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## A 3-Day Workshop: AI Applications in Renewable Energy

### Participants

Any professionals and stakeholders who are interested to understand how basic AI prediction model is built using cloud platform and KNIME software. Suitable for engineers, researchers, utility professionals, government professionals, Senior Managers, Stakeholders, Investors, Startup, and students.

**Duration:** 3 Days (6–7 hours per day)

**Format:** Hands-on + Lectures + Case Studies

### Day 1 — Foundations of AI + Renewable Energy Systems

#### Session 1: Introduction to Renewable Energy & Digital Transformation (1.5 hrs)

- Solar, Wind, Hydropower, Bioenergy, Green Hydrogen
- Challenges: intermittency, forecasting, grid stability
- Role of AI + ML in modern energy systems
- Global use cases

#### Session 2: AI & Machine Learning Fundamentals (2 hrs)

- Types of ML: regression, classification, clustering, prediction
- Neural networks, CNN/LSTM basics
- Data types in renewable energy (SCADA, weather, satellite imagery)

#### Hands-on Activity 1 (1.5 hrs):

- Build a simple **solar power prediction model**
  - Input: irradiance, temperature, panel specs
  - Output: kWh prediction

#### Session 3: Case Studies & Group Discussion (1 hr)

- Wind turbine data analytics
- Battery performance prediction
- Smart grid load balancing
- Predictive O&M (Operations & Maintenance)

### Day 2 — AI for Solar, Wind, and Battery Systems

#### Session 1: AI in Solar Energy (2 hrs)

- Solar irradiance forecasting
- PV performance prediction
- Fault detection (dirty panels, shading, inverter faults)
- CV-based rooftop solar panel detection from satellite images

#### Hands-on Activity 2 (1 hr):

- Build an **LSTM time-series model** for solar generation forecasting
- Dataset: real-world PV plant / NREL dataset

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**Session 2: AI in Wind Energy (1.5 hrs)**

- Wind speed prediction
- Turbine condition monitoring
- Predicting blade damage using vibration data
- Energy yield optimization

**Hands-on Activity 3 (1 hr):**

- Build a **wind-speed forecasting model** using weather + turbine data

**Session 3: AI in Battery Energy Storage Systems (1 hr)**

- Battery State of Charge (SoC) prediction
- State of Health (SoH) modelling
- Remaining useful life prediction
- AI for EV + grid integration

**Day 3 — Smart Grid, Optimization & Industry Implementation****Session 1: AI for Smart Grid & Demand Forecasting (1.5 hrs)**

- Load forecasting (short-term vs long-term)
- Grid stability prediction
- Demand-side management
- AI for microgrid energy optimization

**Hands-on Activity 4 (1 hr):**

- Build a **load forecasting model** using ML + time-series

**Session 2: Optimization & Energy Trading (1.5 hrs)**

- Reinforcement learning for grid control
- Energy price forecasting
- AI in energy trading & market operations
- Economic dispatch optimization

**Session 3: Building AI Pipelines & Deployment (1.5 hrs)**

- Creating an end-to-end renewable energy analytics pipeline
- Tools:
  - Python, TensorFlow/PyTorch
  - AWS/Azure/GCP for energy analytics
  - Power BI dashboards
- Real-time monitoring dashboards for solar/wind plants

**Final Outcome & Project (1 hr)**

Participants design a mini-project:

- Solar/wind forecasting
- Battery health prediction

- Smart grid optimization
- Energy load prediction dashboard

Certificates + Feedback

### **Deliverables for Participants**

- 4 complete hands-on AI models
- Renewable energy datasets
- Python notebooks
- Workshop PPTs
- Final mini-project
- Certificate of completion

**Instructor:** Mr Suresh Tripathi is a founder of Geosun Pty Ltd an Australian company registered in year 2000 to provide AI corporate training, data center solutions and data pipeline end-to-end cloud platform. He has nearly 25+ years of work experience in digital data analytics integrated with AI and tech platforms. His education qualifications include master degree in Statistics from India, master degree in Geostatistics from Australia and master degree in Geoscience from Australia. He completed his AI certificate courses from Stanford Business School from California and High Impact Leadership from Cambridge University, UK. He has worked in Australia and US focusing his career on data strategy, tech platforms, and developing in-house training. He has worked with range of industries in Australia and US that include Deloitte, Flybuys, Ambulance Victoria, CFA (Emergencies Services), Avexa, Covance, Avance Clinical (Pharmaceuticals), Intelligen, Commonwealth Bank, Hackett Group (US), Health and Safety Sphera Solutions(US), Vic Government (Environment, water and energy), Waste Management (US), Outfront Media (US), Adani Mining (Australia) and Fura Gems Industries (Dubai).

**Fee:** Rs 50,000 per participant plus GST payable to GeosunAI Tech Cloud Pvt Ltd. RTGS/Cheque/ PhonePe via below link form.

Bank: Punjab National Bank

Account Name: NB, GeosunAI Tech Cloud Pvt Ltd

Account No.: 1228102100001295