



Azadi ka Amrit Mahotsav
to commemorate 75 years of progressive Independent India
REPORT OF THE FOURTEENTH EVENT
“Webinar on Forecasting of Renewable Energy Production”

NIWE with the support of MNRE has scheduled sixteen events to commemorate 75 years of progressive Independent India (Azadi Ka Amrit Mahotsav).

The fourteenth event, “**Webinar on Forecasting of Renewable Energy Production**” was successfully conducted on 23rd June 2023.

The announcement about the event carrying the instructions was hosted in NIWE website and circulated through Social Media pages along with the Flyer given below.


to commemorate the 75 years of progressive Independent India



As part of the Azadi ka Amrit Mahotsav, NIWE has scheduled sixteen (16) Events with the support of Ministry of New and Renewable Energy (MNRE)

14th
EVENT


**Webinar on
FORECASTING OF RENEWABLE
ENERGY PRODUCTION**

Speaker **23rd June 2023**

Shri. A.G. RANGARAJ
Deputy Director (Technical) &
Unit Chief, Forecasting &
Information Technology, NIWE **4.00 - 5.00 pm**

Registration Link :
<https://forms.gle/220bEmdnEcztdhY3D>

For more information, please contact **Dr. P. KANAGAVEL**
Director and Head, Skill Development and Training & Infrastructure Management Division
Mobile : +91 9445798007 Ph. : +91-44-22463982 / 83 / 84 E-mail : pkanagavel@niwe.res.in

 **NATIONAL INSTITUTE OF WIND ENERGY**
An autonomous Research & Development Institution
Ministry of New and Renewable Energy, Government of India
CHENNAI

The event was conducted online, enabling large number of participants to take part in the Webinar.

REGISTRATION

After the announcement, 75 candidates registered and 51 participants have attended the event.

PROGRAMME SCHEDULE

Date	Time	Webinar Topic	Speaker
23rd June 2023	4.00 - 5.00 pm IST	Forecasting of Renewable Energy Production	Shri. A.G. RANGARAJ Deputy Director (Technical) & Unit Chief, Forecasting & Information Technology, NIWE

The speaker gave a detailed presentation on Forecasting of Renewable Energy Production and all the doubts and queries raised by the participants were clearly explained and clarified by the speaker. The participants were very much satisfied with the presentation and had reciprocated the same by appreciating and thanking the speaker. In addition, they expressed their thanks to NIWE / MNRE for hosting this webinar under the event of Azadi ka Amrit Mahotsav.

Gallery of the 14th Event

Forecasting of Renewable Energy Production

A.G.Rangaraj
Deputy Director (Technical) & UC
Forecasting & Information Technology Unit

09:22

Take control of the presentation

People

Share invite

Presenters (3)

- ST SDT Team (Guest)
- F F & IT
- S SDT Organizer

Attendees (38)

- AR A Rajasekar
- AM Aloysius Gnanaraj M (Guest)
- AB Arunava Bhar (Guest)
- AM Ashish Mishra (Guest)
- A Atul (Guest)
- CS Charan Sekhar (Guest)
- DK Deepesh Kumar (Guest)

Vijayalakshmi S, Harsh Mishra (Guest), Ganesh Mahajan (Gu...), Karthikeyan R Naraya..., Guru Sharan Singh (...)

Indian Power Scenario

403 GW Installed

Resource Wise Installed Capacity of All India

Installed Capacity in MW

Generating Source

Coal, Renewable Energy Source, Hydro, Gas, Nuclear, Diesel

RE Installed Capacity – 113 GW

86% from Wind & Solar Generation

Renewable Energy Installed Capacity of All India

Installed Capacity in MW

Generating Source

Solar Power, Wind Power, BM Power / Cogen, Small Hydro Power, Waste to Energy

2nd Largest Source of Power Generation in India (2014)

13:53

Take control of the presentation

is as on May 2022

F & IT

+35, VS, S, HM, GM, KN, GS

SDT, Harsh Mishra (Guest), Ganesh Mahajan (Gu...), F & IT, Karthikeyan R Naraya..., Guru Sharan Singh (...)

Challenges in System Operations

Load-Generation Balance

Conventional System
Only Demand is varying -> Demand Forecasting -> Generation follows the load

Addition of RE Generation
Both Demand and RE Generation are varying -> Demand + RE Forecast

Wind Generation Variation - Tamil Nadu

14:51

Take control of the presentation

F & IT

SDT

Karthikayan R Naraya...

Guru Sharan Singh (...)

16:16 23-06-2023

People

Share invite

Presenters (3)

- ST SDT Team (Guest)
- F F & IT
- S SDT Organizer

Attendees (41)

- AR A Rajasekar
- AM Aloysius Gnanaraj M (Guest)
- AB Arunava Bhar (Guest)
- AM Ashish Mishra (Guest)
- A Athi (Guest)
- A Atul (Guest)
- CS Charan Sekhar (Guest)

Wind Power Forecasting Framework

NIWE Indigenous Wind Power Forecasting Model

Statistical Input - Wind Power Generation data

- Real Time Generation Data
- Static Information of SS & WTG
- Historical Generation Data

SLDC

NCMRWF / ISRO-SAC / IITM

Physical Input - Numerical Weather Prediction Data

- ISRO-SAC 50m
- NCMRWF 40m
- NCMRWF 200m
- IITM 102m

Final Forecast

Forecast Aggregation System

Substation Forecast

Dynamic Model Selection

Wind Power Forecasting Framework

Indigenous Wind Power Forecast Model Framework - Process

1. Data Collection (Real-time, Static, Historical)

2. Data Preprocessing (Cleaning, Normalization)

3. Model Development (Mathematical/Statistical, AI/ML)

4. Model Validation (Cross-validation, Error Analysis)

5. Forecast Generation (Hourly, Daily, Monthly)

6. Forecast Aggregation (Substation, Regional)

7. Final Forecast Output

16:45 23-06-2023

People

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Attendees (44)

- AR A Rajasekar
- AB Agnimitra Biswas (Guest)
- AM Aloysius Gnanaraj M (Guest)
- AB Arunava Bhar (Guest)
- AM Ashish Mishra (Guest)
- A Athi (Guest)
- A Atul (Guest)

Uncertainties in Numerical weather Prediction

Initial Condition Errors	Model Errors
Observational Data coverage Spatial Density Temporal Frequency	Numerical Approximations Horizontal Resolution Vertical Resolution Time Integration method
Errors in the Data Instrument Error Representativeness Error	Boundary Conditions Horizontal Vertical
Errors in Quality Control	Terrain
Errors in Data Assimilation	Physical Process
Missing Variables	Parameterization
Error due to Post processing of Information Forecast fields are interpolated, smoothed and manipulated.	

Small Errors in defining Initial condition leads to big impact

Ensembling – Multi-model, High resolution model

People

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Conclusion

- Grid operators primarily require the forecast system for solving various key challenges in scheduling, system control and dispatch.
- The various process involved in wind power forecasting using both statistical & physical model chain has been discussed in detail.
- It was seen that combination of NWP models is improving the forecasting accuracy of individual plants and aggregation.
- Data Analytics technique can be adapted in the Satellite Images based Intraday forecasting system to detect cloud movements for every 30mins.
- Automated system shall be implemented in order to capture, process and store the various input data set

01:12:59

Take control of the presentation

People

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Presenters (3)

- ST SDT Team (Guest)
- F & IT
- S SDT Organizer

Attendees (46)

- AR A Rajasekar
- AB Agnimitra Biswas (Guest)
- AM Aloysius Gnanaraj M (Guest)
- AB Arunava Bhar (Guest)
- AM Ashish Mishra (Guest)
- A Athi (Guest)
- A Atul (Guest)