition

Presenter:
• Michael Renner, Programme Officer
  Knowledge Policy and Finance Centre, IRENA

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IRENA

Michael is a Programme Officer in KPFC. His work is focused on the socio-economic impacts of renewable energy, including employment and just transition issues.

He is a co-author of IRENA’s Renewable Energy and Jobs, Annual Review and the Gender Perspective series, and has contributed to the agency’s World Energy Transitions Outlook and Post-COVID Recovery reports.
IRENA’s work on the socio-economics of renewables

<table>
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<tr>
<th>Annual reviews of employment in renewables</th>
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<th>Analyses of local capacities</th>
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<td>2016</td>
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<th>Assessing gender equity in renewable energy</th>
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<td>2017</td>
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<th>Measuring the socio-economic impact of renewables</th>
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<th>Studies of access context</th>
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Inside the 2021 report

- Renewable Energy Jobs: Main Findings
- Employment Outlook for the Energy Transition
- Skills Needs for the Energy Transition
- The Jobs Agenda for a Just Transition
- Gender Aspects
- Beyond the Numbers: Job Quality
- In Focus: Education and Training
- COVID-19 and the Way Forward
Factors influencing renewable energy employment

- Technology advances and falling costs/investment trends
  - Rising competitiveness
  - Lower costs enable more deployment per dollar spent

- COVID-19 responses and recovery efforts
  - Impacts along supply chain
  - Renewables versus fossil fuel dynamics
  - Stimulus and job retention
  - Remote work arrangements

- Deployment: new and cumulative capacity
  - Jobs in project development; manufacturing; sales; construction and installation
  - Jobs in operations and maintenance

- Policy ambition
  - Deployment, integrating, and enabling policies
  - Industrial policies; trade policies; skill-training; labour market measures; gender policies

- Changes in labour intensities
  - Automation; use of drones; artificial intelligence
  - Economies of scale
  - Learning effects

- Supply chain structures
  - Commodity, technology and trade dependencies
  - Geographic footprints
  - Localisation efforts
Growth of renewable energy Jobs, 2012-20

Under IRENA's 1.5C pathway, renewable energy could employ **43 million** people worldwide by **2050**

### Million jobs

<table>
<thead>
<tr>
<th>Year</th>
<th>Solar photovoltaics</th>
<th>Bioenergy (^a)</th>
<th>Hydropower (^b)</th>
<th>Wind energy</th>
<th>Solar heating/cooling</th>
<th>Others (^c)</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>2012</td>
<td>0.22</td>
<td>0.89</td>
<td>0.76</td>
<td>0.04</td>
<td>1.03</td>
<td>2.40</td>
<td>7.3</td>
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<tr>
<td>2013</td>
<td>0.23</td>
<td>2.21</td>
<td>2.04</td>
<td>0.76</td>
<td>1.08</td>
<td>2.50</td>
<td>8.5</td>
</tr>
<tr>
<td>2014</td>
<td>0.19</td>
<td>2.04</td>
<td>2.99</td>
<td>0.94</td>
<td>2.16</td>
<td>2.49</td>
<td>9.5</td>
</tr>
<tr>
<td>2015</td>
<td>0.20</td>
<td>2.16</td>
<td>2.88</td>
<td>0.83</td>
<td>2.06</td>
<td>2.77</td>
<td>10.0</td>
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<tr>
<td>2016</td>
<td>0.24</td>
<td>2.06</td>
<td>2.74</td>
<td>0.81</td>
<td>1.99</td>
<td>3.09</td>
<td>10.1</td>
</tr>
<tr>
<td>2017</td>
<td>0.16</td>
<td>3.05</td>
<td>3.09</td>
<td>1.15</td>
<td>2.05</td>
<td>3.37</td>
<td>10.5</td>
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<tr>
<td>2018</td>
<td>0.18</td>
<td>3.18</td>
<td>3.68</td>
<td>1.16</td>
<td>1.96</td>
<td>3.68</td>
<td>11.1</td>
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<tr>
<td>2019</td>
<td>0.18</td>
<td>3.58</td>
<td>3.75</td>
<td>1.25</td>
<td>2.18</td>
<td>3.98</td>
<td>11.5</td>
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<tr>
<td>2020</td>
<td>0.27</td>
<td>0.82</td>
<td>0.82</td>
<td>2.18</td>
<td>1.25</td>
<td>0.82</td>
<td><strong>12.0</strong></td>
</tr>
</tbody>
</table>

\(^a\) Includes liquid biofuels, solid biomass and biogas.

\(^b\) Direct jobs only.

\(^c\) “Others” includes geothermal energy, concentrated solar power, heat pumps (ground based), municipal and industrial waste, and ocean energy.

Source: IRENA Jobs database.
Jobs in renewable energy in 2020, by technology

- Solar photovoltaic: 3,975 jobs
- Liquid biofuels: 2,411 jobs
- Hydropower: 2,182 jobs
- Wind energy: 1,254 jobs
- Solar heating/cooling: 819 jobs
- Solid biomass: 765 jobs
- Biogas: 339 jobs
- Geothermal energy: 96 jobs
- Municipal and industrial waste: 39 jobs
- CSP: 32 jobs
- Others: 105 jobs
Jobs in renewable energy in 2020, by region/country

- **United States of America**: 838 thousand jobs
- **Germany**: 297 thousand jobs
- **Brazil**: 1202 thousand jobs
- **EU**: 1300 thousand jobs
- **India**: 726 thousand jobs
- **North Africa**: 23 thousand jobs
- **Rest of Africa**: 228 thousand jobs
- **Southern Africa**: 73 thousand jobs

**Total**: 12 million jobs in 2020

Source: IRENA jobs database.
Women’s share of the renewable energy workforce

Women’s share in the oil and gas, renewables, and wind power workforce, with breakdown by STEM, non-STEM and administrative positions in renewables.

- Women’s share in wind energy:
  - Admin: 35%
  - Non-STEM: 20%
  - STEM: 14%

- Average share in wind energy: 21%

- Women’s share in segment:
  - Administrative professionals: 45%
  - Non-STEM professionals: 35%
  - STEM professionals: 28%

- Average share in oil and gas: 22%

Note: STEM = science, technology, engineering and mathematics.
Labor requirements in wind, solar; Skill-delivery pathways

- **SOLAR PV**
  - Lower certification: 31%
  - STEM professionals: 64%
  - Non-STEM professionals: 1%
  - Administrative: 1%

- **SOLAR HEATERS**
  - Lower certification: 1%
  - STEM professionals: 7%
  - Non-STEM professionals: 1%
  - Administrative: 91%

- **WIND ONSHORE**
  - Lower certification: 28%
  - STEM professionals: 4%
  - Non-STEM professionals: 5%
  - Administrative: 63%

- **WIND OFFSHORE**
  - Lower certification: 19%
  - STEM professionals: 8%
  - Non-STEM professionals: 21%
  - Administrative: 52%

**Skill Delivery Pathways**

- **On-the-job training**
  - Workers hired with no specialist qualifications and trained on-site by employers

- **Apprenticeships**
  - Multi-year training and qualification delivered in partnership between educational institutions and employers

- **Vocational training**
  - Instructional programmes that build skills for a specific trade

- **Higher education**
  - Degree level qualifications at either bachelor’s, master’s, or doctoral levels
Just Transition - a comprehensive policy framework
“Benchmarking Scenario Comparisons: Key indicators for the clean energy transition”,

“Reaching Zero with Renewables: Capturing Carbon”

“Sector Coupling in Facilitating the Integration of Variable Renewable Energy in Cities

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