2nd Program on SOLAR ANALYTICS

(5 DAYS WORKSHOP ON BIG DATA ANALYTICS AND DATA SCIENCE (ML/AI) IN CREATING PLANT EFFICIENCIES FOR SOLAR SYSTEM)

PROGRAM DATE: 4th NOV- 08th NOV, 2019
VENUE: NISE CAMPUS, GURUGRAM
Last Date to Submit Form: - 31st October 2019 (Thursday)

Program Brief

SOLAR PLANT DATA ANALYSIS APPLYING DESCRIPTIVE ANALYTICS, DIAGNOSTIC ANALYTICS & PREDICTIVE ANALYTICS IN ASSESSING PLANT CONDITION AND FUTURE OUTPUT WITH REAL TIME ANALYTICS OF BIG DATA (PLANT PARAMTERS, RADIATION, SENSORS, SCADA ETC) APPLYING MACHINE LEARNING PRINCIPLES

About NISE

National Institute of Solar Energy (NISE), an autonomous center of excellence of Ministry of New and Renewable Energy, Government of India, is conducting national skill development programs to meet the needs and upgrade the technical expertise of solar professionals.

About PRAGYA SOLAR

Pragya Solar, is a social startup in solar with the vision to bring solar adoption awareness in India aligned with National Solar Mission principles. Pragya Solar has conducted Entrepreneurial development workshop for 250 individuals and 1500 students across the nation of which 25 individuals are standing on their own feet. Pragya Solar is represented by profession from IIT/NIT & Harvard University Alumni. Pragya is a step towards innovation & transformation with niche offering aimed at nation development thru skill enhancement and opportunity creation.

Learning Objectives

- How to Gain intelligence on plant data and analyze the output with descriptive modelling to understand the current operation
- Understand the parameters which contribute to the variable generation and diagnostics analytics on assessing their impacts
- Explore the methods of Statistical analysis to analyze the data quality from different sources and making it ready for exploratory and inferential analysis
- Understand the basics of plant sustainability with predictive modelling to assess solar plant output, solar cell efficiencies and degradation, inverter outputs and cables /joints impacts
- How to achieve the optimization at the plant level and parameters contributing to same
About the Program

Solar Sector is growing at a tremendous pace with government aiming to achieve 100GW target till 2022. This initiative has seen government directive on solar adoption as grounds up, roof top system across longitude and latitude of India. Solar system works with solar radiation, which create impact on the output energy depending on the quality radiation, cloud cover, ambient temperature, and module technology. Today there is need of knowledge of weather forecasting / solar generation forecasting as it helps the utility professionals with long terms analysis on solar energy generation, O&M, with its relevance and impact on the grid stability, load balancing, addressing peak power demands, creation of power portfolio within utility power purchase basket on renewable energy. Energy Audit of Solar plant is the key objective looked upon for already installed facilities when they are looked upon their quality generation

Like other energy operations SOLAR too generate BIGDATA (radiations, plant parameters etc.) which need to be studied for effective operation as large utility power output impacts power evacuation and grid balancing perspective for state as well as central utility.

SOLAR ANALYTICS is aimed at Developing CoE (Centre of Excellence) on analytics for organization as well as developing skills for managing the same. The program encompasses the combination of solar domain with the technology like Internet of things (IOT), Machine Learning, predictive modelling, forecasting, optimization which has to be understood by utility/solar plant engineers and decision makers to carve differentiator for their utility operations in resolving day to day problems. For private sector solar generators Analytics in today's scenario is used by organization in creating a competitive edge, wherein market share is getting limited and margins are shrinking with each passing day as well as address long term perspective of operational efficiency, Energy Audit, Financial return on investment. In today's scenario organizations are preferring to onboard professional who are prepared in taking responsibility at business with less project deployment expenses/learning. This program would help professional/organization carve a difference for themselves at workplace and help establish a foundation of deep analytics for organization they are part of.
Target Audience:
Graduates, Engineers, Management consultants, Consulting firms, Solar Entrepreneurs; Public Sector Undertaking Officials; solar Developers & EPC contractors; Senior Energy Department Officials of Govt. of India, Engineers from Power DISCOMS

Program Fees:
Training Fee per participant Rs. 25,000 + GST of 18%

Batch Strength will be limited to 25. Lunch, Tea will be provided during all five days. However no TA/DA will be provided. Accommodation at NISE Guest house is available on payment basis (600/- per day), depending on the availability of the rooms.
<table>
<thead>
<tr>
<th>Name</th>
<th>Current Organization</th>
<th>Location</th>
<th>Role/Designation</th>
<th>Work Description</th>
<th>Program Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neeraj Srivastava</td>
<td>Tata Power Trading Company</td>
<td>Delhi</td>
<td>Head -Renewable Trading</td>
<td>Power Trading Forecasting, DSM strategy</td>
<td><a href="http://www.youtube.com/watch?v=y3Z8ZnItjok">www.youtube.com/watch?v=y3Z8ZnItjok</a></td>
</tr>
<tr>
<td>Sama Hari Kumar</td>
<td>China Lighting Power company</td>
<td>Hyderabad (Telangana)</td>
<td>Solar Plant --Operation/Planning</td>
<td>Have been working on excel to Evaluate Solar plant Condition</td>
<td><a href="http://www.youtube.com/watch?v=GdlONIPrnug">www.youtube.com/watch?v=GdlONIPrnug</a></td>
</tr>
<tr>
<td>Venkata Murali</td>
<td>MSL Electricals And Electronics PVT LTD</td>
<td>Qatar</td>
<td>Managing Director</td>
<td>Entrepreneur In Solar Sector and working in diversifying portfolio in global market on newer solar trends</td>
<td><a href="http://www.youtube.com/watch?v=UuvHrGxlx0A">www.youtube.com/watch?v=UuvHrGxlx0A</a></td>
</tr>
<tr>
<td>Lakshmi Nambiar</td>
<td>Amrita School Of Engineering</td>
<td>Kerala</td>
<td>Research Scholar</td>
<td>Have a start up working on Load forecasting &amp; management and moderating wit with off grid solar power supply</td>
<td><a href="http://www.youtube.com/watch?v=n1o2QA3SIml">www.youtube.com/watch?v=n1o2QA3SIml</a></td>
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</tbody>
</table>
Name-> **Gaurav Saini**

Current Organization-> **Saini Power Transactor Company**
Location-> **Chandigarh**
Role/Designation-> Director
Work Description-> Power Trading, Solar Energy Trading, guide customer on solar energy dynamics and analytics

Program Feedback - www.youtube.com/watch?v=jSQqTvNY9g

Name-> **Naveen Kumar**

Current Organization-> **National Institute Of Wind Energy**
Location-> **Chennai, Tamil Nadu**
Role/Designation-> Project Engineer
Work Description-> The Action plan which can be taken with the help of Solar Analytics and forecasting and help states like Tamil Nadu and Karnataka on renewable energy balancing

Program Feedback - www.youtube.com/watch?v=eaaA9dW9DPA

Name-> **Biswajit Dutta**

Current Organization-> **Ex Trina Solar**
Location-> **Gurugram, Harayana**
Role/Designation-> Management Consultant
Work Description-> Helping Clients in making decision on M&A, Investment, Expansion/Diversification of portfolio in Solar Sector,

Program Feedback - www.youtube.com/watch?v=vYrEY3h-zso

Name-> **Subrata Bhattacharya**

Current Organization-> **Entrepreneur**
Location-> **West Bengal**
Role/Designation-> Director
Work Description-> Start Up working in direction of creating new applications to help consumer get benefited by solar data analytics. Getting the Solar data right way and how it can be transformed using Solar Analytics.

Program Feedback - www.youtube.com/watch?v=_8xQscgGjxl
Name-> **Parth Tyagi**

Current Organization-> **Ex Infosys**
Location-> **Noida, Uttar Pradesh**
Role/Designation-> Developer
Work Description-> computer science graduate with interest to grow in the area of Solar worked for 2 years in programming.

Program Feedback -
[www.youtube.com/watch?v=V2DjhgzxM1I](http://www.youtube.com/watch?v=V2DjhgzxM1I)

Name-> **Puspal Manna**

Current Organization-> **State Engineering College, Arunachal Pradesh**
Location-> **Arunachal Pradesh**
Role/Designation-> Electrical Engg Student
Exposure to Analytics-> understand the dynamics of Solar to start up new venture

Program Feedback -
[www.youtube.com/watch?v=8rM7VUT81KM&t=19s](http://www.youtube.com/watch?v=8rM7VUT81KM&t=19s)
SOLAR ANALYTICS

Feed Back and Interaction with Dr A. K Tripathi
(Director General , NISE)

1  www.youtube.com/watch?v=ooogw2sbVrq4
2  www.youtube.com/watch?v=9ZeBoeF8pXI
3  www.youtube.com/watch?v=JBorwPMHICs

Program Certificate for Participants
## SOLAR ANALYTICS

### TENTATIVE PROGRAM DETAILS

**PROGRAM DATE:** 4<sup>th</sup> NOV to 8<sup>th</sup> NOV, 2019  
**VENUE:** NISE CAMPUS, GURUGRAM

<table>
<thead>
<tr>
<th>DAY</th>
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<th>Topic</th>
<th>Activity &amp; Learning</th>
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</table>
| 1   | 10:00 am - 11:30 am with Tea Break | **Introduction to analytics** | What is Data Analytics and its life cycle for industry (Descriptive Analytics, Diagnostics Analytics, Predictive Analysis, Prescriptive Analytics) with reference to SOLAR DOMAIN  
What are the components of data Analytics (Data integration, Data preparation, Data processing/modelling, Data visualization)  
what is BIG Data in Solar  
What is IOT |
| 1   | 11:45 am - 1:00 pm | **Introduction / components of solar analytics/ usefulness of solar data/ solar system pre-requisites** | Solar Radiation data and SRRA  
solar industry preview and integrated role of solar analytics- from business stand point  
solar data sources/parameters/variables - solar irradiance (direct, diffused, reflected, refracted), impact of weather parameters (wind, humidity, precipitation, cloud etc.)  
Impact of solar components on power output or generated energy - panels, cables, inverter |
| 1   | 1:00 pm - 2:00 pm | **BREAK** | **LUNCH** |
| 1   | 2:00 pm - 3:00 pm | **SITE VISIT** | **VISIT TO SOLAR INSTALLATION IN THE NISE PREMISES** |
| 1   | 3:00 pm - 4:00 pm (with tea break) | **Solar Data Management** | Know your data - What kind of data is important for Analysis (ground mounted/ roof top). Data types (structured, unstructured, real time, discrete etc.)  
Solar Radiation data- HOW to get the data - data sources/databases, FIELD sensors/instruments/SRRA/data logger  
Weather data - How to get the data - public domain/weathering agency  
Energy efficiency data - Solar Energy generation data PR & CUF data analysis for the solar plant |
| 1   | 4:15- 5:00 pm | **How do we get the data** |  

## SOLAR ANALYTICS

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<tbody>
<tr>
<td>2</td>
<td>10:00 am - 11:30 am with Tea Break</td>
<td>Solar Analytics</td>
<td>Introduction to Analytics, key components of analytic-data management, business intelligence and correlation/regression</td>
</tr>
<tr>
<td></td>
<td>11:45 am - 1:00 pm</td>
<td>Business Solar Analysis</td>
<td>Analysis of different solar parameters for data driven approach</td>
</tr>
<tr>
<td></td>
<td>1:00 pm - 2:00 pm</td>
<td>BREAK</td>
<td>LUNCH</td>
</tr>
<tr>
<td></td>
<td>2:00 pm - 3:00 pm</td>
<td>CASE ANALYSIS</td>
<td>SOLAR PLANTS DATA ANALYSIS</td>
</tr>
<tr>
<td></td>
<td>3:00 pm - 5:00 pm with tea break</td>
<td>Solar descriptive analytics</td>
<td>Understanding impact of variables like GHI, DNI, Cell data, temperature, weather data influence on the outcome</td>
</tr>
<tr>
<td></td>
<td>10:00 am - 11:30 am with Tea Break</td>
<td>Solar Data Management principles - Statistical modelling of solar data</td>
<td>Building relation and their impact on Generation, Financial impact, Operation impact Analysis using Descriptive analysis</td>
</tr>
<tr>
<td></td>
<td>11:45 am - 1:00 pm</td>
<td>Introduction to data Management/aggregation tool thru platform like “Aaas” Analytics as a Service</td>
<td>Hands on exercise on the Solar Descriptive Analytics- Show casing how to work on this rule using the tool, by simple bar graph, comparative charts, how to Build up KPIs, KRA in solar space</td>
</tr>
<tr>
<td>3</td>
<td>1:00 pm - 2:00 pm</td>
<td>BREAK</td>
<td>LUNCH</td>
</tr>
<tr>
<td></td>
<td>2:00 pm - 3:00 pm</td>
<td>CASE ANALYSIS</td>
<td>ROLE OF INTEGRATED VIEWING OF RENEWABLE PLANTS</td>
</tr>
<tr>
<td></td>
<td>3:00 pm - 5:00 pm with tea break</td>
<td>Solar Data Management Practical</td>
<td>working on data from the large grounds up MW level plant on solar data analysis thru platform like “Aaas” Analytics as a Service</td>
</tr>
<tr>
<td></td>
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<td>practically understand how to work on solar plant data analysis thru platform like “Aaas” Analytics as a Service</td>
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</table>
| 4   | 10:00 am - 1:00 pm with Tea Break | Solar Advanced Analytics - Regression modelling | • Drive Plant Energy Audit  
• Plant operational Efficiency  
• Plant Generation and ROI analysis  
• Net return on Investment  
Establish relationship between impact of solar radiation data, temperature, weather thru regression analysis using R |
|     | 1:00 pm - 2:00 pm | BREAK | LUNCH |
|     | 2:00 pm - 3:00 pm | CASE ANALYSIS | LARGE MW LEVEL PLANT CASE ANALYSIS |
|     | 2 pm - 5:00 pm with tea break | Solar Advanced Analytics - Regression modelling - Practical | Understand how to evaluate plant operating variables relations (univariate, bi variate, multi variate, collinearity) in solar, derive meaning full output from the plant data relations.  
Solar cell degradation analytics  
Solar Plant Audit |
| 5   | 10:00 am - 1:00 pm with Tea Break | Solar Advanced Analytics - Time series predictive modelling-Practice | Role of Renewable Energy Monitoring Centre.  
|     | 1:00 pm - 2:00 pm | BREAK | LUNCH |
|     | 2 pm - 4:00 pm tea break | Solar Advanced Analytics – Artificial Intelligence on SOLAR CELL | Usage of Artificial Intelligence in analyzing the SOLAR CELL DEGRDATION |
|     | 4:00 pm - 4:30 pm | | PROGRAM FEEDBACK |
|     | 4:30 - 5:00 pm | PROGRAM CLOSURE | DISTRIBUTION OF CERTIFICATE |
Registration:

Training Program on SOLAR ANALYTICS

Date: 04th November to 08th November 2019

Registration Form

Name of Delegate/Participant:

Name of the Organization:

Designation:

Contact Number:

Email Id:

NEFT / RTGS Number:

Amount/Date of payment:

Bank Details of NISE:

Account Holder Name: National Institute of Solar Energy-Capacity Building
Bank Name: State Bank of India
Branch: State Bank of India – DLF Qutab Enclave, Shop
No:109-110, Qutab Plaza Shopping C, Gurugram
SB Account No. 3726665652
IFSC Code: SBIN0006604
Branch Code: 6604

The participants must clearly indicate send their bank transfer details (by e-mail) in advance to the Course Coordinator, then only, the participants could be allowed to attend the training programs.

Contact Information: Administrative
Information Submission forms can be sent through email only (startups.nise@gmail.com). The last date to submit the form is 31st OCTOBER 2019 (Thursday). For any queries please write an e-mail to Dushyant@nise.res.in or call to Mr. Dushyant, Head, Technology (9560329740/) NISE shall respond to your queries on immediate basis. Upon receipt of application and proof of deposit of payment (such as screen shot or electronic receipt of scanned copy of IMPS/NEFT/On-line transfer receipt, etc.) by e-mail, NISE shall confirm the seat to individual candidate by return e-mail. The consolidated list of all participants shall be sent to all confirmed candidates one or two days in advance by email.

Contact Information: Technical
Mr Sumit Gupta (9560329740), sumit.gupta@pragyasolar.in

For Accommodation (on payment basis) please contact -Mr. Deepak Mathur (Deepak.mathur@nise.res.in)
SOLAR ANALYTICS

Program Frequently Asked Question

1) What are the eligibility criteria for its enrolment (like Qualification, Work experience etc.)?

Work Experience:
This program is ideal for people who have been working in Solar industry and have exposure to data and have had challenges in managing the same to give a meaningful insight to the business they are part of, for themselves as well as for their clients.
An excellent opportunity to practically understand how your business data can help in your growth by working beyond the spreadsheets with application of decision science in your business environment

Eligibility:
Background in any would be useful Engineering/ Science/ Economics/ Statistics/ Finance/ Management/ Information Technology

2) I am a profession with good number of years of Industry Experience. How will this workshop benefit me in running my business or managing my client?

Benefit:
The program is designed in a manner wherein concepts are explained through practical sessions on tools. You are encouraged to bring your data and work around the tool and take some meaningful insight back to your workplace in form of your learning and understanding the way the learning can be applied in your business environment

4) Do I need to carry my personal laptop for doing the practical sessions?

Kindly bring in your laptop as you would need to install the software on which you would be working.
Alternatively, once you confirm your program participation, we may also send you the link from where you can download the software in advance which would save time to do more of practical session in the class.
The laptop configuration, can be minimum 2 GB RAM, 1.5 GHz speed, with i3 or above and any OS

5) Whom to contact for more information regarding technical session plan?

You can write an e-mail to Mr Sumit Gupta (9560329740) between 10 am - 6 pm (all days) on, sumit.gupta@pragyasolar.in

6) What tool(s) would be used for the workshop and how to get the same?

The tools that would be used shall be given to participation on registration.

7) What certificate is given at the end of the program?

The program certificate is towards participation and learning on the REAL time project which will have unique identifier.