IRENA
International Renewable Energy Agency

Renewable Energy and Jobs

Annual Review 2014

MAY 2014

KEY FACTS

- IRENA estimates that **renewable energy jobs** reached **6.5 million** in 2013.[1] In decreasing order, the largest employers were China, Brazil, the United States, India, Germany, Spain and Bangladesh.
- Regional **shifts from developed to emerging countries** continued in wind and solar technologies, predominantly in the manufacturing and installation segments of the value chain.
- **Solar photovoltaic** and **wind power** remain the **most dynamic** renewable energy technologies.
- In 2013, the **solar photovoltaic** sector accounted for **2.3 million** jobs, largely concentrated in China. The trends show an increase in Chinese installation jobs, while manufacturing jobs remain stable as growing demand is **absorbing the oversupply** of photovoltaic panels.
- **Liquid biofuels, modern biomass and biogas** are large employers **(1.4 million, 0.8 million and 0.3 million)** and jobs are mainly concentrated in feedstock production.
- **Wind** employment remains relatively stable at **0.8 million** jobs. Policy changes in several countries have reduced installation jobs, while those in operations and maintenance have experienced some growth.
- **Solar heating** employed **0.5 million** people, around **70%** were in **China**. Data availability for solar heating, small hydro and geothermal is low, hence there is a potential for underestimation of jobs.
- The **policy context** is vital – **steadiness and predictablity** are essential to ensure **sustained growth** in renewable energy employment.
- **Education and training** are **critical enablers** for employment in this relatively new and highly dynamic sector. Skill shortages are already creating bottlenecks for deployment in some countries.

[1] *This excludes large hydropower*

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As the slow recovery in the global economy fails to invigorate labour markets, job creation has come to the forefront of policy debate and countries' strategic choices. While the potential of renewable energy to create jobs is widely recognised, further analysis is required to understand its full benefits.

Assessing the status and trends in renewable energy employment and analysing all related dimensions (policies, skills, gender considerations, etc.) are essential for policy making. In this context, the International Renewable Energy Agency (IRENA) has been conducting various studies to bridge the knowledge gap on these issues (see Box 3).

IRENA estimates that globally, 6.5 million people are working directly or indirectly in the renewable energy sector, based on a literature review and annual data collection from various sources. This publication presents the status of renewable energy employment by technology (see Figure 1) and by selected countries (see Figure 2). A summary is shown in Table 2.[2]

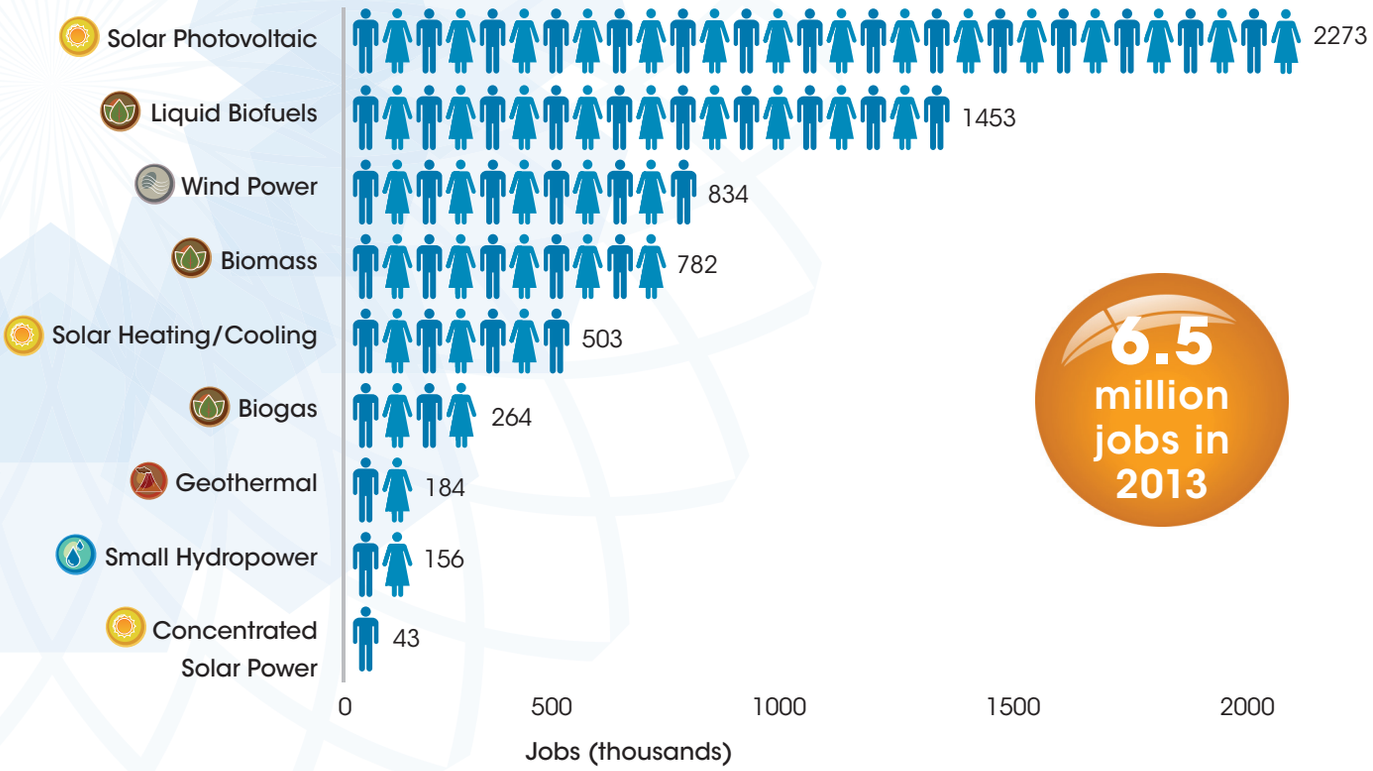
This global figure reflects a direct, year-on-year comparison with IRENA's previous estimate of 5.7 million jobs (IRENA, 2013) as well as an ongoing effort to refine the data. Global numbers are based on a wide range of studies but remain incomplete. The underlying methodologies vary considerably, and the different sources are of uneven detail and quality. The numbers are focused primarily on the years 2012 and 2013. Among other updates, the 6.5 million figure reflects significant changes in Chinese job estimates, which can be attributed to a marked increase in annual installation and manufacturing activity as well as methodological differences in employment estimation.

Recent trends in renewable energy prices and investment have affected job creation across the value chain. For instance, although declining prices of solar photovoltaic and wind equipment are introducing new challenges for suppliers and affecting manufacturing jobs, they are also driving employment growth in installation and operations and maintenance (IRENA, 2013). From year to year, these dynamics can generate substantial employment swings.

Renewable energy employment is also shaped by regional shifts, industry realignments, growing competition, advances in technologies and manufacturing processes and the impacts of austerity and policy uncertainty. The policy context is critical. While the suitability of different policy tools varies depending on a country's circumstances, steadiness in the policy framework is key. Uncertainties or frequent changes are inimical to job creation (see Box 2 and IRENA, 2013). In addition, skill shortages can also act as a major barrier to renewable energy deployment and thus to associated employment (see Box 1).

[2] The IRENA table on job estimates and a short synthesis of this Annual Review will also be published in the forthcoming REN21 "Global Status Report 2014".

Figure 1. Renewable energy employment by technology



RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY

Solar photovoltaic (PV) and wind power remain the most dynamic renewable energy technologies.

Solar PV. Manufacturing employment in solar PV has experienced some turbulence as intensified competition, overcapacities and tumbling prices have caused layoffs and bankruptcies among manufacturers. In general, manufacturing employment has shifted towards Asia as the share of Europe and the United States in global module production declined from 43% in 2007 to 14% in 2012. In the same year, China accounted for 64% of global production, Japan for 5%, and other Asian countries (such as Malaysia and South Korea) for 16% (Mehta, 2013). Data collection does not provide employment numbers disaggregated by segments of the supply chain, which are required to quantify the impacts of these global shifts in module production on manufacturing jobs.

Surging demand in China and Japan in 2013 has eased some of the oversupply concerns, and some Chinese PV manufacturers are actually adding capacity. Jobs in other segments of the value chain continue to grow, as solar PV deployment expands rapidly. In 2013, IRENA estimates that there were as many as 2.3 million PV jobs worldwide, up from 1.4 million in 2012.

Liquid biofuels. The next largest number of jobs, 1.45 million, is in the liquid biofuels value chain, including ethanol and biodiesel. A large share of these jobs is found in growing and harvesting various types of feedstock. Many of these jobs involve physically demanding manual work. Processing feedstock into fuels represents a smaller share of total biofuels employment. The United States is the largest liquid biofuels producer, while Brazil's sugarcane-based industry is the largest employer. However, increasing mechanisation in Brazil continues to reduce the number of direct jobs in feedstock production, with a decline of 7% in 2011-2012 (Ministério do Trabalho Emprego / Relação Anual de Informações Sociais (MTE/RAIS), 2014).

Box 1

THE SKILLS GAP IS A REALITY

Skill shortages are already creating bottlenecks for the expansion of renewable energy. According to a survey by the International Renewable Energy Alliance (REN Alliance), employers in many countries identify several renewable energy occupations (Table 2) as "difficult to fill" (International Labour Organisation (ILO), 2011).

Table 1. Renewable energy occupations identified as "difficult to fill"

SECTOR	OCCUPATION
Wind energy	Project developers; service technicians; data analysts; electrical, computer, mechanical and construction engineers.
Solar energy	Photovoltaic and solar thermal system installers and maintainers; building inspectors.
Hydropower	Electrical, and operations and maintenance engineers; technicians; tradespersons; sustainability specialists.
Geothermal	Trainers; geothermal engineers.
Bioenergy	R&D and design engineers; service technician; trainers.

Source: (ILO, 2011)

In the particular case of wind, a recent report found that there is currently an annual shortage of 7,000 qualified personnel in the European wind energy sector alone (European Wind Energy Technology Platform (TPWind), 2013). This figure could more than double to 15,000 by 2030 unless the number of relevant graduates rises. In line with the findings of REN Alliance, some 78% of companies surveyed judge it either difficult or very difficult to find suitably trained staff.

Collectively, the countries in the European Union accounted for 108,000 liquid biofuel jobs in 2012. Limited data are available for other countries. Argentina is the fourth largest producer (BP, 2013), and an econometric calculation suggests employment of at least 30,000 (Urbanchuk, 2012). However, this appears to be a low estimate in comparison with national figures for Colombia (22,000 ethanol jobs and 75,000 biodiesel jobs), which produced one-sixth of the quantity of biofuels produced by Argentina. This discrepancy could be caused by differences in estimation methodologies and warrants further investigation.

Wind. During 2013, employment in wind was affected by uncertainty about future policies in several countries, which led to a significant drop in new US installations and to weak markets in Europe and India. This was offset by positive impulses in China and Canada. Global wind employment is estimated at more than 834,000 jobs.

In offshore wind, Europe accounted for the bulk of global employment with 58,000 jobs (European Wind Energy Association (EWEA), 2013). The UK was the global leader followed by Germany. Employment in the UK's wind sector (offshore and onshore) has grown from 21,100 jobs in 2010 to 34,400 in 2012/13 (renewableUK, 2013).[3]

Solar heating/cooling. Significant discrepancies exist among available sources for solar heating/cooling, with estimates ranging from 420,000 jobs globally in 2012 (Weiss and Mauthner, 2013) to a high estimate of 800,000 in 2009 for China alone (Institute for Labor Studies and Chinese Ministry of Human Resources and Social Security (ILS and MOHRSS), 2010). These are likely due to varying methodologies, about which the studies offer insufficient detail. Differences in labour productivity may also play an important role. A more recent estimate for China, the global leader, suggests a smaller figure of 350,000 jobs. IRENA estimates the current global total at 503,000 jobs.

There is considerably less information available for the remaining renewable energy technologies, which can lead to an underestimation in our figures. For instance, we do not have any information on small hydropower employment in China, the country with close to half of the world's total capacity.

[3]*This includes a small number of marine energy jobs*

RENEWABLE ENERGY EMPLOYMENT IN SELECTED COUNTRIES

Renewable energy employment continues to spread to more and more countries. Nonetheless, the bulk of employment remains concentrated in a small number of countries: China, Brazil, the United States, India, Germany and Spain. This section also discusses the experience of Bangladesh, Japan, Malaysia, and Australia – all in the solar PV sector.

China remains the largest employer in the renewable energy sector. In 2013, the installation of 13 GW of PV cemented China's position in solar PV globally. The Chinese PV value chain employed 1.6 million people in that year (China National Renewable Energy Centre (CNREC), 2014). This is a significant increase compared to the 2011 employment estimates (0.3 to 0.5 million jobs) – possibly due to a 5-fold increase in annual installations over the same period. Wind, solar water heating and biomass were the other major sources of employment. Recent data suggests that jobs in solar heating and cooling may have decreased significantly since 2010. This can be attributed to methodological differences in employment estimation. As discussed earlier, no data is available on the number of jobs in small hydropower.

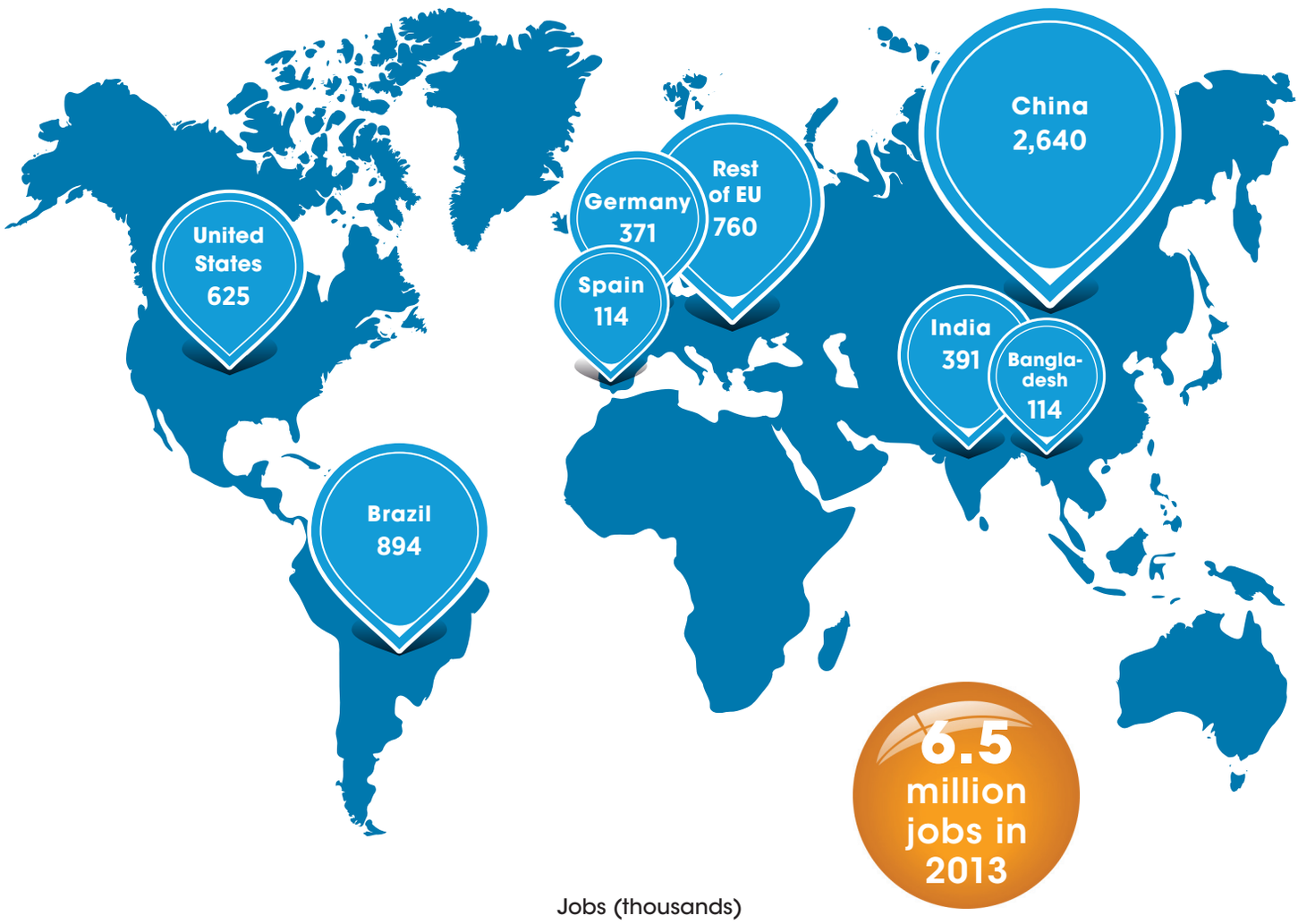
In the **European Union (EU),** there were more than 1.2 million renewable energy jobs in 2012, the most recent year for which complete data are available for the region.[4] Wind, solar PV, and solid biomass were the largest employers. Germany, France, Italy and Spain, together accounted for 60% of all renewable energy jobs (EurObserv'ER, 2014a).

The EU saw mixed job developments in 2012. Wind and solid biomass posted significant gains, and liquid biofuels, biogas, and geothermal were up by small margins. However, the solar PV industry experienced large job losses. Germany, France, Italy, and some other countries witnessed substantial reductions which were not offset by the gains in other EU countries (*e.g.*, Bulgaria, Denmark, the Netherlands and Slovenia). Small job decreases also occurred in the heat pump sector and the solar thermal industry.

In the wind industry, a process of consolidation started in 2013 among European wind manufacturers, in part due to the prospect of growing Chinese competition. Many national markets face job losses or stagnation (the pace of new installations dropped by 8% in 2013 (EWEA, 2014)), and according to EurObserv'ER (2014b) the industry's prospects now ride to an unprecedented degree on installations in just two countries – Germany and the UK.

[4] *This figure is derived from EurObserv'er data, with adjustments on the basis of national data from Spain and the UK.*

Figure 2. Renewable energy employment in selected countries



Germany remains the dominant force in Europe, despite having suffered some job losses. The latest statistics from 2013 indicate that the country has 371,000 direct and indirect jobs (O'Sullivan *et al.*, 2014). While wind added 20,000 jobs for a new peak of 138,000, jobs in Germany's solar PV industry were cut in half from a peak of 111,000 jobs in 2011 to just 56,000 in 2013. PV manufacturing employment fell from more than 12,000 direct jobs in late 2012 to 4,810 in November 2013 (Die Welt, 2014; pv magazine Deutschland, 2014).

Once a renewables pioneer, Spain has been hit hard by economic crisis, and adverse policy changes continue to damage employment prospects (Rose, 2013). Altogether, about 23,700 jobs were lost in the renewable energy sector between 2008 and 2012. 18,000 of these jobs were lost in wind power (a cut of 43%), 16,500 in PV (-59%), and 4,400 in liquid biofuels (-60%). Jobs in Concentrated Solar Power (CSP) continued to grow until 2011, but close to 6,000 were lost in 2012. APPA (2013) warns that Spain risks losing its position as an international CSP leader as projects grind to a halt. In the wind sector, APPA speaks of a "paralysis … which has led to the relocation of many businesses and the disappearance of some of them." In the liquid biofuel industry, Spain is hard pressed to compete with imports from Argentina and Indonesia. About 80% of the country's 53 biodiesel production plants were idle in 2012 (APPA, 2013).

Brazil's largest renewable energy industry is bioenergy (mainly bioethanol with close to 539,000 direct ethanol jobs and about 82,000 biodiesel jobs). Wind power is growing, but remains a distant second at an estimated 32,000 jobs. There

are continuing and far-reaching changes in the Brazilian ethanol industry. Increasing mechanisation of sugarcane cultivation and harvesting has reduced the number of direct jobs to about 331,000 in 2012, down from some 460,000 in 2006. Meanwhile, ethanol production jobs increased from almost 177,000 to 208,000, though they are slightly down from more than 213,000 in the 2009-2011 period (MTE/RAIS, 2014). Biodiesel is still far less important than ethanol in Brazil, but employment is on the rise, reaching 81,800 in 2012 (Ministério de Minas e Energia and Empresa de Pesquisa Energética (MME and EPE), 2013). Other Brazilian sources point to a larger figure of 86,112 jobs (direct and indirect) in 2011, a 3.5-fold increase from 24,660 in 2008 (Associação dos Produtores de Biodiesel do Brasil and Fundação Instituto de Pesquisas Econômicas (APROBIO and FIPE), 2012).

In the **United States**, solar employment has been rising fast, mostly in solar PV project development and installation. Employment reached close to 143,000 jobs across all solar technologies in 2013 (predominantly PV). This employer survey-based figure includes most direct jobs and many indirect jobs.[5] 2013 saw a gain of almost 24,000 jobs, 20% over 2012, raising the total to 53% above 2010. Driven by the falling costs of solar panels, installation jobs now represent almost half of all solar jobs; sales and project development add another 22%. Manufacturing accounts for only 21%, down from 36% in 2011. The number of manufacturing jobs stabilised in 2013, following a drop of some 8,000 jobs in 2011 (Solar Foundation, 2014).

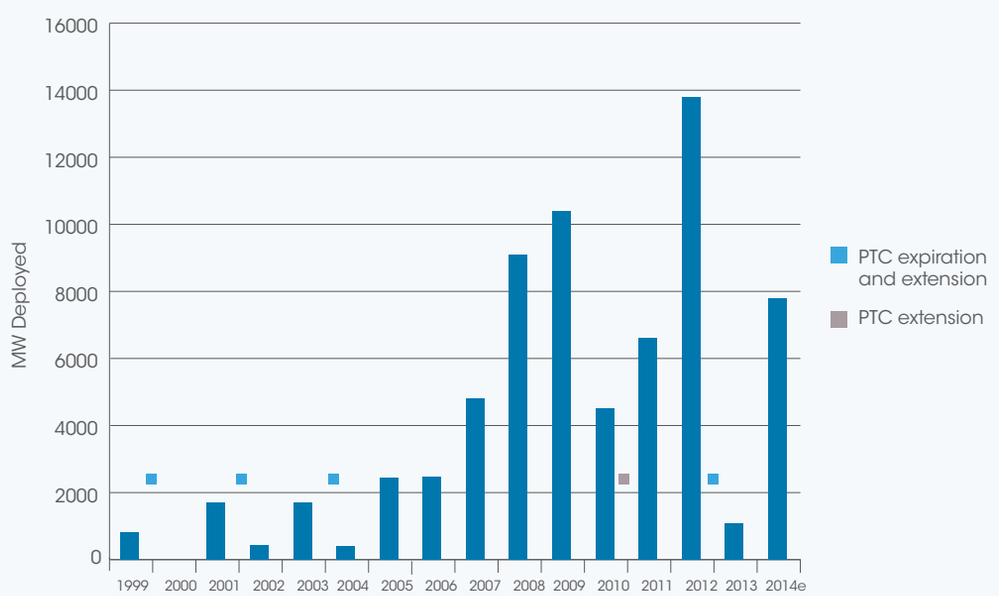
The manufacturing capacity of the US wind industry has grown strongly in the last decade.

Box 2

UNCERTAIN TAX CREDIT HINDERS WIND DEPLOYMENT

To take the example of one large renewable energy market, the US Production Tax Credit (PTC) has been instrumental for wind development. It must be renewed regularly by Congress, but it has lapsed several times before a renewal was agreed. Such discontinuity reduces the propensity to invest and has resulted in a repeated rollercoaster (in 2000, 2002, 2004, 2010 and 2013) for capacity additions (Figure 3) and thus in associated employment. The uncertainty surrounding the extension of PTC meant that a year of record installations (13.8 GW in 2012) was followed by a year with the lowest installation (1.1 GW) since 2004. The PTC was eventually extended in January 2013 (after expiring the previous month). After some months of restarting the industry, over 12 GW of wind power plants were under construction at the end of 2013 (Global Wind Energy Council (GWEC), 2013). It is estimated that 7.8 GW will be deployed in 2014 (Global Data, 2014).

Figure 3. United States Wind Capacity Additions and PTC



Note: The capacity addition for 2014 is estimated (Global Data, 2014).

Source: IRENA, 2013.

[5] *The Solar Foundation claims that a full accounting of indirect jobs, and inclusion of induced employment, could raise the full economic impact to nearly 600,000 jobs throughout the US economy.*

The domestic content of turbines has risen from less than 25% prior to 2005 to 67% in 2012, measured in monetary terms (American Wind Energy Association (AWEA), 2013; Platzer, 2012). However, the stop-and-go nature of the national support mechanism triggers periodic fluctuations in deployment and associated employment. In 2013, the uncertainty surrounding the renewal of the Production Tax Credit resulted in the lowest annual wind installations (1.1 GW) since 2004, a decline of 92% relative to the previous year (Box 3). This translated into significant turbine manufacturing overcapacities. U.S. manufacturing capacity fell from 12.5 GW in 2012 to 10.1 GW in 2013 and a number of manufacturers announced lay-offs (Bloomberg New Energy Finance (BNEF), 2014). Wind employment of 80,700 in December 2012 declined to 50,500 jobs at the end of 2013 (AWEA, 2014). Between 2011 and 2013, wind manufacturing jobs declined from 30,000 to 17,400 jobs. However, a project pipeline of 12 GW should alleviate some of the employment concerns in 2014.

In 2012, U.S. bioethanol employment had declined from 181,300 to 173,700 due to soaring feedstock prices, a drought-induced decline in yield, and lower demand. During 2013, the situation stabilised and bioethanol employment remained essentially unchanged (Urbanchuk, 2014).

No updated numbers are available for **India**. Ganesan *et al.,* (forthcoming 2014) offer estimates for wind and grid-connected solar PV that suggest the number of jobs remains at the level of 2009. In general, solar PV manufacturers have struggled in the face of cheap panel imports. Recently, however, interest in PV manufacturing in India may have grown due to the potential market size, proposed anti-dumping measures, reduction of global oversupply and expectation of supportive industrial policies (Bridge to India, 2014).

As previously mentioned, most other countries in the world still have limited renewable energy employment, and information is often scarce or non-existent. However, some information is available, particularly for solar PV.

The worldwide leader in installations of small solar home systems is **Bangladesh,** where their number has risen from 25,000 to 2.8 million in the last decade. This has increased the number of jobs (mostly in installations, but also in panel assembly and operations and maintenance) from 60,000 direct jobs in 2011 to more than 100,000 in 2013. The numbers are set to increase further, with an average monthly installations rate that has reached some 80,000 units (Barua, 2014).

Japan was an early technology leader in solar PV and available figures suggest that currently it is the fifth largest employer. The International Energy Agency (IEA) estimates that Japan may have had some 40,000 PV jobs, but does not offer any details (IEA Co-operative Programme on PV Power Systems (IEA PVPS), 2013b; Kaizuka, 2014). The Japan Photovoltaic Energy Association similarly estimates 40,800 direct jobs for 2012; which increases to 60,000 if indirect jobs are included (Ohbayashi, 2014). Japan's residential rebate and feed-in-tariff contributed to a tripling of the country's PV installations in 2013 (Liebreich, 2014). Employment will likely have increased substantially, but no estimates are available yet for this year.

Malaysia has grown to become a major PV producer. Manufacturing employment rose from 7,300 in 2012 to 9,200 jobs in 2013 (IEA PVPS, 2013a). Solar installations in the country, and the associated jobs, are still limited. Virtually all production is the result of foreign direct investment, part of the decision by many US and European producers to move factories to Southeast Asia.

Australia's solar PV employment grew from 1,800 jobs in 2008 to an estimated 23,500 direct and indirect jobs in 2012 (REC Agents Association (RAA), 2014). However, following the removal of state and federal government incentives, the PV market declined 22% in 2013, leading to the loss of 5,800 jobs. A further retrenchment to 12,300 jobs is expected for 2014. Similarly, the solar water heating market (with about 1,000 jobs) contracted by 20%.

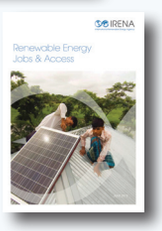
THE WAY FORWARD

In 2013, global employment continued to grow, with noteworthy shifts in the breakdown along the segments of the value chain. Valuable insights into these shifts are provided by the current estimation method. However, a more comprehensive analysis of renewable energy employment requires a more thorough understanding of the underlying dynamics. Therefore, in the next edition of this review IRENA will employ a new estimation method that allows us to analyse employment in more countries, with more technologies in each country and along the different segments of the value chain.

Box 3

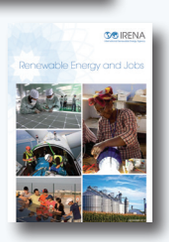
IRENA'S WORK ON RENEWABLE ENERGY AND JOBS

» The 2011 policy brief *Renewable Energy Jobs: Status, Prospects & Policies* laid the ground for IRENA's work on employment. The analysis focused on job creation in the large-scale renewable electricity and transport biofuel industries.



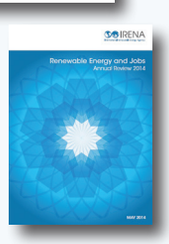
» The 2012 *Renewable Energy Jobs & Access* report analysed the role of renewable energy in creating jobs and improving livelihoods in the context of energy access.

» IRENA developed country and project case studies to demonstrate the potential for job creation in rural areas (2012).



» The 2013 report *Renewable Energy and Jobs* provides the first comprehensive view of the various dimensions of global employment in the sector. It underlines the importance of an enabling policy framework to realise the full potential for job creation.

» In January 2014, the first international "Renewable Energy Jobs Conference", held in Abu Dhabi, brought together experts, practitioners, academics and policy makers to discuss employment dynamics in the sector.



» *Renewable Energy and Jobs – Annual Review 2014* is the first of a series on the global state of employment in renewable energy.

» In parallel, IRENA has been contributing a sidebar on renewable energy employment to REN21's annual *Global Status Report* since 2012.

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TABLE 2. ESTIMATED DIRECT AND INDIRECT JOBS IN RENEWABLE ENERGY WORLDWIDE, BY INDUSTRY

	World	China	Brazil	United States	India	Bangladesh	European Union[m]		
							Germany	Spain	Rest of EU
	Jobs (thousands)								
Biomass[a,b]	782	240		152[h]	58		52	44	210
Liquid biofuels	1,453	24	820[f]	236[i]	35		26	3	82
Biogas	264	90			85	9.2	49	0.5	19
Geothermal[a]	184			35			17	1.4	82
Small Hydropower[c]	156		12	8	12	4.7	13	1.5	18
Solar PV	2,273	1,580[e]		143[j]	112	100[k]	56	11	153
CSP	43						1	28	0
Solar Heating/ Cooling	503	350	30[g]		41		11	1	31
Wind Power	834	356	32	51	48	0.1	138	24	166
TOTAL	6,492[d]	2,640	894	625	391	114	371[l]	114	760

[a] Power and heat applications. [b] Traditional biomass is not included. [c] Employment information for large-scale hydropower is incomplete, and therefore focuses on small hydro. Although 10 MW is often used as a threshold, definitions are inconsistent across countries. [d] The total for 'World' is calculated by adding the individual totals of the technologies. [e] Previous estimates were substantially lower (in the 300,000 to 500,000 range), but installation jobs have expanded massively. [f] About 331,000 jobs in sugarcane and 208,000 in ethanol processing in 2012; also includes 200,000 indirect jobs in equipment manufacturing, and 81,800 jobs in biodiesel. [g] Equipment manufacturing; installation jobs not included. [h] Biomass power direct jobs run only to 15,500. [i] Includes 173,700 jobs for ethanol and 62,200 jobs for biodiesel in 2013. [j] All solar technologies combined, with solar PV estimated at close to 100,000 jobs. [k] Direct jobs only. [l] Data for 2013. Includes 8,000 jobs in publicly funded R&D and administration; not broken down by technology. [m] All data are from 2012, except for Germany. The 'World' total and the 'Rest of EU' total are calculated using the EU country data for 2012 (even if 2013 data for a specific country is available, e.g., Germany).

Sources: Global numbers for biomass, liquid biofuels, biogas, CSP, solar heating/cooling and wind power are aggregates of individual countries and regions shown in the table, plus available figures for additional countries. Biofuels estimates for several countries are taken from Urbanchuk, 2012, and the global total also includes an estimate for Colombia (Vélez, 2013). Biogas total includes an estimate for Nepal (UNCTAD, 2010). In addition to the countries shown in the table, the solar PV figure is also based on figures from IEA PVPS (2013) and a variety of IEA PVPS national reports, as well as on RAA, 2014; Ohbayashi (2014); RSA (2012) The geothermal and small hydro figures are author estimates. Chinese numbers are from the following sources: biomass, solar PV, and solar heating/cooling from CNREC, 2014; biofuels from Urbanchuk, 2012; biogas from the Institute for Urban and Environmental Studies (IUES) and the Chinese Academy of Social Sciences (CASS), 2010; and wind from Liu (2014). Brazil biofuels from Ministério do Trabalho e Emprego/ Relação Anual de Informações Sociais (MTE/RAIS), 2014; from MME and EPE, 2013; and from Almeida, Bomtempo and Souza e Silva, 2007. Brazil solar heating/cooling from Alencar, 2013. Brazil wind power from Simas and Pacca, 2013. The United States geothermal power calculation is based on Jennejohn, 2010 and on 2013 capacity data. Other United States figures from the following: biomass from Bezdek, 2007, and from Biomass Power Association (n.d.); biofuels from Urbanchuk, 2013 (ethanol) and from LMC International, 2013 (biodiesel); hydropower from Navigant (2009); solar PV, CSP and solar cooling/heating from the Solar Foundation, 2014; and wind power from the American Wind Energy Association (AWEA), 2014. Indian biofuels from Urbanchuk, 2012, Indian wind power from GWEC and Greenpeace International, 2012, and on-grid solar PV from Ganesan et al., 2014. All other Indian figures are from the Ministry of New and Renewable Energy (MNRE) and Confederation of Indian Industry (CII), 2010. Bangladesh solar PV from Barua, 2014. All other Bangladeshi figures from GHK, 2010. German data from O'Sullivan et al., 2014. Spanish data from Association of Renewable Energy Producers (Asociación de Productores de Energías Renovables- APPA), 2013. EU figures derived from EurObserv'ER, 2014a and from renewableUK, 2013

Notes: Data are principally for 2012–2013, with dates varying by country and technology. Some of the data for India and China are older. Totals may not add up due to rounding.

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