



Solar & Wind Energy Forecasting

Green Power Labs: About Us



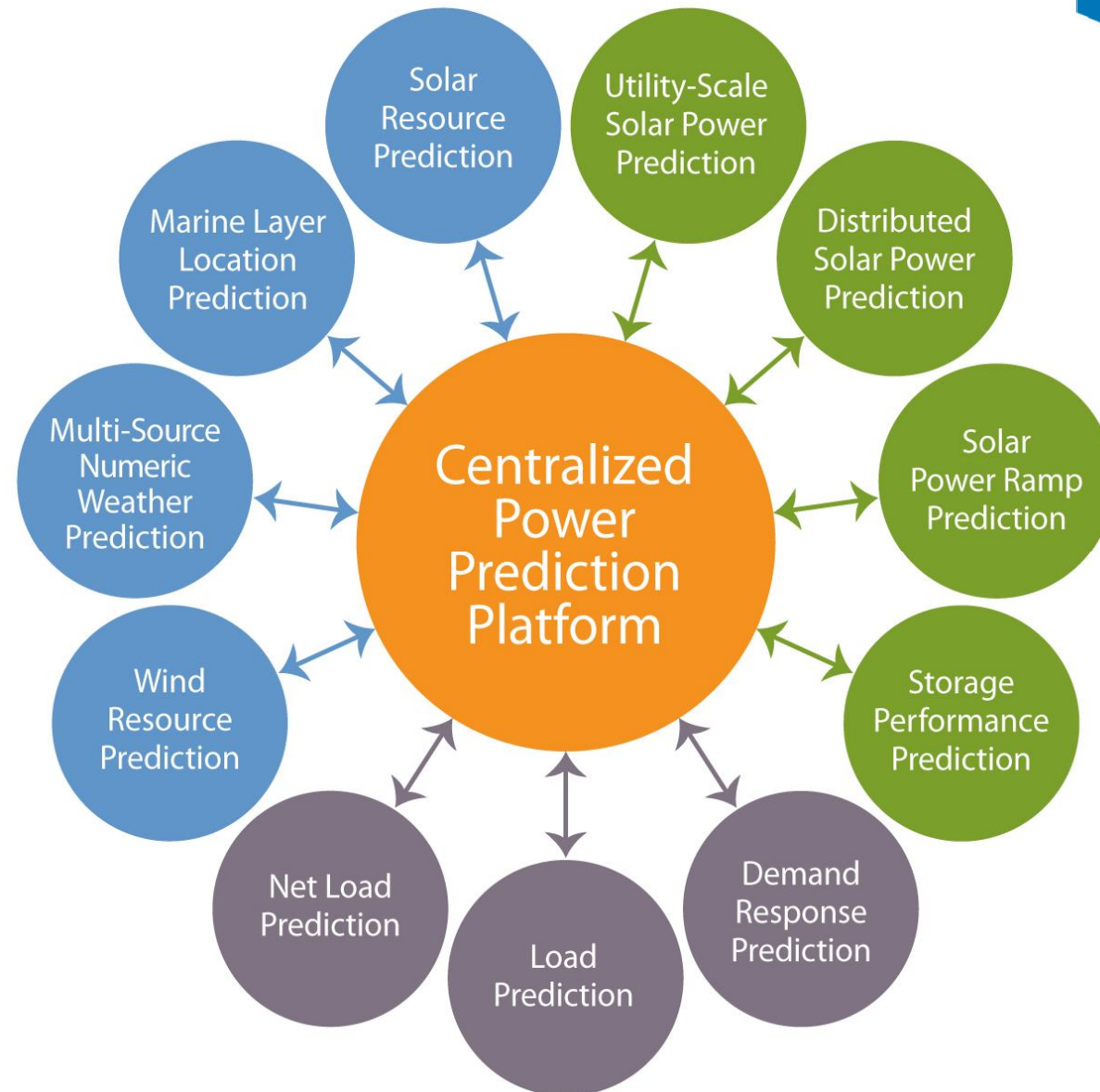
ISL

- Iacharya Silicon Limited (ISL) is an ISO 9001:2015 certified company based in Chennai.
- We have over 3MW of roof top Implementation experience on grid solar system in the last 18 months. We have trained over 5500 people on solar PV installations in the last 2 years and certified over 200 through UL.
- We offer total consulting and owners engineers services for erection, commissioning & maintenance of the power plants of capacity from kW to MW scale. We are working on over 1GW of consulting projects .

GPL

- Founded in 2003; head office in Halifax (Canada), representative offices in San Diego (California), Adelaide (Australia), China mainland (Beijing) and Hong Kong
- An internationally recognized solar expert, a leading predictive analytics company with focus on operational forecasting services
- Quality Management: ISO9001:2008 certified

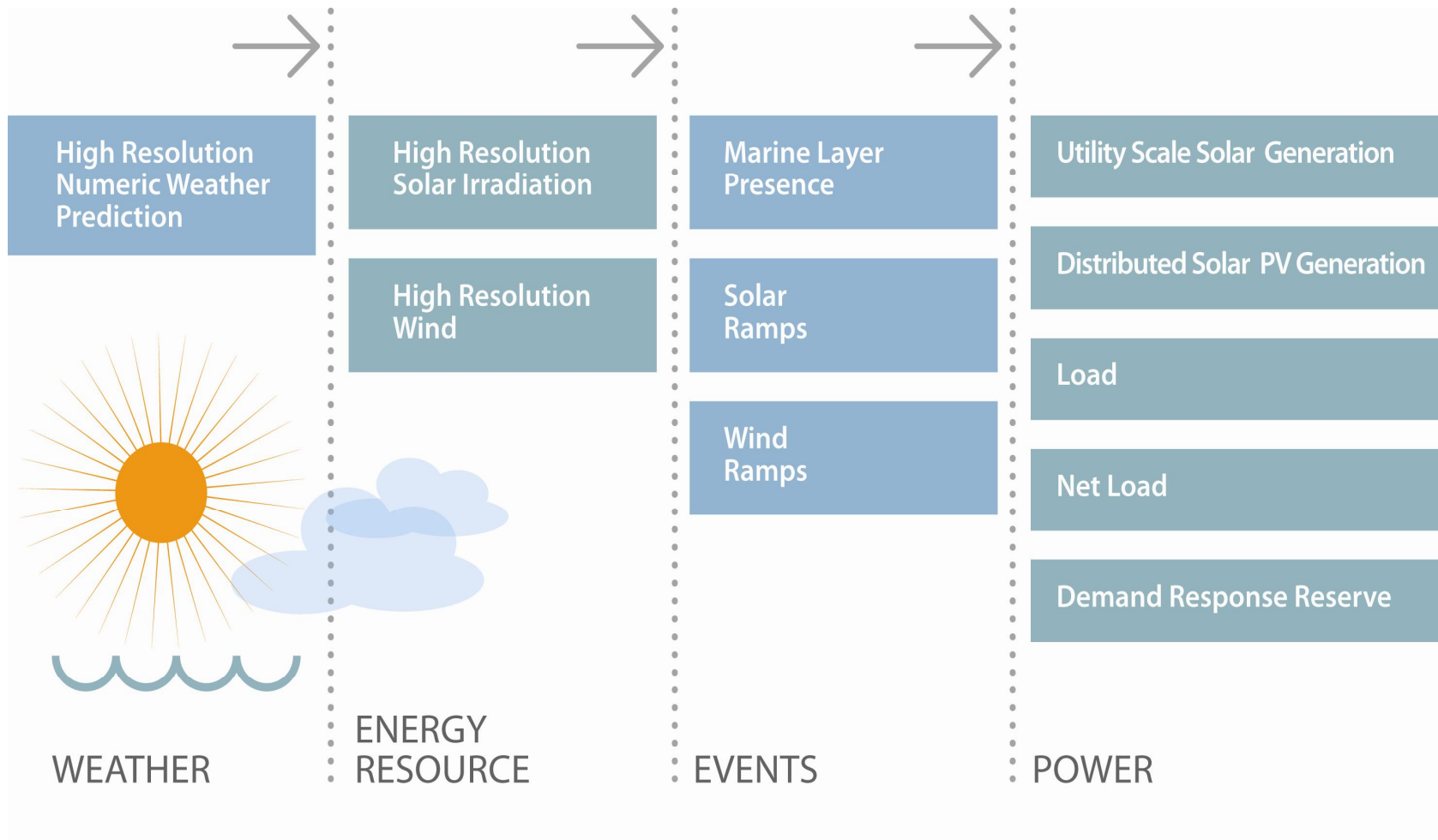
Predictive Power Analytics



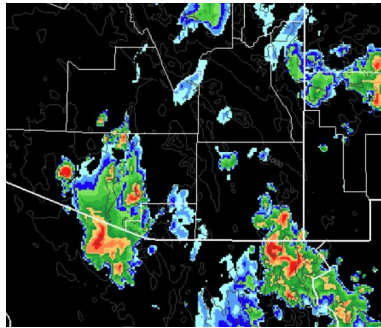
Multi modal model combines

- Various Weather models–NWP & **Aerosol, Various cloud models** including **scattered and low cloud, Fog**
- Pollution
- Power models
- Grid models
- Loads and storage related models at the generators level
- Artificial Intelligence model work with bias correction based on designs parameters and compares with actual generation/ load and predicts with very high level of accuracy and very low MAE

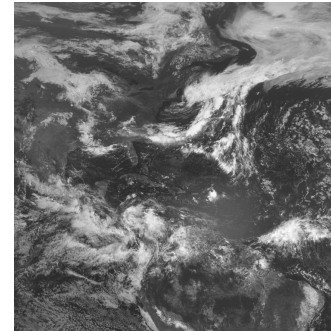
Predictive Power Analytics: Process Flow



Proprietary Technologies



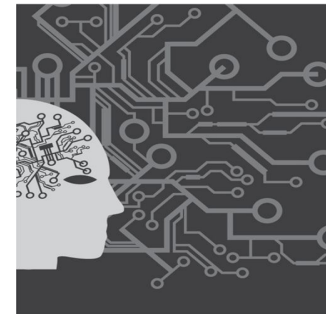
**High Resolution
Numerical Weather
Forecasts**



**Satellite Image
Processing for
Long Term GHI
Datasets**



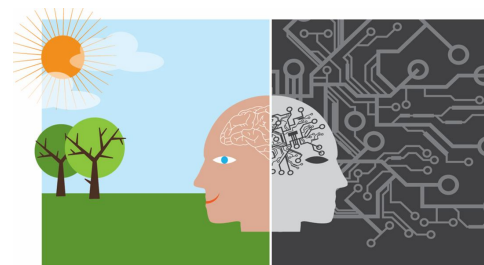
**Smart Persistence
& Cloud Tracking
Models**



**Artificial Intelligence
Forecasting Models**

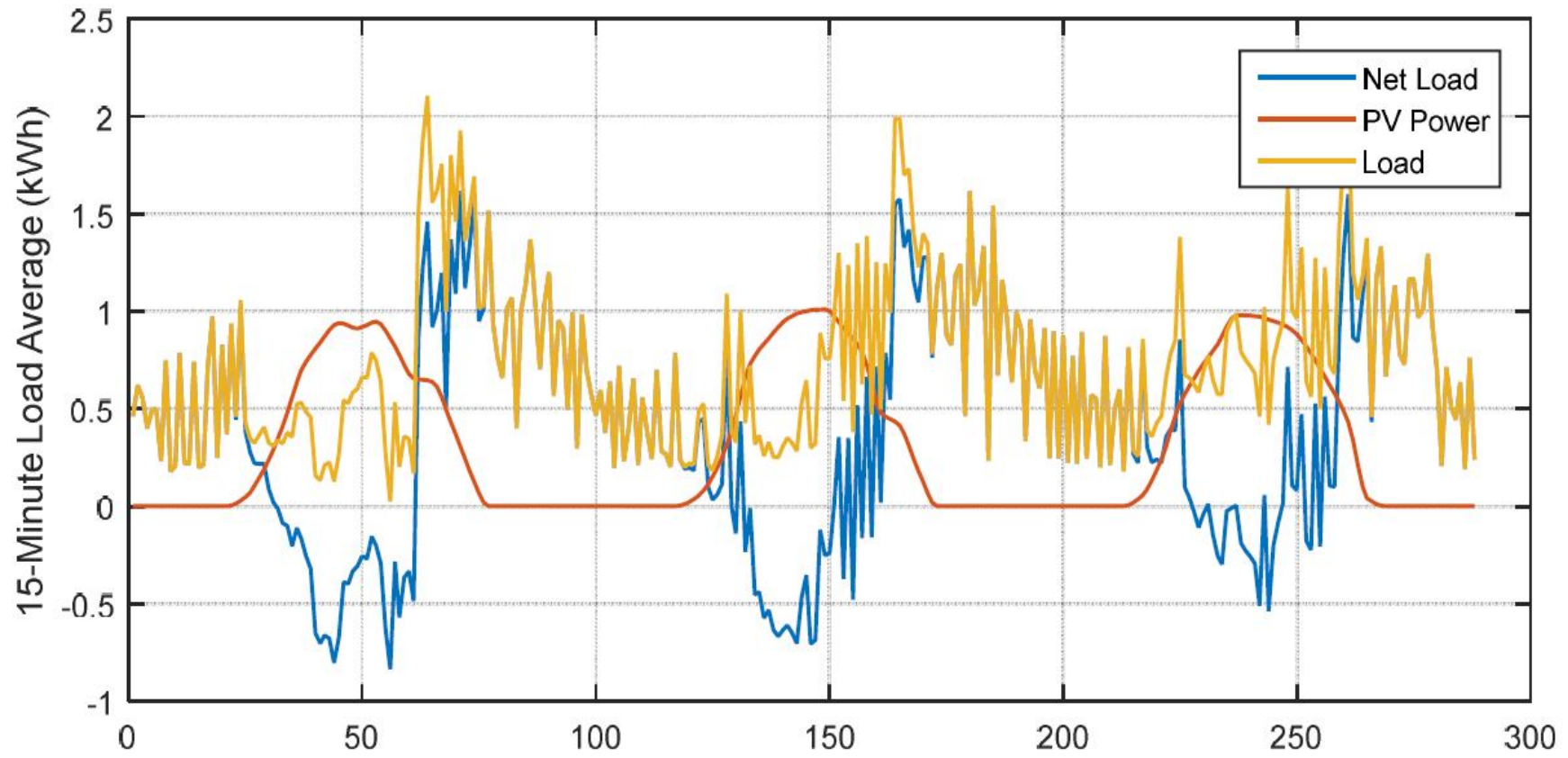


**Solar Power
Plant Modeling**



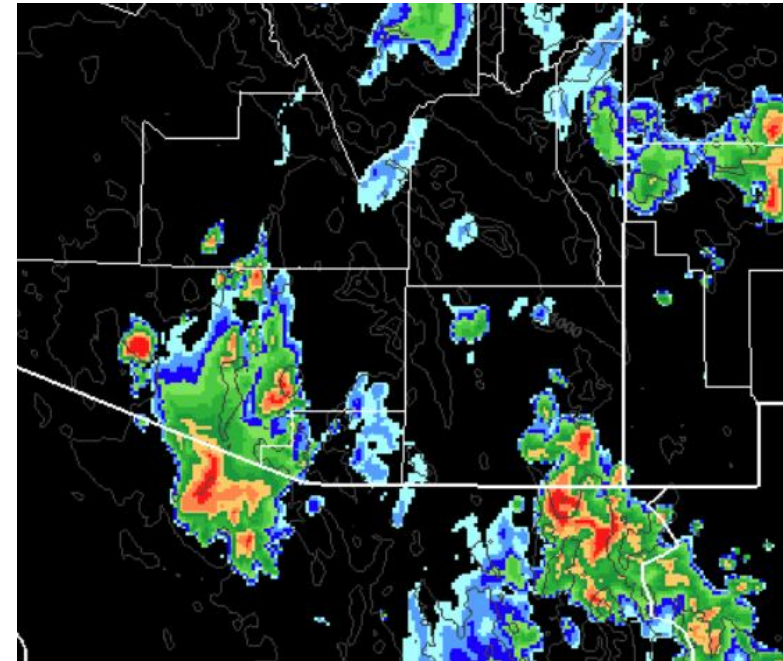
**Blending of
Physical & AI
Forecasts**

Load Forecasting: DER, Net Load, Load

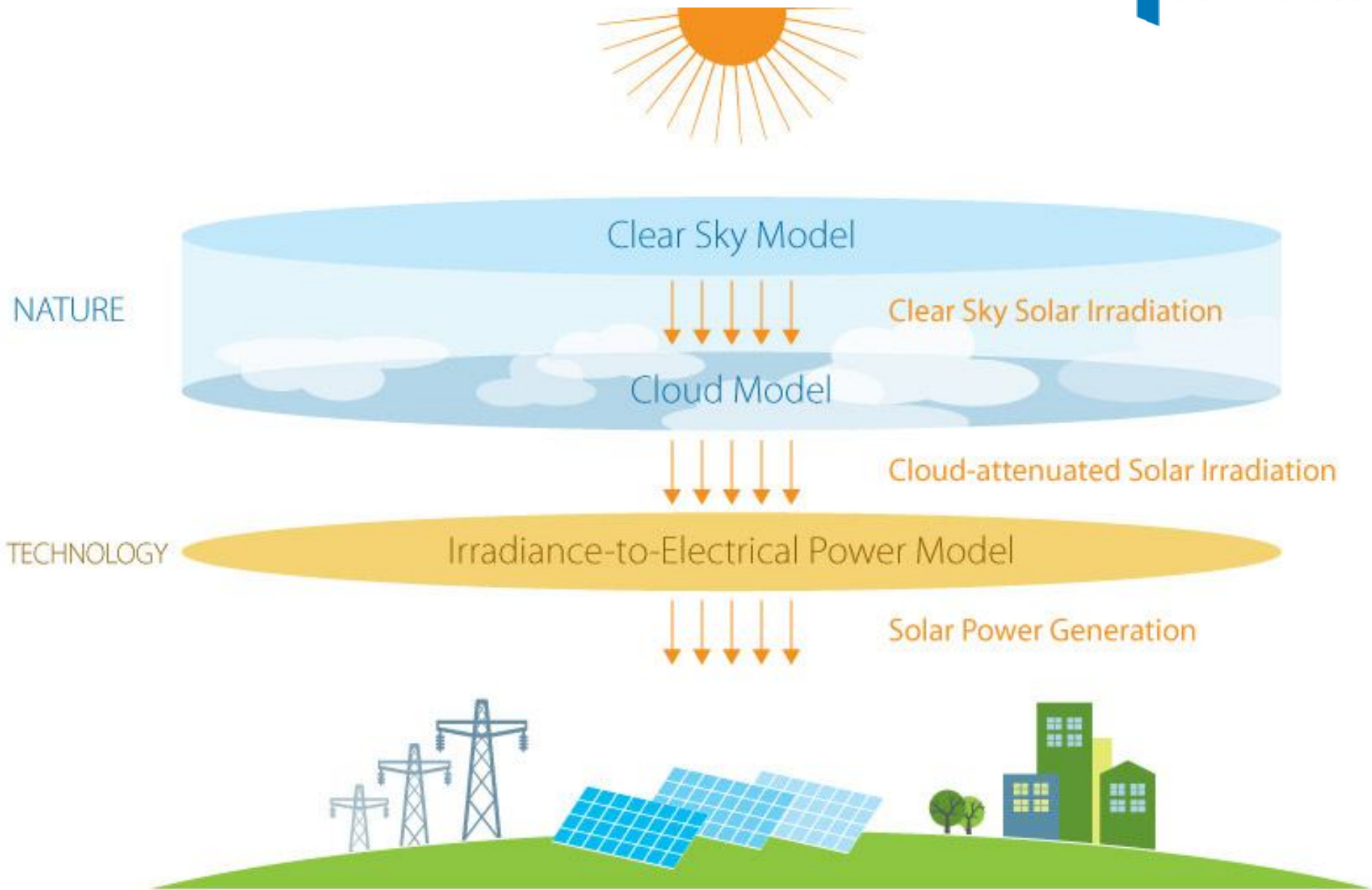


Weather Forecasting: WRF

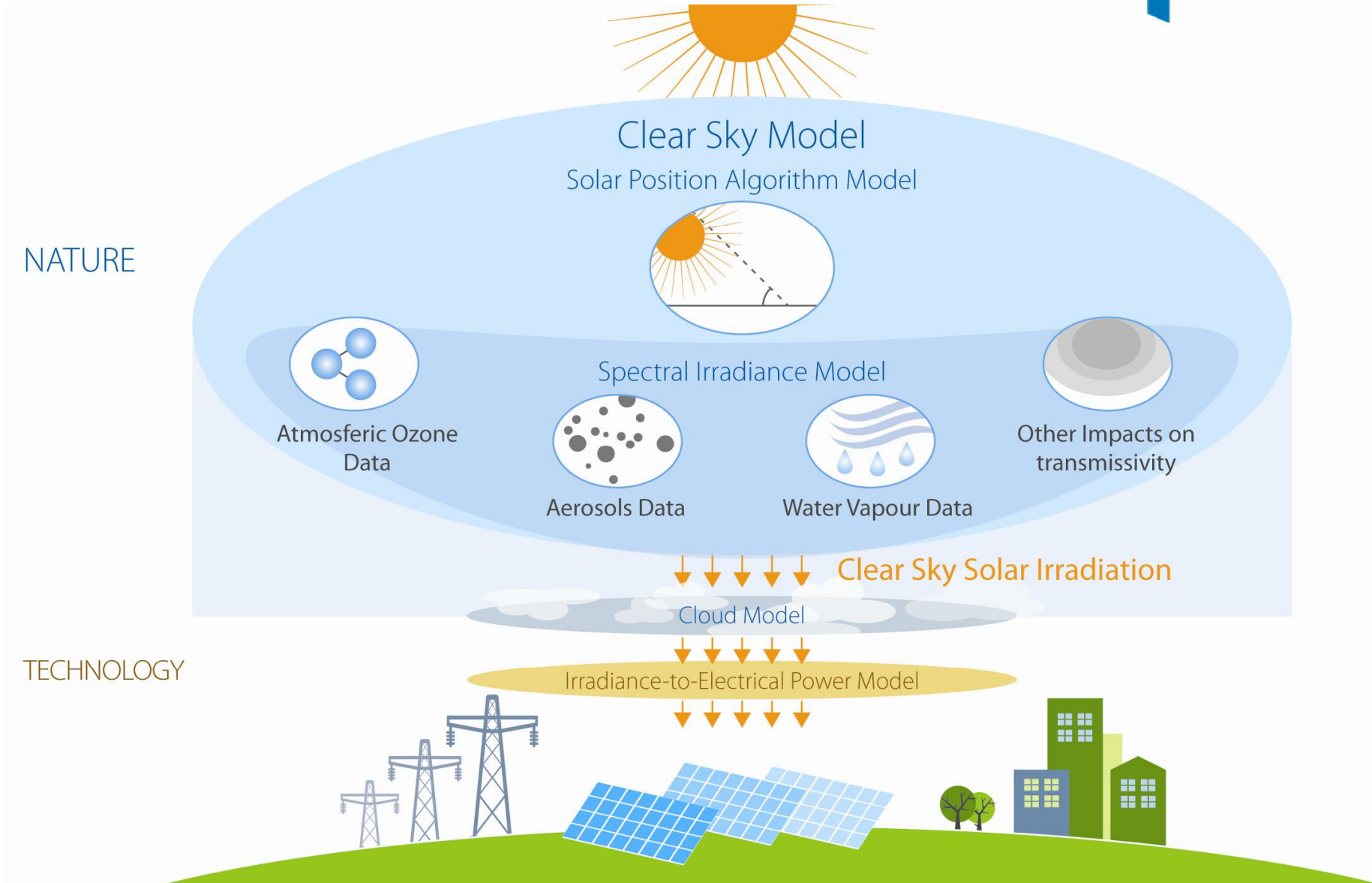
- Mesoscale Weather Forecasts at 1km resolution
- Data Assimilation of Satellite, Radar, Ground Based Measurements and Numeric Weather Models
- WRF's Physics Models Optimized for Renewable Energy Forecasting



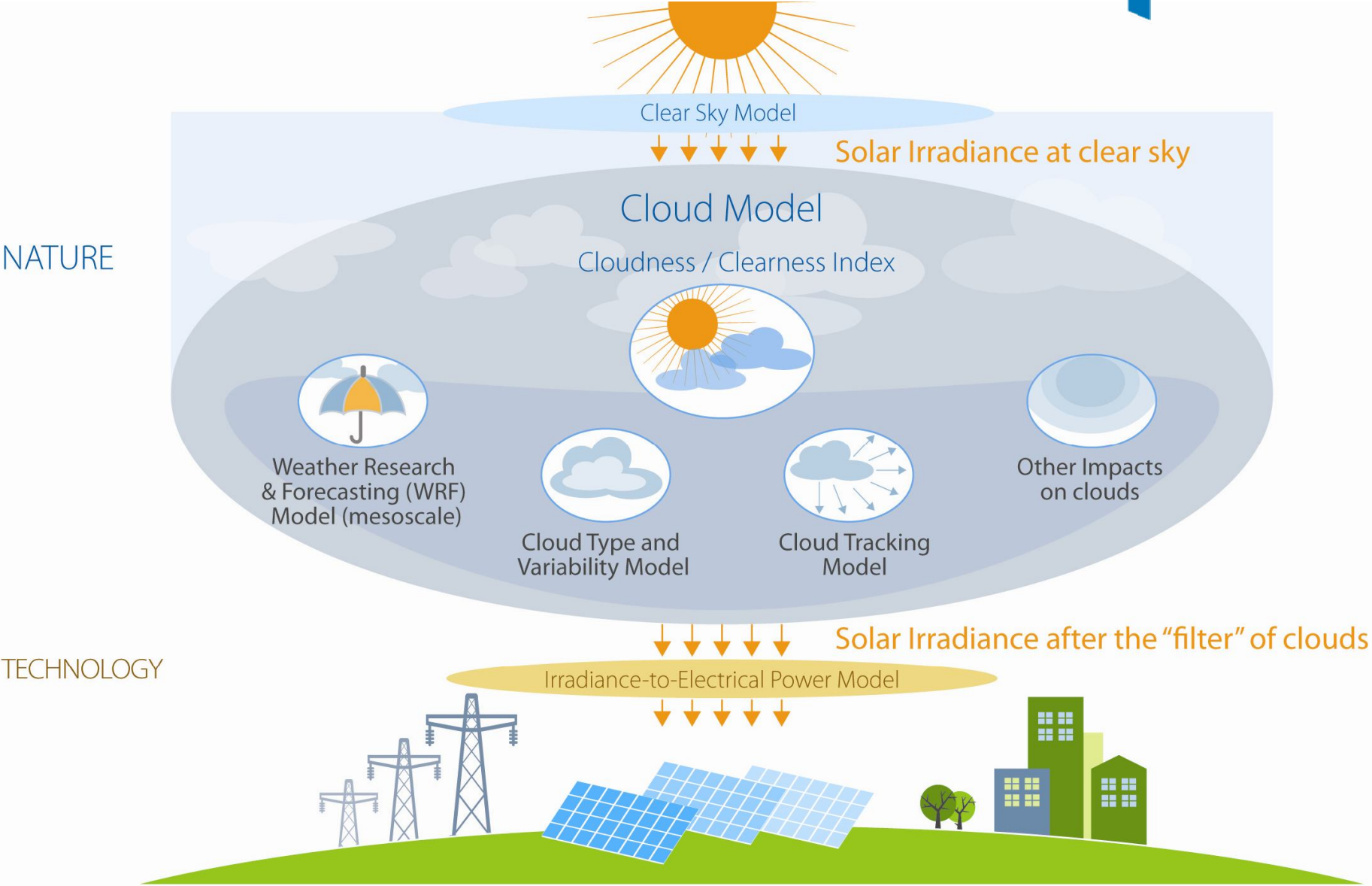
Solar Power Forecasting Concept



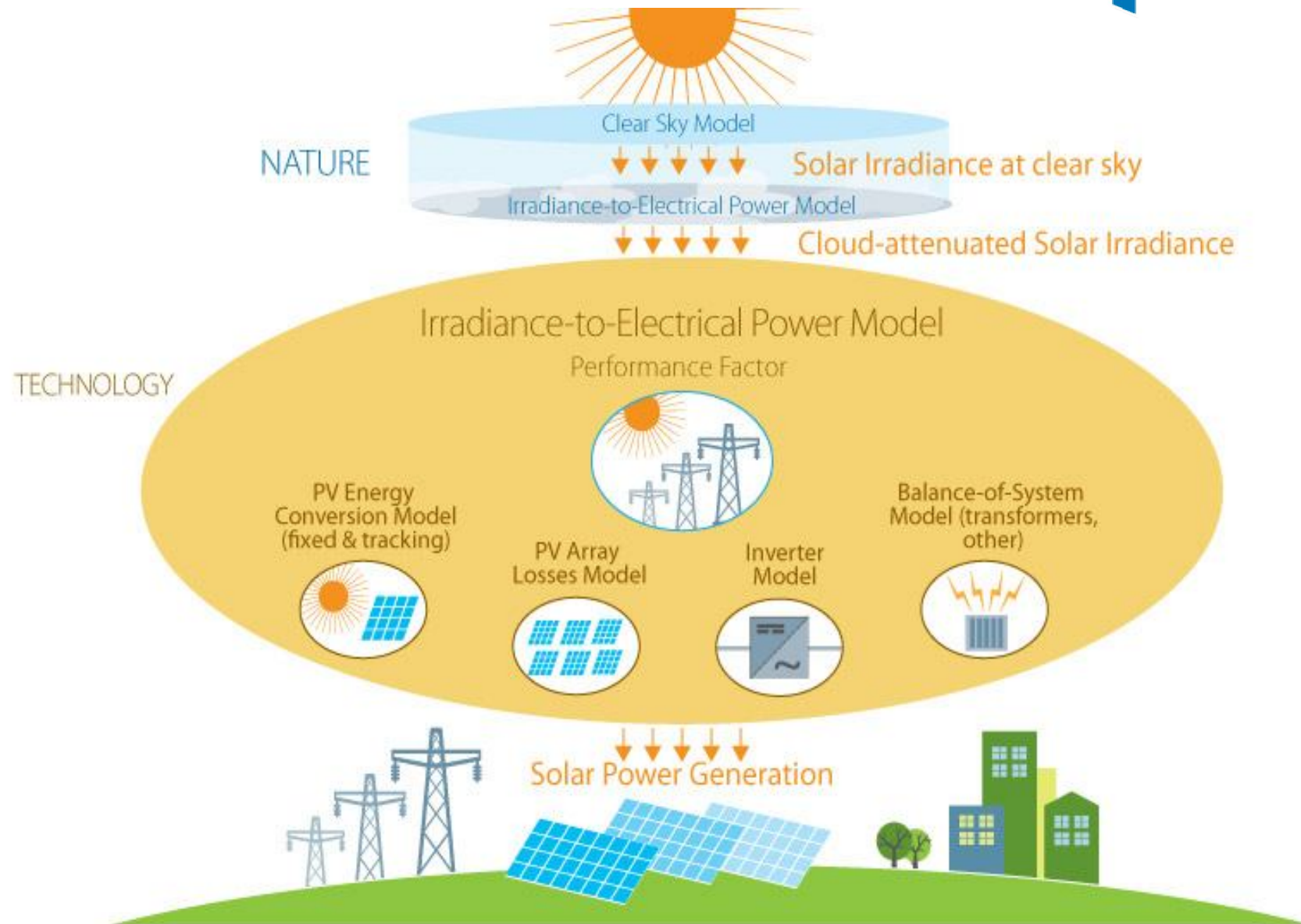
Clear Sky Irradiance Model



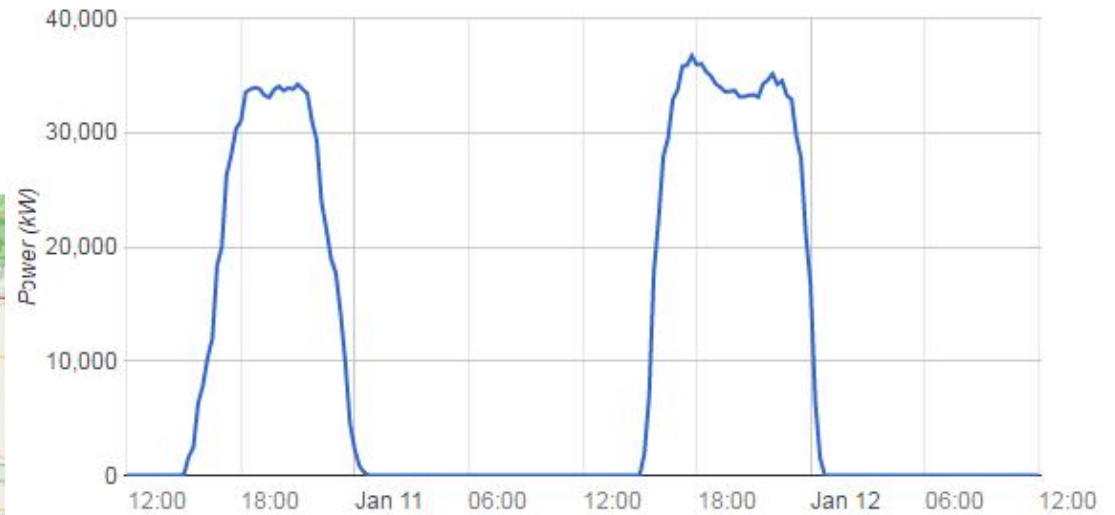
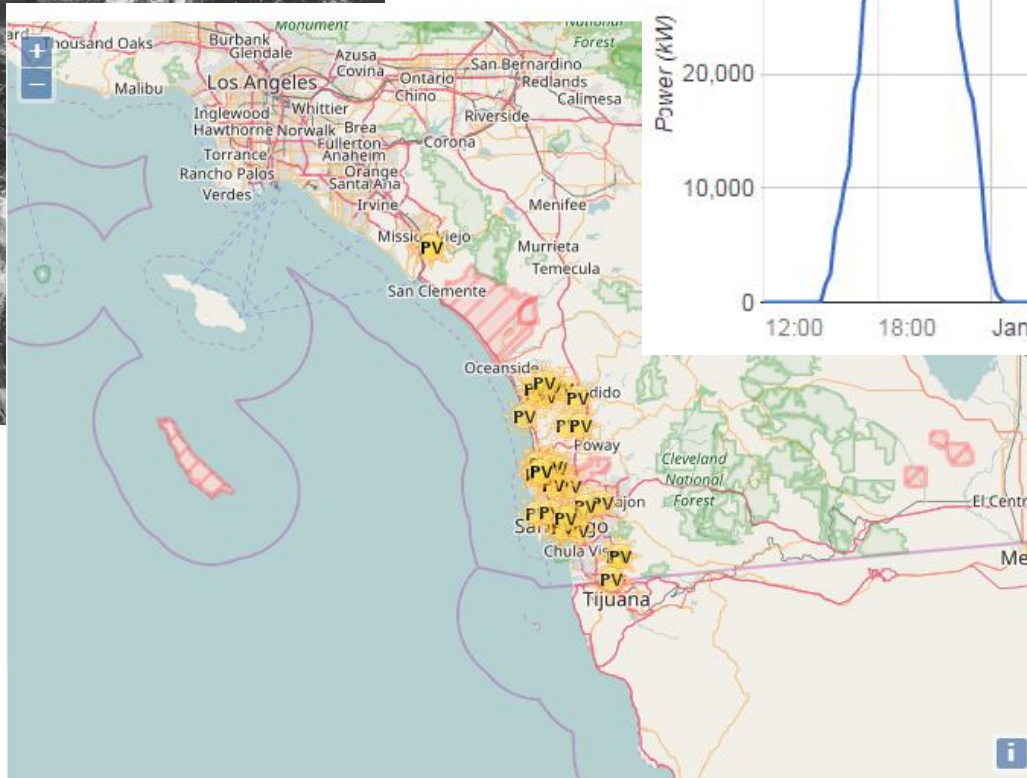
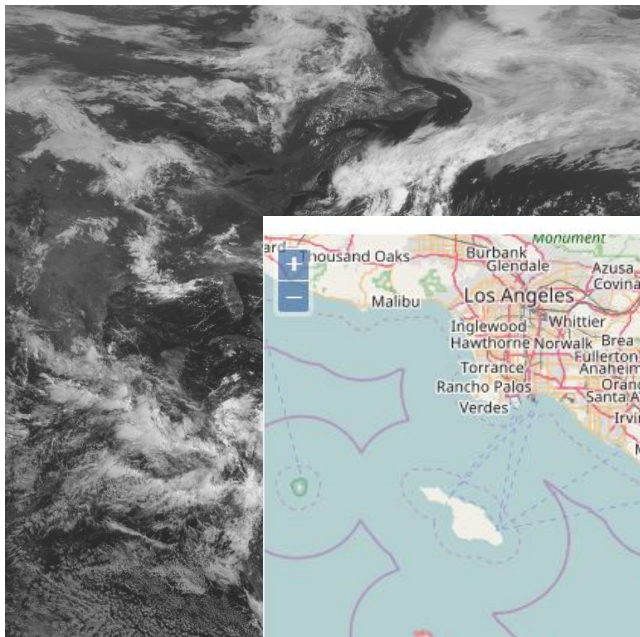
Cloud Model



Irradiance to Electrical Power Conversion



Virtual Monitoring of Weather: **Global Access in Near-Real Time**



Our Strengths



Advanced Physical Model for Solar Irradiance Forecasting:

- In-house mesoscale numerical weather prediction (NWP) model (WRF - Weather Research & Forecasting)
- In-house near-real time satellite image processing technology
- In-house Cloud Tracking model

Advanced Irradiance-to-Power Model:

- PV conversion model
- Detailed solar power plant losses models
- Soiling model
- Georeferenced obstructions analysis

Advanced Blend of Physical and Artificial Intelligence Models:

- Multi-model NWP ensemble for solar irradiance forecasting
- Automated bias correction

Quality Management: ISO9001 certified

SolarSatData system availability of 99.90%

Patented technology: US62/211,924

Optimized Model for India



Solar Irradiance Forecasting:

- Highly variable solar climatology in India requires high resolution numerical weather prediction models
- Multiple sources of region-specific weather data available require Artificial Intelligence based multi-model ensembles

Solar Power Forecasting:

- Operational uncertainties related to solar power plants availability require automated real time bias correction models enabled by Artificial Intelligence techniques

Automated Technology Platform:

- Large scale of expected solar power deployment requires advanced information and operation technology platform integrated with power grid's energy management systems

Key references

1. San Diego Gas & Electric Forecasting Services – Grid Operations

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2. Southern California Edison

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3. Pacific Gas & Electric Forecast Service - Benchmarking Pilot

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4. Enedis (formally ERDF) Forecasting Service – Long Term

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5. Toronto Hydro Forecasting Services – Pilot Project

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FEATURED FORECASTING CLIENTS

- *San Diego Gas & Electric, California, U.S.A.*
- *Pacific Gas & Electric, California, U.S.A.*
- *Southern California Edison, California, U.S.A.*
- *Enedis/ERDF, France*
- *Toronto Hydro, Ontario, Canada*
- *Southern Company, Georgia, U.S.A.*
- *CPS Energy, Texas, U.S.A.*
- *Enel Green Power, Italy*
- *CDEC SIC, Chile*
- *Los Angeles District Water & Power, California, U.S.A*
- *SMA, Germany*
- *Sacramento Municipal Utility District, California, U.S.A.*
- *Eaton, U.S.A.*



Thank you!

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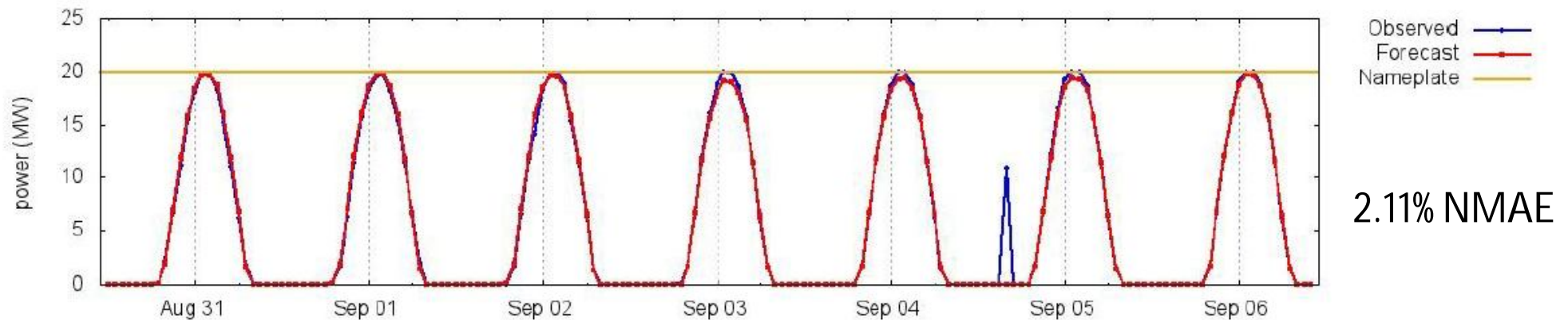
SolarSatData™ : Forecasting Power



Case Study – Solar Power Forecasting – Day Ahead: United States



Day Ahead – California – Utility Asset



Day Ahead – California – Distributed Asset

