IRENA
International Renewable Energy Agency

RENEWABLE ENERGY JOBS: STATUS, PROSPECTS & POLICIES
- an IRENA Working Paper

The job-creating potential of renewable energy is analysed in *Renewable Energy Jobs: Status, Prospects & Policies*, a recent IRENA Working Paper. Noting that governments are increasingly seeking win-win solutions to the dual challenge of high unemployment and climate change and that policy-makers in many countries are now designing renewable energy policies that aim to create new jobs, build industries and benefit particular geographic areas, the paper has been written to provide an overview of current knowledge on five questions:

- How can jobs in renewable energy be characterised?
- How are they shared out across the technology value chain and what skill levels are required?
- How many jobs currently exist and where are they in the world?
- How many renewable energy jobs could there be in the future?
- What policy frameworks can be used to promote employment benefits from renewable energy?

The paper focuses primarily on grid-connected electricity generation technologies and biofuels. The considerable employment potential of off-grid applications will be analysed in a future IRENA study.

1. Jobs in renewable energy

Fuel-free technologies, such as solar or geothermal heat and power, wind, ocean and hydro power, typically involve the greatest number of jobs in the installation, manufacturing, and administration phase. Depending on the technology, this can draw on a range of occupations, and the share of jobs can fall across different parts of the value chain.

The paper lists the various types of employment that will be needed. For solar PV, for example, engineers and technicians will be required to process raw materials and assemble system components. Project development needs qualified personnel to conduct resource assessments, as well as system designers, energy officers, business managers, financial analysts, as well as wholesalers. Construction workers, technical personnel and electricians will work on installation, while maintenance will involve technical staff. Finally, construction and materials recycling workers are needed for decommissioning.

Other technologies require different skill mixes. In fuel-based technologies, such as biofuels for transport, feedstock production and distribution of biofuels account for the largest share of jobs. Even though labour productivity evolves through time, studies have shown that renewable energy technologies are currently more labour-intensive than fossil fuel technologies, with solar PV technology accounting for the highest number of job-years per GWh over the lifetime of the facility.

BASIC INFORMATION

The largest numbers of renewable energy jobs are found in China, Brazil, Germany, India and the United States. The top five wind turbine manufacturers are from Denmark, China, the United States, and Germany; and the top five solar PV cell manufacturers are from China and the United States. These countries offer long-term policy support to renewable energy, and have significant national markets for the appropriate technologies.

The paper suggest that most renewable energy jobs are "decent work", as defined by their social benefits and working conditions and suggests that leadership from this sector in terms of working conditions could broaden support for its ongoing development.

2. Job distribution and skills levels

On average renewable energy jobs are relatively highly skilled, although unskilled workers are also needed. Graduates are needed to fill positions in fields such as engineering, meteorology, project development and research and development, while system design, installation or construction are more likely to require vocational qualifications. A number of unskilled jobs may be created in construction, transport and administration.

3. Existing jobs

Estimated gross global renewable energy employment increased from 1.3 to more than 3.5 million jobs worldwide between 2004 and 2010. Most studies conclude that a high proportion of jobs are related to fuel-based technologies. The biofuels sector is estimated to account for about half of the jobs in the renewable energy industry (1.5 million in 2010). The largest number of jobs related to any one fuel-free technology was in the solar thermal sector (over 600,000 jobs in 2006).

4. Future possibilities

The paper notes that most studies show a positive future for jobs in renewable energy. One study suggests gross employment effects of up to 20 million jobs by 2030, with the highest job creation in the biofuel sector (up to 12 million) followed by solar (6.3 million) and wind (2.1 million).

Another study suggests that if countries remain dependent on fossil fuels, energy sector jobs will decline by 0.5 million by 2030 due to increasing labour productivity. By contrast, a wider deployment of renewable energy results in a net increase of two million jobs in the energy sector compared to 2010, to a total of 11.3 million, of which 6.9 million are renewable energy jobs.

5. Policy frameworks

The paper concludes that strong, stable, transparent and credible national policy is the single most significant driver of private sector investment in renewable energy and the related creation of jobs. Governments concerned with job losses and skills gaps could also consider how best to develop renewable energy policy to take account of the existing skills that are available. It will also be necessary to implement intensive, vocational and tailor-made education and training programmes, directed toward specific needs of employers. Measures should be taken to ensure that job-seekers are both aware of, and able to take advantage of, job opportunities in the renewable energy sector.

Fast Facts

Key lessons for policy-makers:

1. There is potential for net job creation.
2. There are job opportunities across the whole value chain.
3. Job creation is one of the reasons that speaks in favour of renewable energy.
4. Sustainable job creation depends on stable and predictable deployment policies.
5. Industrial policy will influence the jobs that are created.
6. Increased training and education in renewables is crucial.

Policy-makers in many countries are now designing renewable energy policies that aim to create new jobs, build industries and promote the development of certain regions.