

# Challenges for Climate Change Risk Reduction

## with Cutting-Edge Technologies in Weather and Climate Services

2023 AFEC Climate Symposium

& Asia Pacific Climate Services Workshop Joint Conference

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*Public Private Partnership  
Data Strategy and  
Corporate Sustainability  
Weathernews Inc. (WNI)*



# Introduction

*“I want to protect the lives of mariners.”*  
*“I want to help in time of crisis.”*

January 1970, an explosive low-pressure system hit the port of Onahama, Japan, and lives of 15 crew on the vessel has lost due to an “Undelivered” warning information.

“If there had been really useful weather information, maybe this accident could have been prevented.”

Weathernews Inc. was established with a sense of responsibility and strong will of company founder Mr. Hiro Ishibashi in 1986.

Since then, our “Risk Communication service” have expanded to cover all types of business and our daily lives.



# Weathernews Inc. (WNI) in Brief

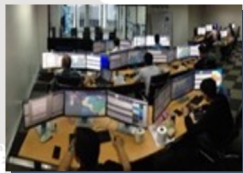
## Global Operation Network Supporting 24 x 7, from 32 offices in 21 countries

Oklahoma  
Operations Center



Copenhagen  
Operations Center

Amsterdam  
Operations Center



Athens  
Operations Sub-Center

Yangon  
Operations Center



Tokyo Global  
Operations Center

Manila  
Operations Center

Sales in 44 areas of global market, with 1,100+ employees  
(including 200 Certified Forecasters & 250 IT Experts)  
2,500+ BtoB customers in 50 countries  
2,000,000+ BtoS "Supporters" 180,000 Weather Reports / Day

**Shipping: Over 10,000 Vessels worldwide under our service in a year**

**Aviation: Over 13,000 flights a day for safety, comfortable & economical flight**

**Energy: Safe and stable supply and distribution of electric & gas power**

**Climate: Risk analysis and support corporate management for climate change**

## Sea Planning



## Sky Planning



## Mobile / Internet Planning



## Land Planning



## Broadcast Planning



## Climate tech Planning



## Sports Planning



## Environment Planning



## Legal Framework for Meteorological Services in Japan - Meteorological Service Act - (1952)

1993: Revised

### Enhancement of Public-Private Partnership

- Establishment of an authorized organization for dissemination of meteorological data to the private sector
- Establishment of “certified meteorological forecasters” system
- Authorization of Public Weather Forecast by the Private Sector

 <b>Japan Meteorological Agency</b>	 <i>Always WITH you!</i>
<b>Public Weather Platform</b>	<b>Your Weather Information Exchange Platform</b> (interactive communication)
<b>Weather Forecast Warning</b>	<b>Weather Forecast Solutions for Risks Warning Dissemination</b>
<b>Basic Observation</b>	<b>Original Obs. for Specific Services</b>

## Input Observation Data

### Observation (観測) + Eye-Servation (感測)

### Original Observation

#### 1 独自観測インフラの情報

- WNI衛星：1基
- WITHレーダー：80基
- WITHセンサー：3,000基
- TSUNAMIレーダー：25基
- ライブカメラ：900台
- 火山監視カメラ：50台
- マイクロネット：10,000箇所
- ボールンロボ：1,000台
- Yure Station：1,000台



### Weather Report (from users)

#### 2 サポーター感測情報



### Public Observation

#### 3 全世界の公的機関による観測情報



例：気象庁、世界気象機関など

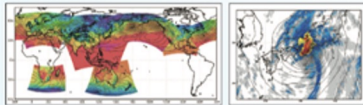
## Ensemble Analysis

### Analysis (分析) + Forecast (予測)

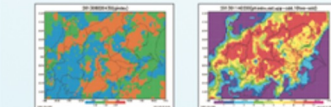
#### 1 世界最大の気象、海象、地象データベース



#### 2 独自の予測モデル



#### 3 KN-Expertシステムによる予報技術者の知見反映



#### 4 24時間365日のモニタリング



#### 5 気象技術の研究開発と オクラホマ大学との連携など

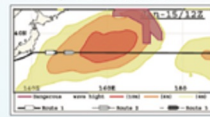


## High Resolution Forecast

### Risk Communication (7Vスケールに基づく対応策情報の提供)

例：航海気象サービスの7Vスケール=DASH INDEX

DA: Dangerous (危険)  
S: Severe (コースとスピード配分の変更の検討)  
H: Heavy (スピードの変更の検討)



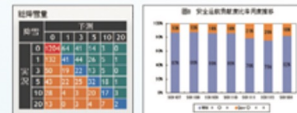
最適な航路の推奨



### Risk Communication

### Evaluation (サービスと予測の評価・検証)

#### 1 日々のサービスと予測の定量評価



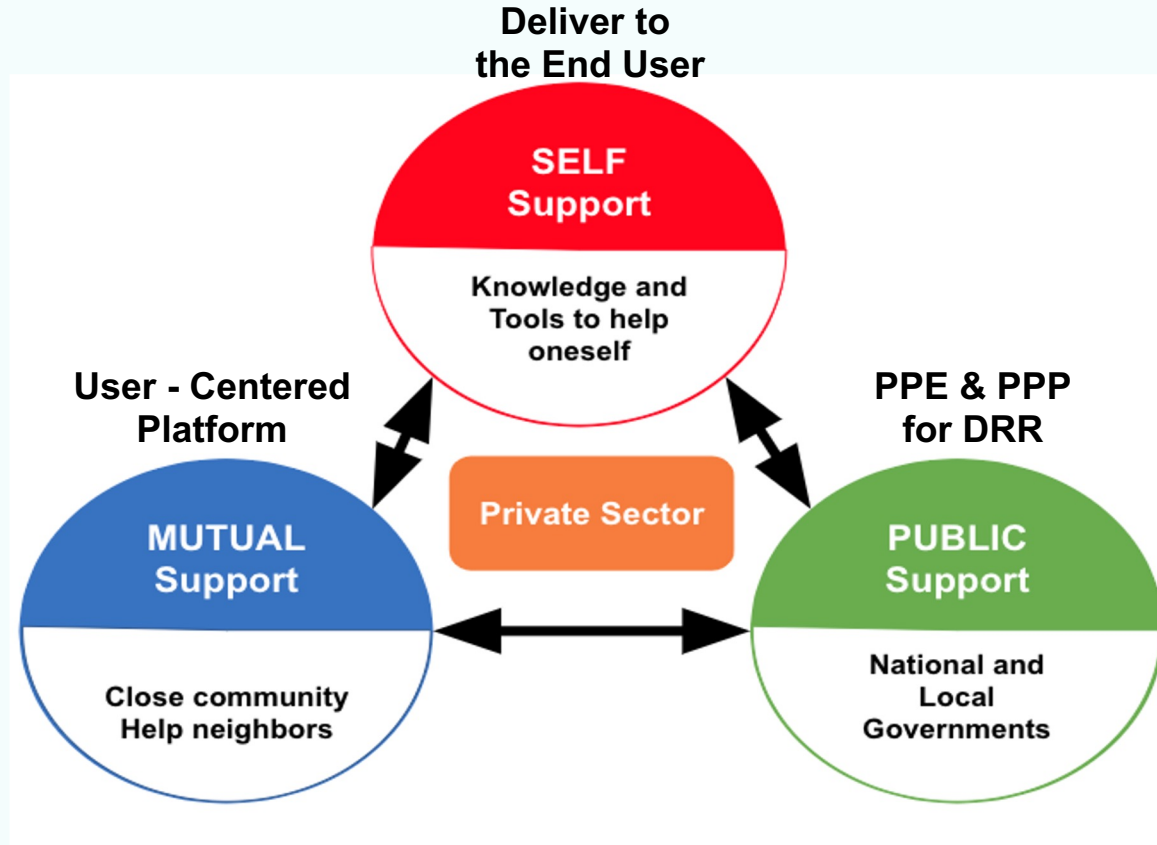
#### 2 お客様とのService Review & Planning Meeting



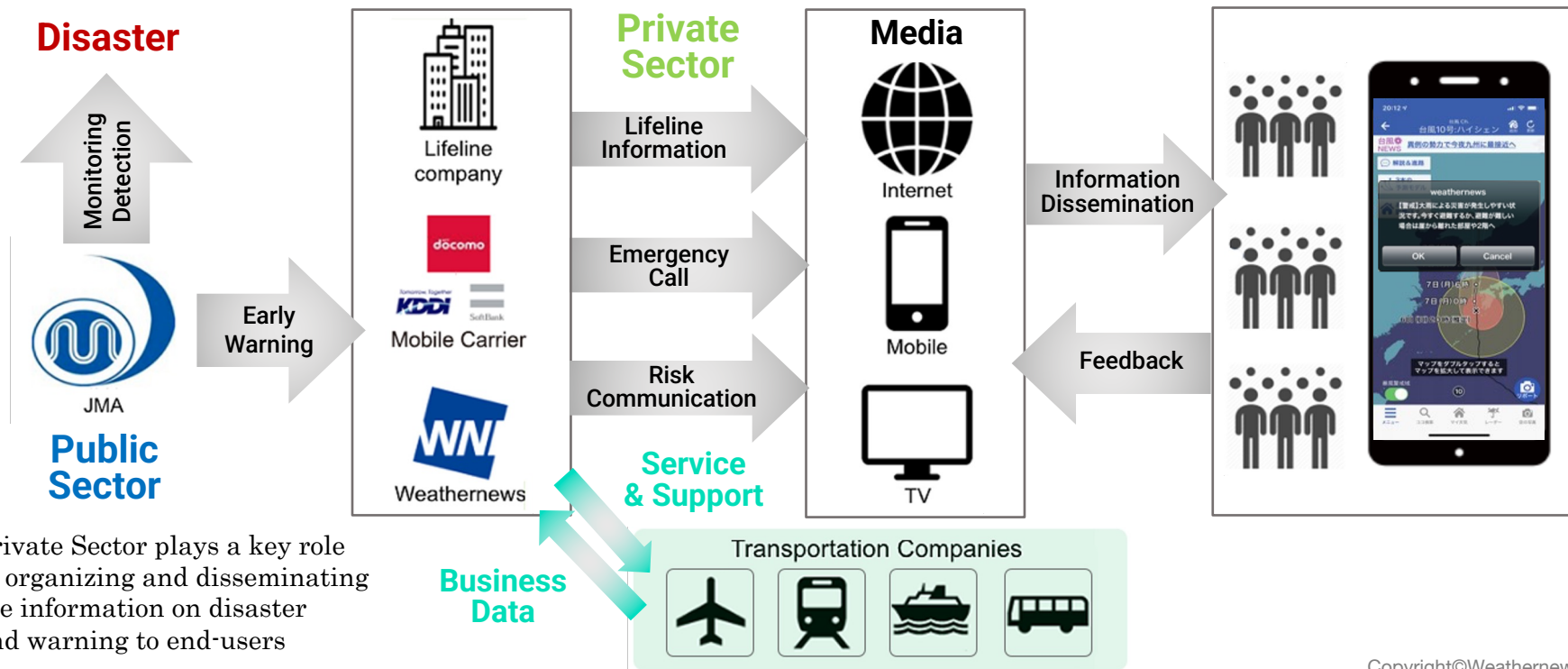
### Service Review & Feedback

# Challenges for Climate Change Adaptation

# BOSAI framework for Disaster Risk Reduction



# PPE: Warning Dissemination in the Disaster Situation



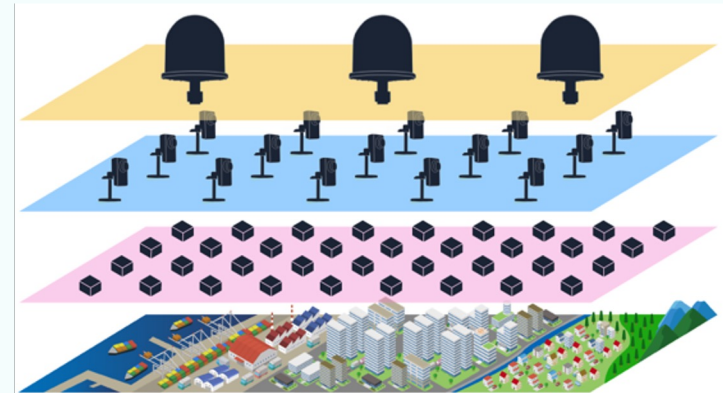
Private Sector plays a key role in organizing and disseminating the information on disaster and warning to end-users

# PPP: Observation Development Project in Thailand



WNI invests and attempts to building an observation network with the same level of density as Japan in the designated area indicated in map.

WNI will plan to set a station in each grid (at least) with the combination of existing public and academic stations to deliver advanced weather information service of disaster mitigation.



- X-Band Radar
- Web Camera
- Weather IoT

# PPP: The EAGLE Radar for VCP (Voluntary Cooperation Programme of WMO)

The latest X-band meteorological radar "EAGLE Radar" is installed in Hanoi, Viet Nam, in May 2023 within the Voluntary Cooperation Programme (VCP) of WMO in cooperation with the Japan Meteorological Agency (JMA).

With higher-resolution observation data, WNI and the Viet Nam Meteorological and Hydrological Administration (VNMHA) will contribute to the enhancement of resilience by improving the accuracy of weather forecasts and decision-making regarding the issuance of warnings.



The EAGLE radar is a new meteorological radar that performs 3D observation of 50-km periphery in 30 seconds.



Signing ceremony with VNMHA in Hanoi

# PPP: AI & Deep Learning Capability

Computer Vision

Multi-Architecture

Meteorology

Physics

Machine Learning

Deep Learning

Weather Reports From Users



Auto-Detection, Prediction & Classification by analyzing the image



Notification



Enhance & Complement monitoring operation



Camera



Detect the signs of severe phenomena & Transcribe



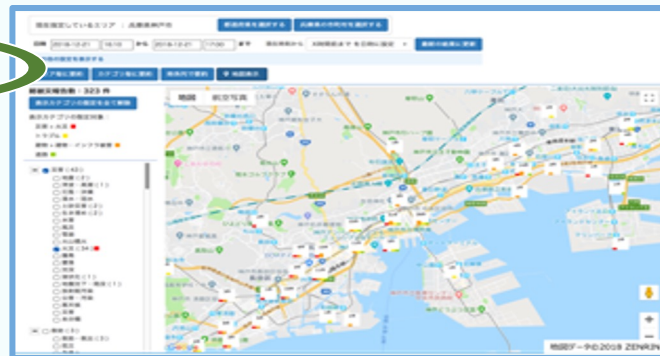
Notification



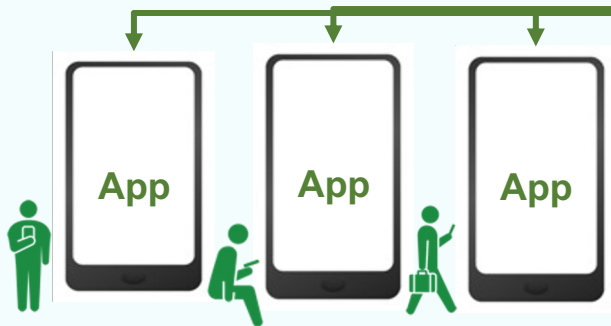
Customized information  
from AI Chatbot/Government



Collecting and organizing information  
from citizens (victims)



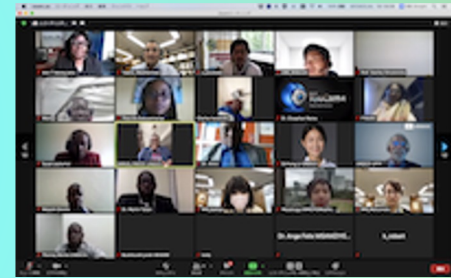
AI Chatbot



- Familiar communication tool helps to get information easily
- Optimize the communication between government and citizen
- Share the information of supplies and evacuation immediately
- Grasp the situation of damage/recovery accurately
- Record and analyze of losses & damages after the disaster

# PPP: Joint Project with UNESCO for East Africa

Weathernews is joining the “SIP” national program led by the Council for Science, Technology and Innovation (CSTI) of the Japanese Government and developing “AI Chatbot” system for disaster prevention with the collaboration of National Research Institute for Earth Science and Disaster Resilience (NIED), National Institute of Information and Communications Technology (NICT) communicating through the mobile app platform of LINE.



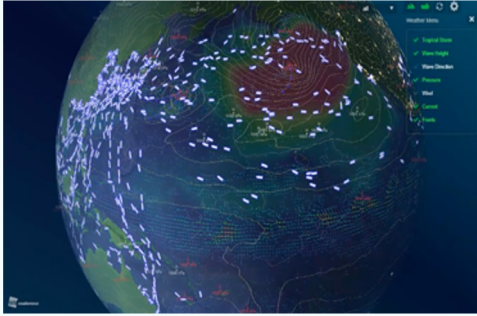
In collaborative project with UNESCO, Weathernews attempts to contribute to disaster prevention in East Africa nations by providing and collecting information related to disasters through mutual communication with users by utilizing the “AI” language analysis and mobile app platform as the fundamental Early Warning System. This original system is totally adaptable at economical cost, in the any country, on any communication tool in the world.

# PPP: Chatbot Model Case in Japan



- 74 Reports have been made and shared by citizens
- Created a hazard map in real-time, and grasped the area in damage
- All governmental organizations shared and used the same information
- Found the area with bad reception and power outage (no reports has been made on the map)
- Even a small village without enough resources and infrastructure, collaboration of Public, Private & citizens and technology/tool may help lives and properties of people

# Challenges for Climate Change Mitigation



## ► CO2 Reduction by Optimum Ship Routing (OSR)

WNI provides global ship routing services which optimize both engine speed and fuel consumption. Along with safety support services, WNI is challenging in monitoring and visualizing CO<sub>2</sub> reduction, and in fact, the Optimum Ship Routing service has contributed to the reduction of 2.8 million MT of CO<sub>2</sub> from June 2018 to May 2019.

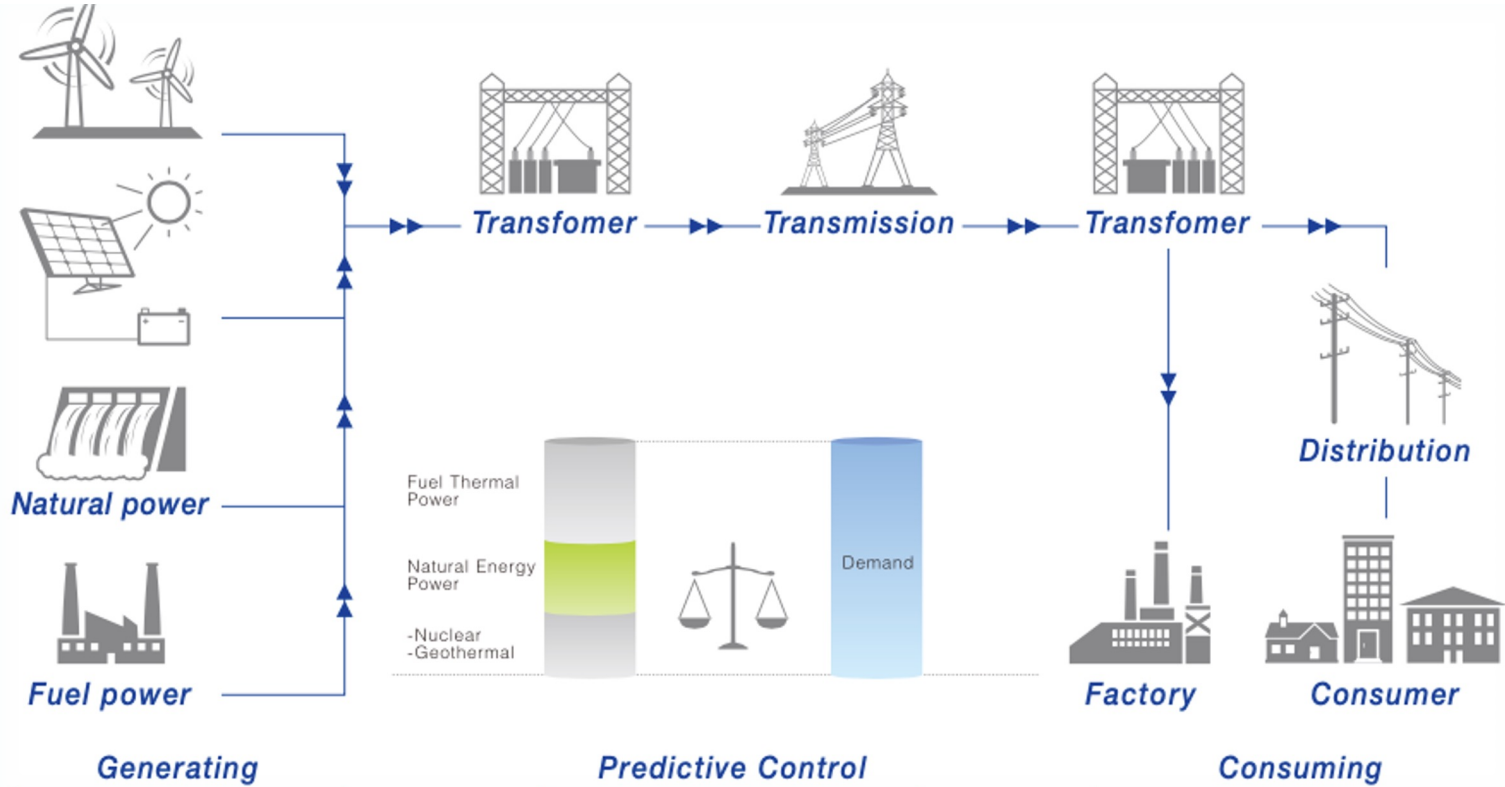


## ► Minimize Food Waste with Supply/Demand Forecast

WNI's demand and supply planning support service is also utilized in the distribution and retail markets. Especially for an issue of food waste, predicting future demand with weather/climate risk analysis can avoid excess production waste in the supply chain.

# Services for Energy Industry

Providing “Energy Resilience Service” for power company  
with site specific power demand/supply forecast & risk analysis

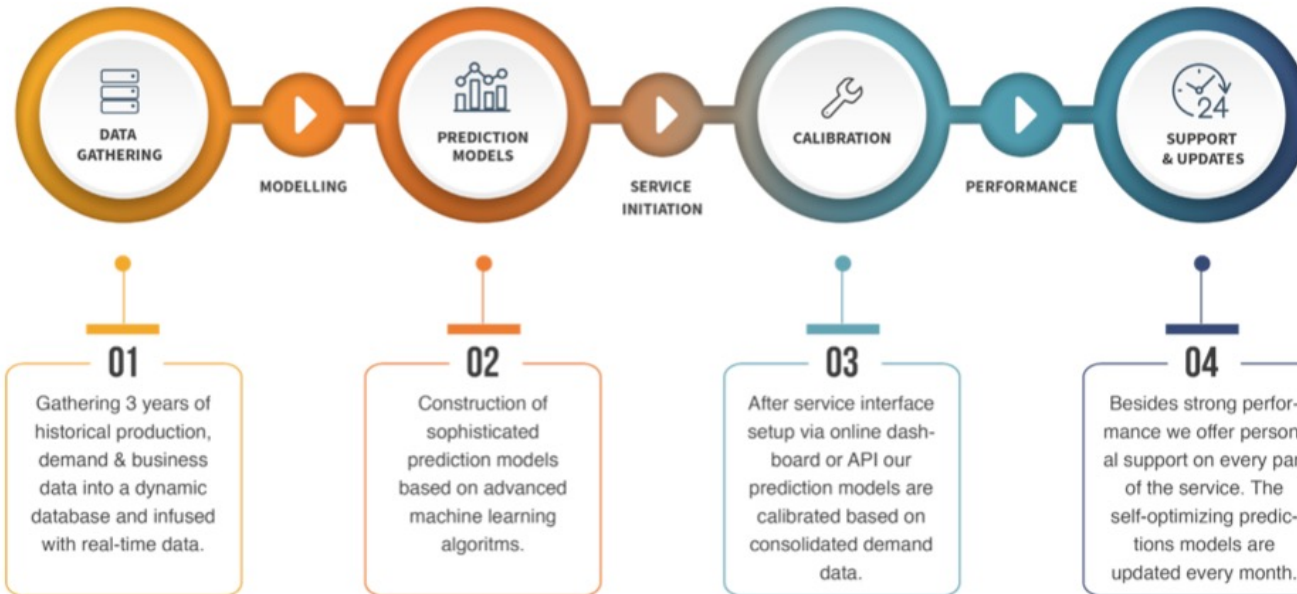


# Full Support Energy Services

- ✓ High-precision, local weather forecasts
- ✓ Power demand prediction
- ✓ High level support, quality control & digital integration



## THE ROAD TO BETTER PERFORMANCE

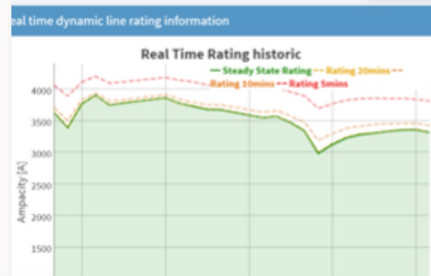
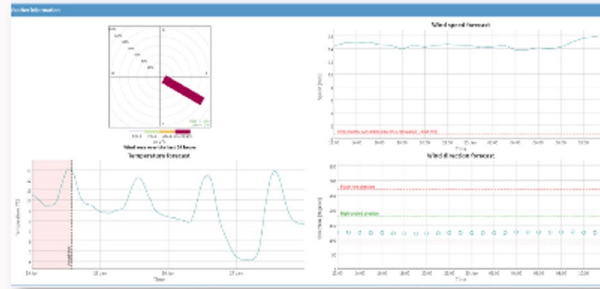


# Services for Power Grid / Social Infrastructure

- ✓ Grid line weather monitoring & forecasting
- ✓ Focused Grid Line Capacity Trend Monitoring & Forecasting
- ✓ Regional Grid Demand & Renewable power prediction

## EASY-TO-USE DLR TRACKING AND SIMULATION

Through our online dashboard, you can easily access grid line weather data, real time DLR ratings (stationary and transient for 5, 10 and 20 minutes), and create forecasted simulations of transient DLR (inputing specific date, time and power forecast).



**Forecasted DLR simulation tool**

Date to forecast:

Time to forecast:  :

Power forecast (in Amperes):

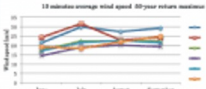
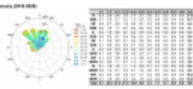

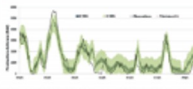
Time constant to forecast:



# Services for Offshore Wind Farm / Renewable Energy

The global push for the adoption of renewable energy for the achievement of a sustainable society is causing more companies to advance into the offshore wind power business, which in turn is resulting in an increase in demand for meteorological information geared specifically toward the business. WNI provides the service for offshore wind farm with the combination of experiences from maritime and energy industries.

## Total Offshore Project Support

Project Phase	1 Feasibility Investigation	2 Project Planning	3 Construction & Logistics	4 Operation & Maintenance
Key points	Selection of appropriate wind turbine installation sites with high business feasibility	Formulation of construction plans to ensure on-time completion	Safe implementation of construction work without delay	Optimization of power generation planning and safe maintenance work.
Our support	Occupancy rate survey reports, etc., using historical weather data 	Provide information of weather working days monthly by using historical weather data, etc. 	Provide weekly workable dates, wind farm site-specific forecasts, etc. 	Prediction of wind power generation amount and enroute support for maintenance craft, etc. 



# Total Support for Energy Resilience

Our expertise is based on econometric modeling of the activity, taking into account weather factors, calendar, and markets. Our recommendations help industries to make the best decisions for building / improving the energy resilience.

**Observation Data**

**Business Impact**

**Nowcast**

**Risk Analysis**

**Historical Data**

**Demand / Supply**

**Forecast (Short Term)**

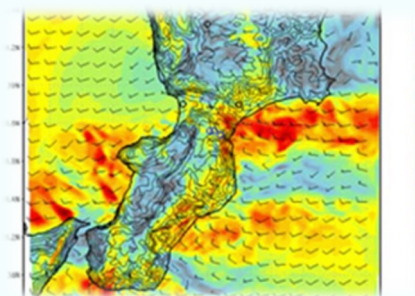
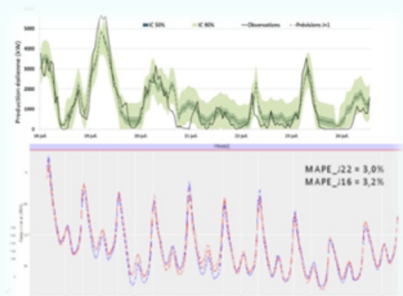
**Operation Support**

**Analysis Data**

**Market Trends**

**Forecast (Long Term)**

**Optimization**



# Conclusion: Challenges and Opportunities

- 1. Advanced and sustainable observation & monitoring and effective data sharing / utilization based on the efficient PPE/PPP framework are required for enhancement of new values in weather & climate services for the climate change.**
- 2. Utilizing the cutting-edge technologies and user feedback through the communication lead to strengthening the social resilience for extreme weather and natural disasters.**
- 3. Innovative weather & climate service might optimize the power management (demand & supply) and support the energy resilience of the society.**

**Our dream is to be the Weather Information Platform  
to reduce the weather and climate risk for  
8 billion people living in the world.**

**We hope, a combination of traditional scientific approach  
and innovative cutting-edge technologies  
based on the appropriate mechanism for PPE/PPP  
will enhance and maximize the contribution of  
Weather and Climate Enterprise to save the people and society.**

***Thank you***

**多謝**

<https://global.weathernews.com/>



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