



SOLAR POWER EXPANSION

Fact File

- 121 countries are part of the International Solar Alliance, formed by French and Indian governments at COP 21 in November 2015
- By 2030, the use of solar is expected to increase six fold, according to the International Renewable Energy Agency ([Bloomberg](#))
- The average cost of Photovoltaic (PV) solar plants is set to continue falling by up to 59 per cent by 2025 ([Bloomberg](#))

INTRODUCTION

Solar energy harnesses the sun's rays and turns them into useful energy. There are two main ways in which this is done – photovoltaic (PV), which is the conversion of light into energy, or thermal, which is energy created by heat. PV is the more common of the two and can be recognised – on a small scale – as the panels used on household roofs to capture the sun's light.

Solar power is an important player in today's renewable energy but sixty years ago, the high cost meant it wasn't used nearly as much as it is now. Back in the 1950s, each watt cost £1,350 (equivalent in today's money) compared to less than £0.55 per watt now¹.

As it stands, the world's largest solar power producer is Germany, which generates 38,250 MW of energy. Other countries in the top ten solar producers include China (28,330 MW), Japan (23,409 MW), Italy (18,622 MW), the USA (18,317 MW), France (5,678 MW), Spain (5,376 MW), Australia (4,130 MW), Belgium (3,156 MW) and South Korea (2,398 MW).²

By 2030, the use of solar is expected to increase six fold, according to the International Renewable Energy Agency. At the end of 2015, solar energy accounted for only 1.2 per cent of the global energy produced, though it is estimated that by 2030 this will have risen to between 8 and 13 percent³. This increase is said to be due to a decrease in the price of solar plants using photovoltaic technology – with the average cost set to continue falling by up to 59 per cent by 2025.

There are numerous other countries with markets fertile enough for solar power expansion, including Chile, Jordan, Israel, Brazil, Mexico, Russia, the Philippines, Saudi Arabia, South Africa and Turkey⁴. At the end of 2015, their combined solar power capacity stood at 227 GW, but has the potential to reach from 1,760 to 2,500 GW by 2030.⁵

¹ <https://www.theguardian.com/sustainable-business/2016/jan/31/solar-power-what-is-holding-back-growth-clean-energy>

² <http://www.techinsider.io/best-solar-power-countries-2016-3>

³ <http://www.bloomberg.com/news/articles/2016-06-22/solar-power-to-grow-sixfold-as-sun-becoming-cheapest-resource>

⁴ <http://www.bloomberg.com/news/articles/2016-06-22/solar-power-to-grow-sixfold-as-sun-becoming-cheapest-resource>

⁵ <http://www.bloomberg.com/news/articles/2016-06-22/solar-power-to-grow-sixfold-as-sun-becoming-cheapest-resource>

The International Solar Alliance

At COP 21 on November 30 2015, French President Francois Hollande and Indian Prime Minister, Narendra Modi, launched an International Solar Alliance. The alliance is made up of more than 120 countries and pledges to generate 1,000 gigawatts of solar power globally by 2030.⁶

Modi has been hailed as a 'clean energy enabler' by many, mainly because he introduced in excess of 900 MW of solar power to Gujarat during his time as chief minister. India itself has also developed a strong voice in solar circles. Through the National Solar Mission they have put considerable investment into solar power expansion in the country ensuring that 100GW of energy is produced by solar by 2022.

The current list of countries invited to make up the alliance consist of those located on the tropics of Cancer and Capricorn – also known as the sunshine countries. Rich in solar power, they provided the perfect basis for ensuring maximum solar power is captured.

Being part of the group means that countries must cooperate in regards to their training, regulation, building, standards and investment, as well as working closely with the U.N. However, it is acknowledged that many of the countries will not have the infrastructure in place for large scale solar plants. As a result, this will need to be implemented before they can begin harnessing solar power.

As part of the agreement India will contribute \$30 million to the alliance. This money will support the alliance for five years, as well as forming a secretariat which will be headquartered in India. The International Solar Alliance would then plan on generating \$400 million predominantly from membership fees and investment from companies and agencies globally. There are already numerous companies involved in the project, including HSBC France, Tata Steel, Areva, Engie and Enel. Hollande has also promised €300 million to the project over the next five years.

Furthermore, in June this year (2016), it was announced that the World Bank 'will help in accelerating mobilisation of finance for solar energy, and the Bank will have a major role in mobilising more than \$1 trillion in investments that will be needed by 2030'.

There are an abundance of solar power projects being undertaken in the 121 countries that are part of the Solar Alliance. Examples of these include:

India

- **Jawaharlal Nehru National Solar Mission** - as a founder of the alliance, India is expected to complete a number of solar expansion projects that are currently underway or due to start. Solar power expansion is a topic which has been prevalent in India for many years thanks to the Jawaharlal Nehru National Solar Mission. Launched on January 11 2010. The aim of the Mission is to ensure that 20,000MW of solar power grid connected energy is produced by the country.⁷ In July this year (2016), India was given a \$1 billion loan from the World Bank for the 2017 financial year to help them reach their solar power target.⁸ This is the largest loan ever given by the World Bank to support solar power
- **Delhi Rooftop Solar Power Projects** – ReNew Power Ventures, 'India's leading renewable energy project,' has entered into an agreement with the Delhi Metro Rail Corporation which will result in 6MW worth of rooftop solar power projects.⁹ It is expected that the projects will be commissioned in February 2017. This 6MW will be in addition to the 6.3MW of rooftop solar power systems already operated by the Delhi Metro Rail Corporation

Japan

- Japan has begun work on the world's largest floating solar farm.¹⁰ The intention is to supply 5,000 households with electricity from the plant upon completion in 2018

The Philippines

- The Energy Department in The Philippines has sanctioned 17 solar power projects in June 2016. The projects will have a combined capacity of **417.05 MW**.¹¹

⁶ <http://pib.nic.in/newsite/erelease.aspx?relid=146680>

⁷ <https://cleantechnica.com/2016/07/04/world-bank-approves-1-billion-indias-solar-power-program/>

⁸ <http://www.mnre.gov.in/solar-mission/jnsm/introduction-2/>

⁹ <http://www.businessgreen.com/bg/news/2463540/world-bank-lends-usd1bn-to-power-india-s-solar-revolution>

¹⁰ <http://cleantechnica.com/2016/06/27/delhi-metro-announces-new-rooftop-solar-power-projects/>

¹¹ <https://www.theguardian.com/environment/2016/jan/27/japan-begins-work-on-worlds-largest-floating-solar-farm>

¹² <http://thestandard.com.ph/business/208748/17-more-solar-projects-okayed.html>

Chile

- El Pelicano photovoltaic plant - also known as El Pelicano I and El Pelicano II, building of the plant is set to commence this year and will have a capacity of 100MW. Located in Vallenar and La Higuera, the plant is set to go on stream at the end of 2017. The purpose of the plant is to provide energy to the Metro of Santiago. Total and SunPower agreed to supply 300GW annually of solar power energy to the Metro of Santiago.¹² Consequently, the Metro of Santiago will be the 'first public transportation system in the world to run on mostly solar energy'

In fact, Chile's solar power industry is expanding so quickly that for 113 days in April, prices for solar were zero.¹³ In the country, 29 solar farms have been developed with a further 15 in planning

Zambia

- With investment from the World Bank, American company First Solar Inc. and French company Neoen, a 45 MW plant will be developed that will sell power for around six cents per kWh, and a 28 MW plant that will sell power for around eight cents per kWh¹⁴

Solar Power Projects Middle East

A report produced for the Middle East Solar Industry Association stated that from 2010 to 2015, investment in solar projects in MENA grew from \$160 million to \$3.5 billion, and is expected to continue increasing.

- **Dubai** - The Dubai Clean Energy Strategy 2050 launched at the end of 2015 'aims to make Dubai a global centre of clean energy and green economy'.¹⁵ By 2050, Dubai intends 75 per cent of its energy to be from renewable sources. Since launching this strategy, the Dubai Electricity and water authority announced plans for a solar plant that would generate **1,000MW**. Due to the enormity of the plant, the building will take place in stages. The first stage, (which will generate 200 MW) is set to be finished in 2021, with the plant set to be finished completely by 2030
- **Jordan** – a **160MW** 'solar park' is set to open in Jordan in summer 2016. Two thousand of Jordan's mosques and a number of universities are also employing solar power. In 2016, **220MW** will come online in 2016, with a further 300MW to be awarded to EPC and IPP models

Challenges for Solar Power

One of the biggest challenges for solar power is infrastructure. Grid infrastructure could struggle with the variability of solar energy – as it was built for 'consistent levels of generation'.¹⁶ These are being adapted, though this requires a considerable amount of investment and is being done at a slow pace.

An additional challenge for the industry is that the transmission costs have not fallen as quickly as the panel building costs.¹⁷ Consequently, growth has been limited. For example, there was a plan to build a large solar farm in the Sahara desert, with the purpose of providing 15 per cent of Europe's power by 2050. These plans have fallen through as a result of the discrepancy in costs in different areas of the solar industry. With this need for significant investment, plans can fall through due to a lack of money.

The 'capacity factor' is also a significant issue to the solar industry, as it is with other renewable energy sources. 'Capacity factor' is the actual output versus the potential output of a plant. A solar plant capacity is currently around 15 per cent in comparison to a coal power plant which runs at roughly 70-80 per cent capacity. A solution to this is the development of battery storage within the renewable arena – a solution that is becoming more viable as science progresses and costs decrease. A further solution suggested to combat the challenge faced by the solar industry is to build combination plants that combine solar with other renewable technology, and subsequently increasing plant capacity.

¹² <http://newsroom.sunpower.com/2016-05-23-The-Worlds-First-Metro-to-Run-on-Solar-Energy-Powered-by-Total-and-SunPower>

¹³ <http://www.bloomberg.com/news/articles/2016-06-01/chile-has-so-much-solar-energy-it-s-giving-it-away-for-free>

¹⁴ <http://africa-me.com/world-bank-program-puts-zambia-path-solar-energy/>

¹⁵ <http://www.solarmiddleeast.ae/en/Industry-News/Dubai-clean-energy-strategy-2050-launched/>

¹⁶ <https://www.theguardian.com/sustainable-business/2016/jan/31/solar-power-what-is-holding-back-growth-clean-energy>

¹⁷ Ibid.

Top 10 Solar Energy Producers

1	Germany		38,250	6	France		5,678
2	China		28,330	7	Spain		5,376
3	Japan		23,409	8	Australia		4,130
4	Italy		18,622	9	Belgium		3,156
5	USA		18,317	10	S. Korea		2,398



*Megawatts (MW) of solar energy produced annually

Typical Job Roles

Much like other industries, job roles in the solar industry can be split under a number of headings. These include:

- Development and Research
 - o Scientific Research – including physicists, chemists and material scientists
- Engineering
 - o Materials, chemical, electrical, industrial and mechanical engineers
 - o Computer software developers
 - o Engineering technicians
- Construction
 - o Environmental scientists
 - o Construction managers
 - o Civil engineers
- Operation
 - o Power plant operators
 - o Electrical and electronics installers and repairers
 - o Electrical engineers
- Installation and Maintenance
 - o Solar photovoltaic installers
 - o Site assessors

Opportunities

If you have the relevant skills and are interested in hearing about renewables energy opportunities for contractors in the solar industry, please visit www.procorre.com and apply to become a Procorre Consultant.

About Procorre

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Singapore +65 3158 7777

UK +44 20 3432 0480

Ireland +353 15 134 777

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List of prospective Member Countries and Territories for ISA

1.	People's Democratic Republic of Algeria	42.	France	87.	Republic of Rwanda
2.	Antigua and Barbuda	43.	Gabonese Republic	88.	St. Lucia
3.	Republic of Angola	44.	Republic of The Gambia	89.	Federation of Saint Kitts and Nevis
4.	Argentina Republic	45.	Republic of Ghana	90.	Saint Vincent and the Grenadines
5.	Commonwealth of Australia	46.	Republic of Grenada	91.	Independent State of Samoa
6.	Commonwealth of Bahamas	47.	Republic of Guatemala	92.	Democratic Republic of Sao Tome and Principe
7.	Peoples Republic of angladesh	48.	Republic of Guinea	93.	Kingdom of Saudi Arabia
8.	Barbados	49.	Republic of Guinea-Bissau	94.	Republic of Senegal
9.	Belize	50.	Republic of Guyana	95.	Republic of Seychelles
10.	Republic of Benin	51.	Republic of Haiti	96.	Republic of Sierra Leone
11.	Pluri'National State of Bolivia	52.	Republic of Honduras	97.	Republic of Singapore
12.	Republic of Botswana.	53.	Republic of India	98.	Solomon Islands
13.	Federal Republic of Brazil	54.	Republic of Indonesia	99.	Federal Republic of Somalia
14.	Nation of Brunei, Abode of Peace	55.	Jamaica	100.	Republic of South Africa
15.	Burkina Faso	56.	Japan	101.	Republic of South Sudan
16.	Republic of Burundi	57.	Republic of Kenya	102.	Democratic Socialist Republic of Sri Lanka
17.	Kingdom of Cambodia	58.	Republic of Kiribati	103.	Republic of Sudan
18.	Republic of Cameroon	59.	Laos People's Democratic Republic	104.	Republic of Suriname
19.	Republic of Cape Verde	60.	Republic of Liberia	105.	United Republic of Tanzania
20.	Central African Republic	61.	Libya	106.	Kingdom of Thailand
21.	Republic of Chad	62.	Republic of Madagascar	107.	Democratic Republic of Timor-Leste
22.	Republic of Chile	63.	Republic of Malawi	108.	Togolese Republic
23.	People's Republic of China	64.	Federation of Malaysia	109.	Kingdom of Tonga
24.	Republic of Colombia	65.	Republic of Maldives	110.	Republic of Trinidad and Tobago
25.	Union of Comoros	66.	Republic of Mali	111.	Tuvalu
26.	Congo - Democratic Republic of	67.	Republic of Marshall Islands	112.	Republic of Uganda
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40.	Federal Democratic Republic of Ethiopia	81.	Republic of Palau		
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