

This month we provide

- A brief overview of solar research and applications pre-1950; and
- A focus on India

The overview of solar pre-1950's provides some key highlights taken from the booklet:

[ISES SWC50 The Century of Solar Stories and Vision Booklet.](#)

For more highlights, please refer to the booklet or the [ISES Solar Energy Museum – Past, Present and Future.](#)

### Photovoltaics Pre-1950

The modern-day PV cell was developed in the 1950's however two significant events in the history of PV pre-1950 include:

- In 1839 French scientist Edmond Becquerel discovered the photovoltaic effect while experimenting with an electrolytic cell made up of two metal electrodes placed in an electrically conductive solution where the electricity generated increased when exposed to light.
- In 1876, William Grylls Adams and Richard Evans Day (UK) discovered that selenium produces electricity (photovoltaic effect) when exposed to light. Although selenium solar cells failed to convert enough sunlight to power electrical equipment, they proved that a solid material could change light into electricity without heat or moving parts.

### Solar Thermal Pre-1950

Using the sun to heat water was commercially available in West Coast USA in 1891 (Clarence Kemp with Climax Solar) however some significant events prior to that include:

- In 1767 Horace-Bénédict de Saussure built his "hot box" plate collector.
- Starting in 1860, the French mathematics professor Augustin Mouchot constructed a series of solar water heaters made of reflectors in various shapes and water-flowing cylindrical absorbers made of blackened copper. Mouchot used these devices partly as solar stoves, partly as distillation apparatus for brandy and partly to produce steam

### What is SWC50 – The Century of Solar?

In 1970 solar research pioneers met at the first International Solar Energy Society (ISES) Conference in Melbourne Australia. ISES is commemorating this first Solar World Conference with a special 50th Anniversary Virtual Conference, called the Solar World Congress at 50 (SWC50).

During these past 50 years solar energy has grown from being emerging technologies to a vibrant industry. The Century of Solar highlights the transformation in the global energy sector that has taken place since the first Solar World Congress in 1970 and looks forward to the next 50 years when solar energy will be a major cornerstone of the global energy system. While the focus of the Century of Solar is on the evolution of solar energy, the importance of other renewable energy sources working together to reach the 100% renewable energy world goal will be a central theme.

**SWC50 - The Century of Solar** is about the people: researchers, industry players, policy makers, and leaders of NGOs and Non-profit organizations who have all contributed to make solar energy the fastest growing contributor to new electricity capacity.

**SWC50 Programme:** The SWC50 virtual conference was held on 3 - 4 December 2020, with two follow up webinars due in 2021.

## Concentrating Solar Power Pre-1950

As early as the 3<sup>rd</sup> century, Dositheius, a mathematician, observed that solar rays bouncing off a parabolic mirror focused on a point could produce high temperatures while around 1515 Leonardo da Vinci developed drawings for industrial applications of solar energy using parabolic mirrors. However, two early working machines include:

- In 1878, for the World Fair in Paris, Augustin Mouchot constructed a solar machine that had a conical reflector five meters in diameter. This was able to drive a pump that could transport around 2,000 litres of water per hour.
- The American Frank Shuman built a power plant from 1913 onwards in the then British protectorate of Egypt. It consisted of five elongated parabolic trough collectors that reflected solar heat onto a zinc pipe suspended in its focal point and heated water in it. Shuman's power plant achieved an output of 55 horsepower and, given the coal prices in Egypt at the time, was also competitive with fossil fuel power plants. This plant used an insulated tank to store hot water to allow the plant to run 24 hours a day.

## Solar Architecture/Buildings

Out of all the applications for solar, making use of the sun to heat buildings is the oldest, for example:

- In China during the Zhou Dynasty (before 12<sup>th</sup> century BC) the government instructed builders to use gnomon to determine where what we now call solar noon was at the equinoxes and solstices, and by 7<sup>th</sup> century BC positioning buildings to face true south.

*Note: Gnomon developed in about 2000 BC were sticks or rocks perpendicular to the ground used to track the movement of the sun.*

- Socrates in ancient Greece promoted that houses should be pleasant to live in and be cool in summer and warm in winter by having buildings that provided shade when the sun was high and provided warmth on porches when sun was low. Archaeologists found a rectangular building near Athens, where Socrates lived, that faced south with the entrance and courtyard in that direction and the main rooms on the north.
- Olynthus was northeast of Athens. Around 345 BC a new district was created in an area called North Hill. The streets ran east-west so that the houses could be built facing south. The streets were spaced wide enough so that they would all get the winter sun.
- Vitruvius was a Roman architect in first century BC and is believed to have visited Greece as a military engineer. He wrote *The Ten Books of Architecture* in which he advised architects and builders in more temperate parts of the Roman Empire that "buildings should be thoroughly shut in rather than exposed towards the north, and the main portion should face the warmer (south) side"

The above examples show that using solar energy is not new. Though it is often stated it is the way of the future, it has been the way of the past and has been applied for centuries.

For more highlights, please refer to the booklet or the [ISES Solar Energy Museum – Past, Present and Future](#)

## Focus on India

The origin of the Solar Energy Society of India (SESI) goes back to the year 1967, when a Solar Energy Working Group was constituted at the Central Salt and Marine Chemical Research Institute (CSMCRI), Bhavnagar (Gujarat-India). Dr. R. L. Datta, Dr. Gomkale, Dr. Chaman Lal Gupta, Ms. Anna Mani and Mr. J. C. Kapoor were the key players during the formative days of the Society. In the run-up to the formal establishment of SESI as a registered body and as the national section of ISES, several meetings and conferences on solar energy were organized under the auspices of the Working Group, with Dr. R. L. Datta as its first secretary. A conference on solar energy was first held followed by several meetings during 1967–68. In 1974–75 the All India Solar Energy Working Group formally became affiliated with the International Solar Energy Society and was named Solar Energy Society of India (SESI). The Solar Energy Society of India was formally registered under the Societies' Act with a full governing council and office bearers, and its first national convention was held at Jadavpur

University in 1976. (Further information on the early years of SESI can be found in the *The Fifty-Year History of the International Solar Energy Society and its National Sections*’.

Today SESI has total membership strength of 2000 at present. Majority of them are engaged in the research, development, manufacturing and programme implementation activities etc.

SESI is administered by its Governing Council of twenty members elected once in two years, consisting of the President, six Vice Presidents, a Treasurer, a Secretary General and 11 members of whom one is the Immediate Past President. The council meets two or three times per year. The Annual General Meeting of the members is normally held at the time of the International Congress on Renewable Energy (ICORE).

Day to day administration is provided by the Society Secretariat headed by the Director General.

### **Indian ISES Presidents and Solar World Congresses**

India has had one ISES President:



Dr. R. L. Datta  
1978-79

India hosted the Solar World Congress in Delhi in 1978. The 2021 SWC was due to be hosted by India however due to the pandemic the 2021 SWC will be online. The SWC 2023 will take place in New Delhi, India.

### **Sample of India Pioneers Pre-1980**

Each month this Newsletter presents a sample of people involved with renewable energy prior to 1980, coming from both research and industry.

It is impossible in this monthly newsletter to cover the thousands who have contributed to the development of renewable energy prior to 1980. What is included in each newsletter is just be a snapshot of those included SWC50 celebratory booklet: *The Century of Solar-Stories and Visions*.

### **Dr R. L. Datta**

Dr. R . L. Datta (India) was educated in India and England, with degrees in Chemistry and Applied Chemistry. He studied separation processes at the Max Planck Institute in Germany and worked at the Central Salt and Marine Chemicals Research Institute in India. His contributions to solar energy R&D were in the field of salt production by solar evaporation, solar distillation, solar ponds and space cooling. He was active in a wide variety of energy agencies, including as chairman of the All-India Solar Energy Working Group, Convener of the Energy Research Committee of CSIR (the government of India), Member of the ad hoc Committee of the USA Academy of Sciences for Solar Energy for Developing Countries, and others.

### **Prof (Dr) H.P Garg**

A pioneer in Renewable Energy Research and Education in India, Prof. (Dr.) H.P. Garg has achieved National and International recognition for his outstanding original contributions to the development and design of solar energy technology applications. Largely due to the zeal and perseverance of Prof. (Dr.) H.P. Garg, a range of quality assurance processes have been adopted in India and abroad which has earned him the credit of Renewable Energy Man. In addition, Prof. Garg has spearheaded the establishment of academic programmes focusing on research and training in renewable energy at Indian Institute of Technology (IIT) Delhi as well as at many other engineering institutions in the country. He has also led the effort to develop suitable training material for several of these academic

programmes, including his 18 books, more than 520 research papers, 80 technical reports and supervising 30 Ph.D. students. Prof. Garg has been actively engaged in Teaching; Research, Development and Demonstration (RD&D), and Consultancy in the field of Renewable Energy; Technical & higher education, Management and Energy Education and Administration for the last 55 years, mainly at Indian Institute of Technology (IITD), New Delhi, India as Professor (Solar Energy) and Head. In between, on deputation, he was Director General and Principal Secretary, Department of Science & Technology, M.P. Govt., India during 2002-2004. Presently Prof. Garg is the Director General at Trinity Group of Educational Institutions, New Delhi and Adjunct Professor, Netaji Subhash University of Technology, New Delhi.

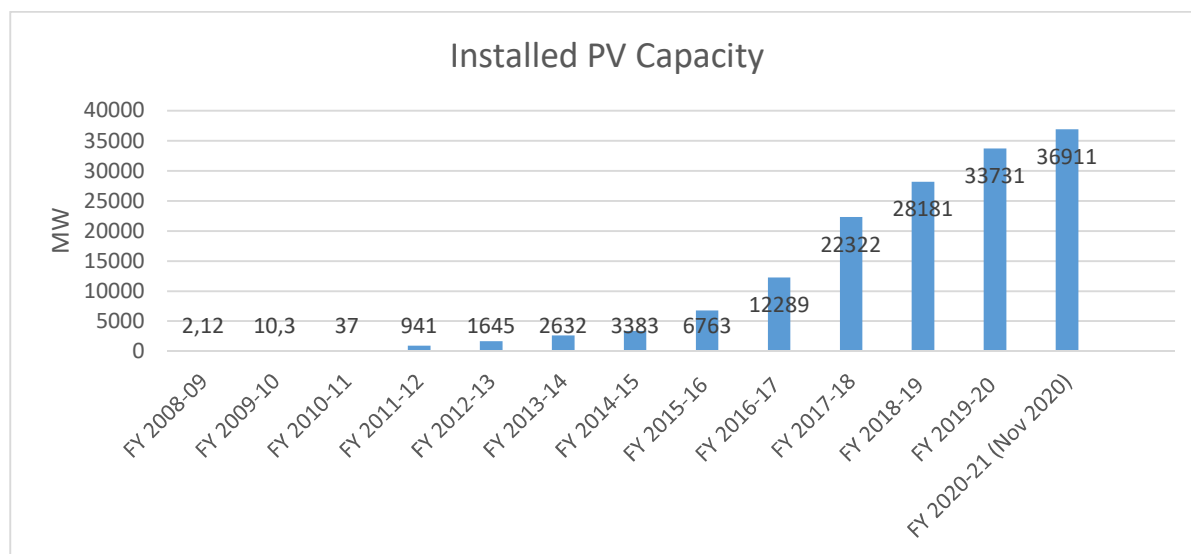
### **Prof Biswajit Ghosh**

Prof Biswajit Ghosh started his research career as PhD Student in the field of CdTe Thin film solar cells at Jadavpur University, India in the year 1978. He has more than 42 years of experience in Teaching and Research in the field of Solar Photovoltaic. He was Professor and Director at School of Energy Studies, Jadavpur University, Visiting Professor at Kalinga Institute of Industrial Technology, Adjunct Professor, Manipal University and Leverhulme Visiting Professor at Newcastle University, UK. Presently he is serving as Vice-Chancellor of The Neotia University, Kolkata, India. He has worked as Visiting Research Scientist at University of Stuttgart, Germany; as Fellow, European Commission at Northumbria University, UK; as Academic Visitor at Imperial College, London; as Royal Society Overseas Scientist at University of Surrey, UK and as Visiting Professor at Newcastle University, UK. He has received D. Sc. (Engg.) from Jadavpur University in 2008 and D.Sc. (Honoris Causa) for outstanding contribution in Science, Engineering and Education by the National Institute of Technology, Agartala, in the year 2017. He was nominated for prestigious European award by World Renewable Energy Council for 'Edmond Becquerel Prize' and received Best Scientific Poster Award by the EU at 24th EU PVSEC, at Hamburg, Germany.

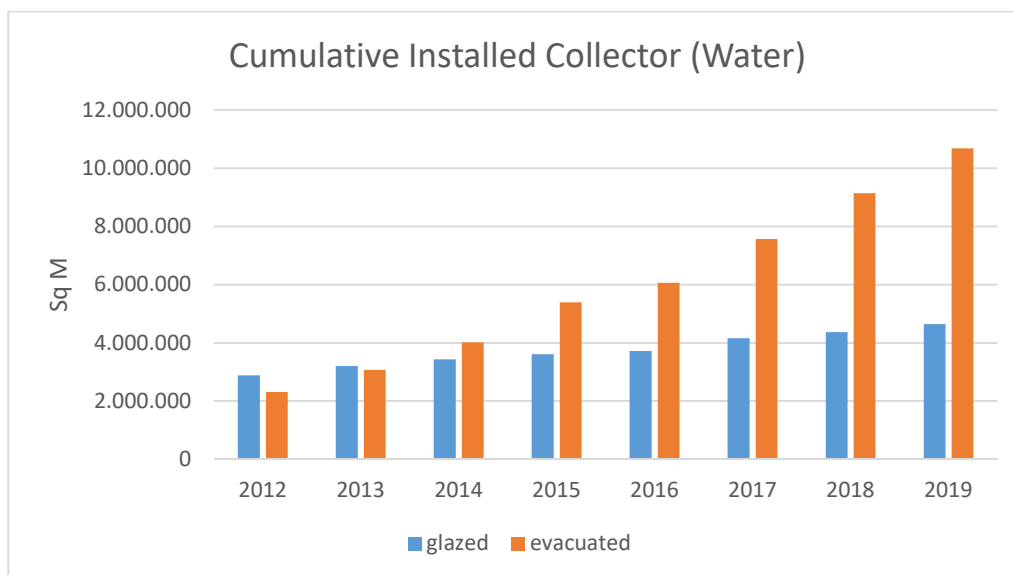
Within the booklet there are a number of people of Indian origin who started their research in India but then moved to other countries where they spent most or all of their working lives. Other Indians that are listed as pioneers in the booklet include:

<b>Name</b>	<b>Year Started</b>	<b>Research or Industry</b>
Ravikumar Gurumurti	1982	Industry
Rabindra Satpathy	1982	Industry
Dr Gouri Datta	1984	Research
Deepak Gadhia	1985	Industry
Dr. Jami Hossain	1985	Industry
Dr. Mrs. Janak Palta McGilligan	1985	Industry
Dwipen Boruah	1990	Industry
Dr Harish hande	1992	Industry
Jaideep Malaviya	1995	Research and Industry

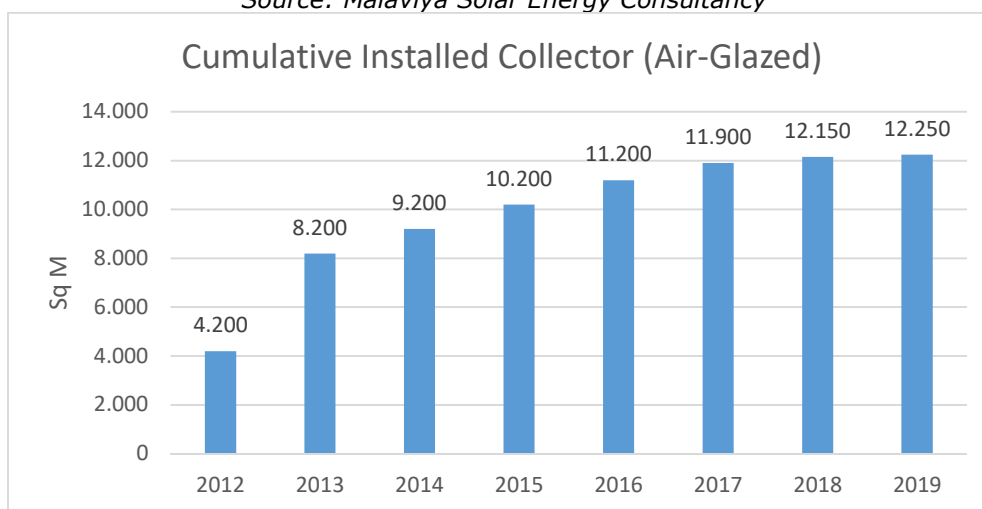
### **India's Growth in Solar**



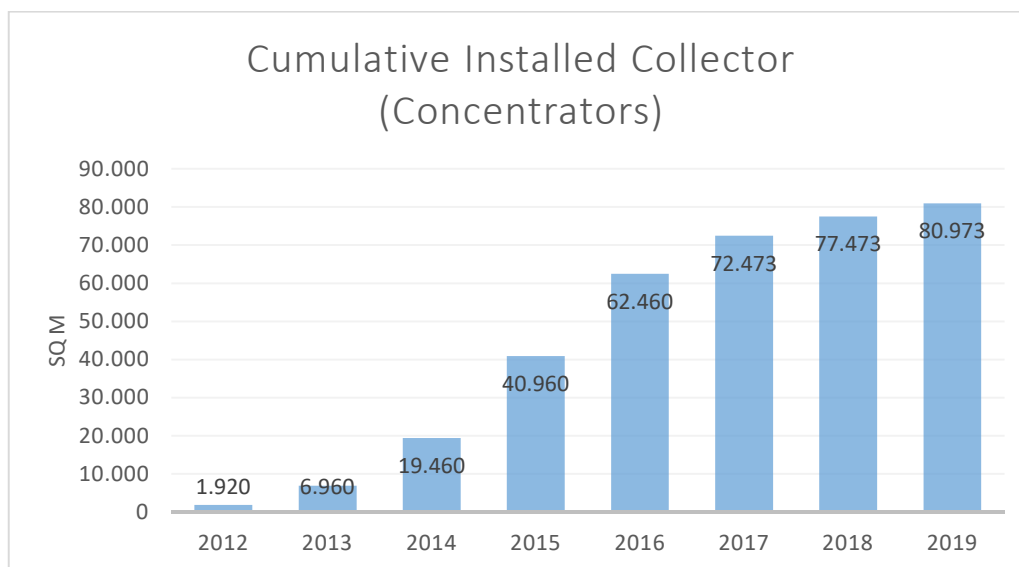
Source: Ministry of New and Renewable Energy (MNRE)



Source: Malaviya Solar Energy Consultancy



Source: Malaviya Solar Energy Consultancy



Source: Malaviya Solar Energy Consultancy

## ***Renewable Energy Pioneers***

Without the efforts of individual researchers, system designers, system installers, business leaders, policy makers and those within the donor community, the renewable energy industry would not have grown from watts to Gigawatts in the last 50 years. ISES' way of acknowledging the many people was by issuing a call for the submission of Renewable Energy Pioneers to be listed in the celebratory booklet.

ISES will be releasing an updated version of the booklet in December 2021 and therefore **ISES is re-issuing the call for submissions of the names of individuals covering the following two categories:**

1. **Research Pioneers:** Individuals who started their research in 1995 or earlier.
2. **Industry Pioneers:** Individuals who actively started working in or with the renewable energy industry in 1995 or earlier.

Names and information can be submitted [here](#). Individuals can submit on behalf of themselves or on behalf of someone else, also for example for those who may have passed away.

## ***Partners of SWC50***

ISES acknowledges the support provided by the Platinum Partners: GSES from Australia and NREL from USA; Gold Partner: Smart Energy from Turkey.

