Renewable Energy Benefits: Boosting Renewable Energy Jobs
IRENA’s Knowledge Base on Employment

Leading the work on jobs since 2011
Growth of Renewable Energy Jobs to Date

Source: IRENA jobs database.
Renewable Energy Jobs Today

28.8 million jobs in 2050

Source: IRENA jobs database.
Note: Others includes jobs which are not technology specific.
Renewable Energy Jobs by 2050

Million jobs

2017 - Estimate
2030 Reference Case
2030 REmap Case
2050 Reference Case
2050 REmap Case

Others
Wind
Hydro
Solar (incl. SWH)
Bioenergy

10.3
12.54
23.65
14.90
28.84

1.15
1.46
2.19
3.51
4.29

1.51
1.46
3.81
3.51
4.29

3.37
3.23
8.48
9.07
5.83

3.06
1.2
0.05
0.10
0.06

1.2
1.6
0.13

3.61
1.97

11.28
11.85

IRENA
GLOBAL ENERGY
TRANSFORMATION

A ROADMAP TO
2050
Energy Jobs by 2050

54.3 million jobs in non-fossil fuels, non-nuclear

Fossil fuels: loss of 8.6 million jobs by 2050 compared to today’s 30 million.
Solar PV

Project Planning 1%

50 MW Solar PV: 229 055 person days

- Procurement: 22%
- Manufacturing:
  - Logistics: 4%
  - Marketing and sales: 5%
  - Admin & Management: 5%
  - Health and safety: 4%
- Transport: 2%
- Installation: 17%
- Grid Connection: 56%
- Operation and Maintenance: 2%
- Decommissioning: 2%

Procurement personnel breakdown:
- Quality control: 4%
- Regulation and standardisation experts: 4%
- Factory workers and technicians: 64%

Installation personnel breakdown:
- Operators: 15%
- Administrative and accountant personnel: 1%
- Technical personnel: 8%
- Lawyers, experts in energy regulation and management: 1%

TOTAL person-days:
- 50,225
- 13,560 per year
Onshore Wind

50 MW Onshore Wind: 144,000 person days

Project Planning: 2%

Manufacturing: 17%

Transport: 1%

Installation: 30%

Grid Connection: 43%

Operation and Maintenance: 7%

Decommissioning: 1%

Procurement: 17%

Transport: 1%

Installation: 30%

Grid Connection: 43%

Operation and Maintenance: 7%

Decommissioning: 1%

Procurement: 17%

Transport: 1%

Installation: 30%

Grid Connection: 43%

Operation and Maintenance: 7%

Decommissioning: 1%
Offshore Wind

500 MW Offshore Wind: 2.1 million person days

Percentages and breakdown:
- Project Planning: 1%
- Procurement: 0.3%
- Manufacturing: 59%
- Transport: 0.1%
- Installation: 11%
- Grid Connection: 24%
- Operation and Maintenance: 5%
- Decommissioning: 0.1%

Personnel breakdown:
- Design and R&D engineers: 0.5%
- Electric engineers: 0.5%
- Factory workers: 54%
- Safety experts: 3%
- Crane operators: 3%
- Environmental experts: 3%
- Technicians: 17%
- Industrial, mechanical, electric, naval, telecommunication and computer engineers: 15%
- Site security and cleaning personnel: 7%
- Administrative personnel: 10%
- Ship crew: 17%
- Civil workers: 17%

Total person-days: 1.25 million

Person-days per year: 25,073
50 MW solar PV
229,055 person-days

50 MW onshore
144,420 person-days

500 MW offshore
2.1 million person-days

Construction workers and technicians

Engineers: 13%
Factory workers: 14%
Construction workers and technicians: 44%
Operators: 5%

50 MW onshore

Construction workers and technicians

Engineers: 16%
Factory workers: 20%
Construction workers and technicians: 29%
Operators: 2%

500 MW offshore

Construction workers and technicians

Engineers: 8%
Factory workers: 9%
Construction workers and technicians: 32%
Ship crew: 14%
Priority Actions

- Leverage existing capacities in support of value chain development (labour, materials and equipment needs along the supply chain)
- Education and training programmes to ensure well-train workforce
- Design industrial policies to strengthen the capability of domestic value creation
- Industrial upgrading, supplier development programs and joint ventures
Priority Actions

- Ensure that jobs are decent
- Undertake measures to minimise disruptions in the energy transition through social protection measures and retraining efforts
- Remove barriers to entry for women’s employment in renewable energy

IRENA Survey in gender:

Renewable energy has more gender parity than the broader energy sector.

35% Average share of women working at 90 renewable energy companies surveyed

NEW SURVEY- 2018

www.irena.org/gendersurvey
# Overarching framework for renewable energy policy

## Policies to achieve the energy transition

<table>
<thead>
<tr>
<th>Direct policies</th>
<th>Deployment of renewables in the general context</th>
<th>Deployment of renewables in the access context</th>
<th>Maximisation of socio-economic development from renewable energy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Push</strong></td>
<td>• Binding targets • Quotas and obligations • Codes and mandates</td>
<td>• Rural targets, strategies, programmes</td>
<td>Deployment policies designed to maximise benefits and ensure a sustainable transition (e.g., communities, gender) including requirements, preferential treatment and financial incentives provided to installations and projects that help deliver socio-economic objectives</td>
</tr>
<tr>
<td><strong>Pull</strong></td>
<td>• Regulatory and pricing policies • Tradable certificates • Instruments for self-consumption • Support voluntary programmes</td>
<td>• Regulatory and pricing policies (e.g. legal provisions, price/tariff regulation)</td>
<td></td>
</tr>
<tr>
<td>Fiscal and financial</td>
<td>• Tax incentives • Subsidies • Grants</td>
<td>• Tax incentives • Subsidies • Grants • Concessional financing • Support for financial intermediaries</td>
<td></td>
</tr>
</tbody>
</table>

## Integrating policies

- Measures to enhance system flexibility
- Integration of off-grid systems with main-grid
- Coupling with efficient appliances and services
- Policies for infrastructure, sector coupling and R&D
- Better alignment of energy efficiency and renewable energy policies
- Incorporation of decarbonisation objectives into national energy plans
- Adaptation measures of socio-economic structure to the energy transition
- Policies to level the playing field
- Policies to ensure the reliability of technology
- National renewable energy policy
- Access to finance, Education, Labour, Land-use, RD&D and innovation, Urban and Public health policies
- Supportive governance and institutional architecture
- Awareness programmes
- Social protection policies to address disruptions
- Measures for integrated resource management

## Enabling policies and integrating policies

- Industrial, trade policy and environmental and climate policies
- Supportive governance and institutional architecture
- Awareness programmes
- Social protection policies to address disruptions
- Measures for integrated resource management