



# ASIA CLEAN ENERGY FORUM 2026

Beyond Transition: Building Secure, Resilient, Inclusive, and Intelligent Energy Systems

8-11 June | ADB Headquarters, Metro Manila, Philippines



## AI-Enabled Virtual Power Plants for Optimizing Distributed Energy Systems

9 June 2026

In cooperation with





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## About Korean East-West Power(EWP)

### 2040 MANAGEMENT GOALS

Building a Sustainable Future with Clean Energy and Innovation

<p><b>01</b></p> <p><b>SUSTAINABLE &amp; RELIABLE POWER GENERATION</b></p> <ul style="list-style-type: none"> <li>Carbon-Free / Low-Carbon Power Generation <b>17 TWh</b></li> <li>Renewable Energy Generation Mix <b>44%</b></li> </ul>	<p><b>02</b></p> <p><b>GLOBAL BUSINESS GROWTH</b></p> <ul style="list-style-type: none"> <li>Energy New Business Revenue <b>KRW 230 Billion</b></li> </ul>	<p><b>03</b></p> <p><b>FINANCIAL STABILITY &amp; AI INNOVATION</b></p> <ul style="list-style-type: none"> <li>AI Innovation Achievement Rate <b>100%</b></li> </ul>	<p><b>04</b></p> <p><b>ESG &amp; SAFETY LEADERSHIP</b></p> <ul style="list-style-type: none"> <li>Greenhouse Gas Reduction Rate <b>76%</b></li> </ul>
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## Contents

# What We'll Cover

**01**

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## Power Market Transition

From Day-Ahead to an integrated Day-Ahead & Real-Time Market

**03**

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## AI Technologies

Forecasting, automated bidding, diagnostics, and flexibility

**02**

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## VPP Ecosystem

Defining the Virtual Power Plant and its role in distributed energy

**04**

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## EWP Projects

Jeju pilot, K-VPP, Digital Twin, and V2G demonstrations



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## #1 Transition of the Power Market Structure

*South Korea is shifting from a Day-Ahead Market to an integrated **Day-Ahead and Real-Time Market** — piloted first on Jeju Island, with nationwide expansion planned.*

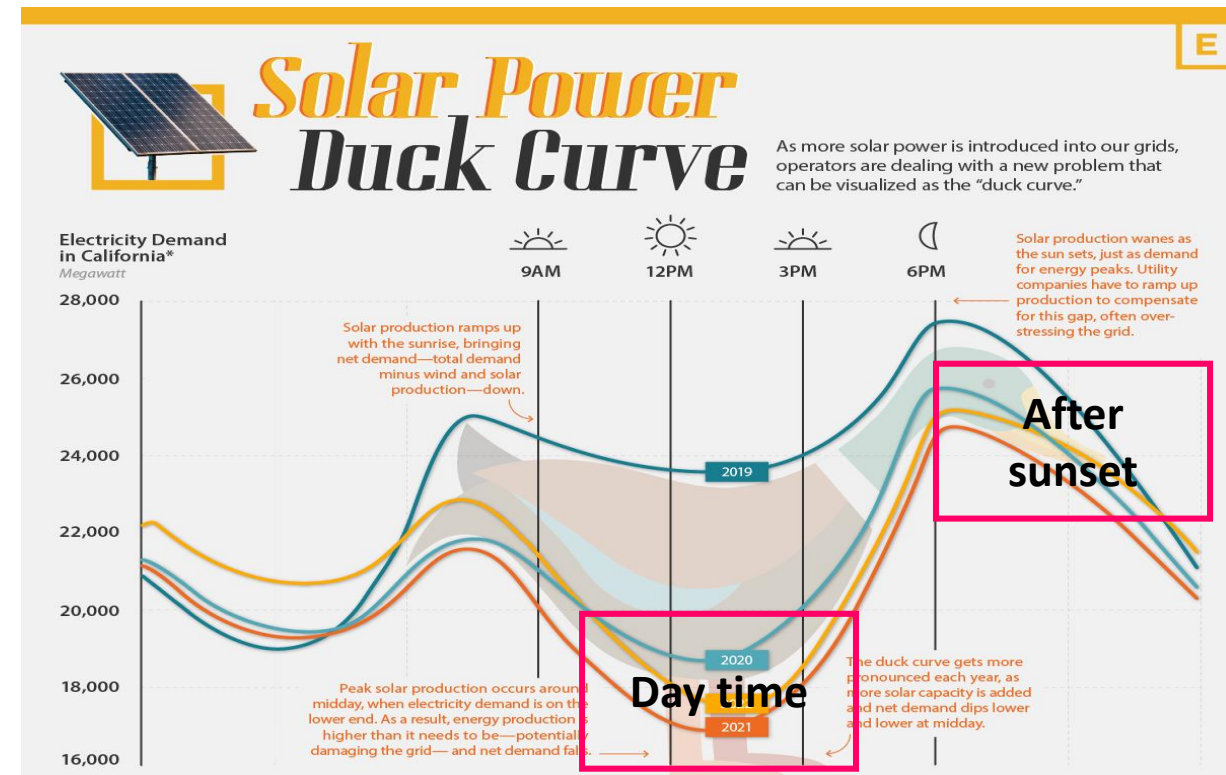
### ■ Why Is Power Market Reform Necessary?

#### Managing Renewable Energy Variability and Uncertainty

*Solar and wind variability creates forecast gaps. Real-time balancing every 15 minutes to 1 hour is critical.*

#### Addressing the Duck Curve and Grid Flexibility

*Midday solar oversupply requires ramp-down, Evening demand spikes require fast ramp-up. Day-Ahead and Real-Time Markets improve price signals and support ESS, hydropower, and demand response.*





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## #1 Transition of the Power Market Structure

- Day-Ahead Market(DAM) & Real-Time Market(RTM)**

Category	Day-Ahead Market(DAM)	Real-Time Market(RTM)
Primary Goal	Efficient unit commitment & scheduling	Balancing supply-demand in real-time
Gate Closure	11:00 (D-1)	T-75 Minutes
Trading Unit	1 Hour	15 Minutes
Execution Cycle	Once per Day	Every 15 Mins(96 times/day)
Bidding Result	D-1 18:00	T-15 Minutes



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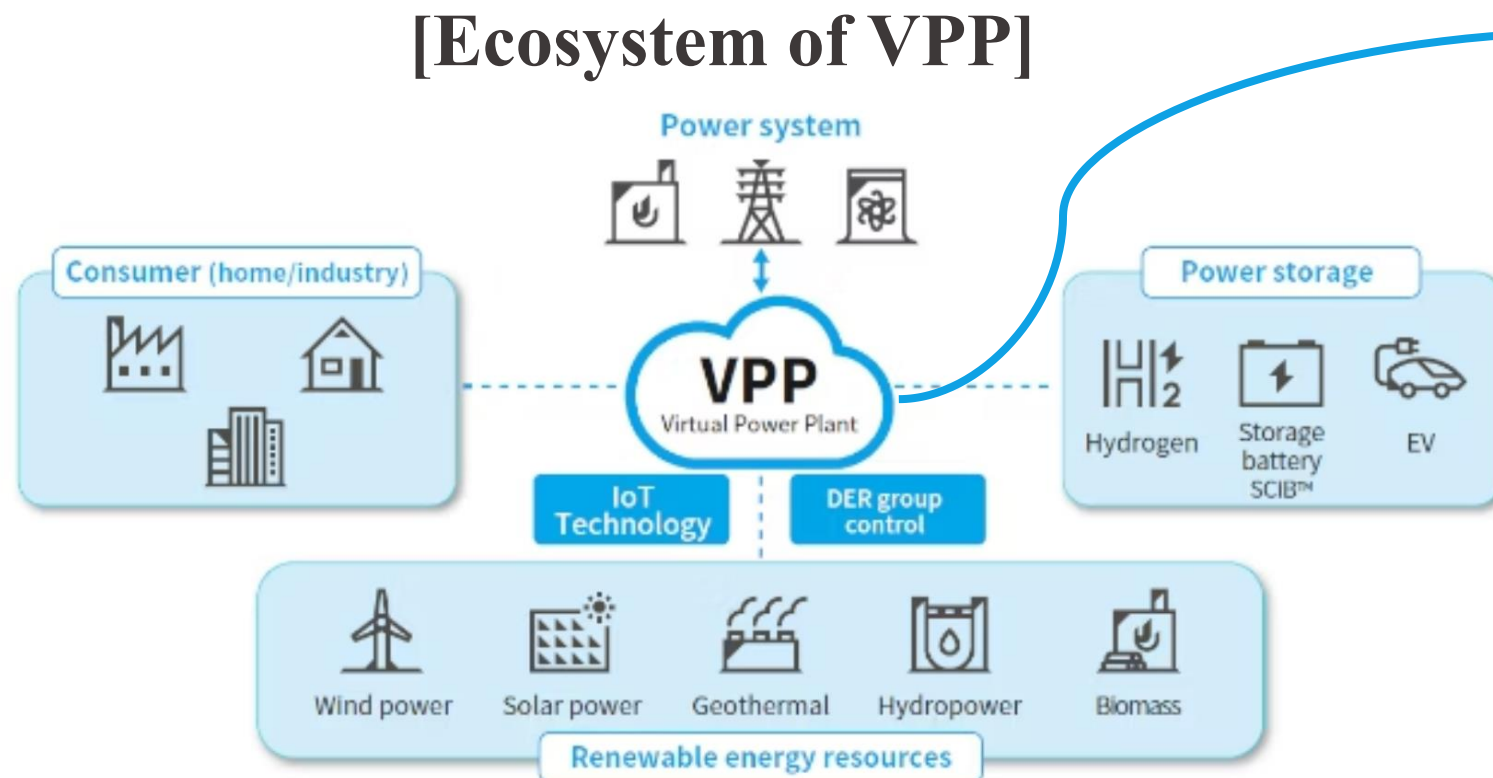
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## #2 The VPP Ecosystem

### What is Virtual Power Plant?

A Virtual Power Plant aggregates distributed energy resources into a single, intelligently managed system.



### Key Component of VPP

- Aggregated Resources(DER\*s)
  - Generation(Solar, Wind..)
  - Storage(ESS, EV batteries V2G)
  - Demand Side(DR)
- Brain of Control System
  - Forecasting(Predicting generation)
  - Optimization(Most profitable way to bid into market)
  - Dispatch(Sending real-time control signals)

\*DER : Distributed Energy Resources



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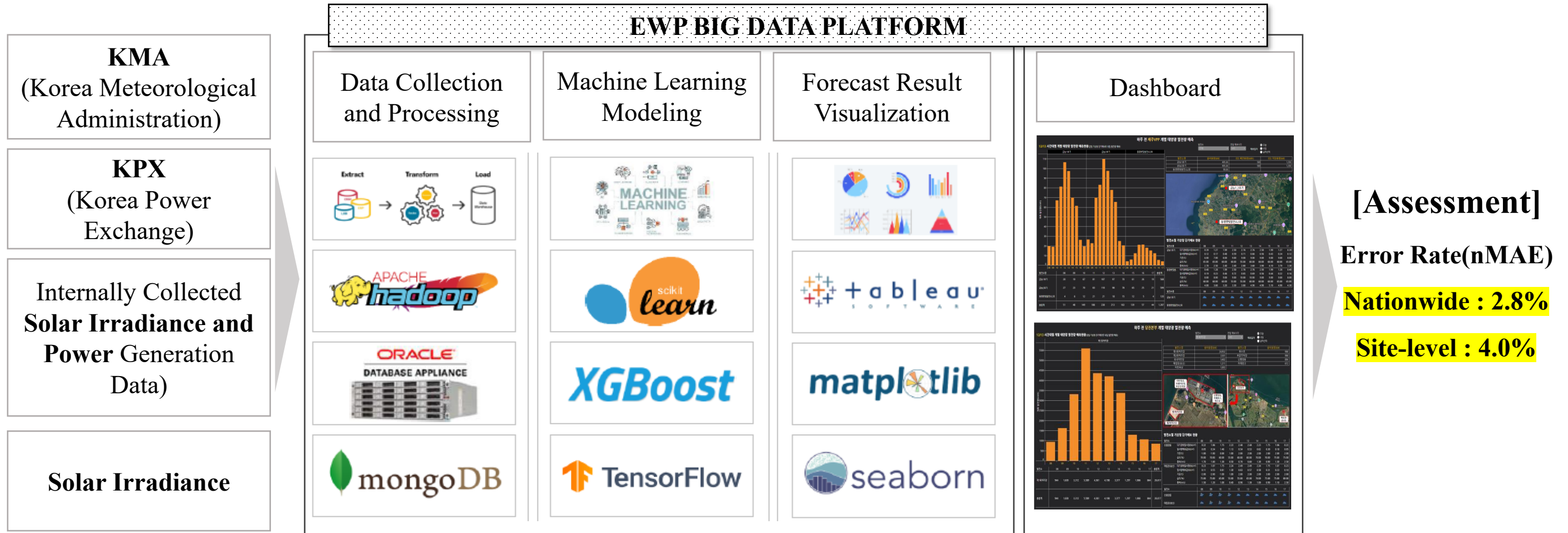
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## #3 VPP AI Technology

### ▪ Solar Power Generation Forecasting





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## #3 VPP AI Technology

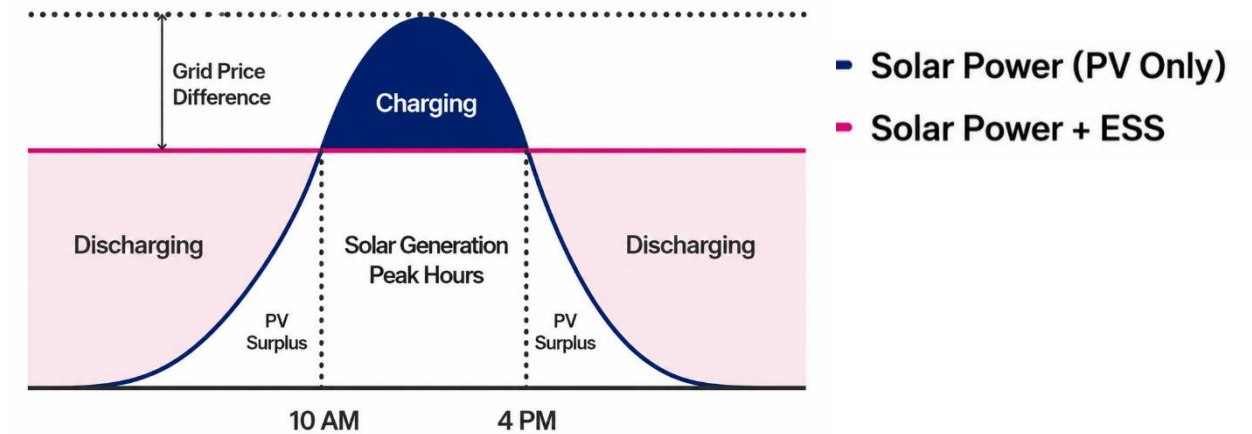
### Market Optimization

Weather & Power demand	Fuel cost data <i>LNG, coal</i>	Power supply <i>capacity, reserve ..</i>	Time feature <i>seasonal, public holiday</i>
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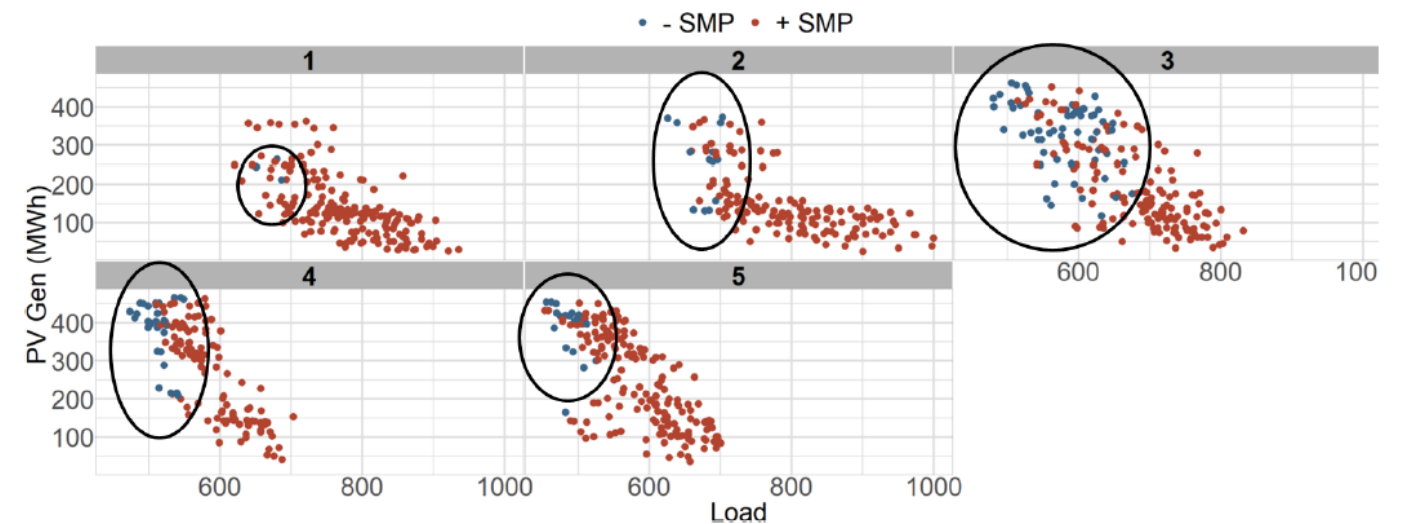
**SMP Prediction(System Marginal Price)**  
*The variable cost of the last (most expensive) generator meeting real-time power demand is awarded at the real-time SMP*

ESS Operating Optimization	Risk Management (IMBP 6%)	Real-time Revise bidding	Market Bidding Decision
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**Optimal Bid Strategy**  
*How much electricity to offer into the market, and when*



[ ESS Operating Optimization ]



[ -SMP in periods where PV generation relative to load is high ]



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## #3 VPP AI Technology

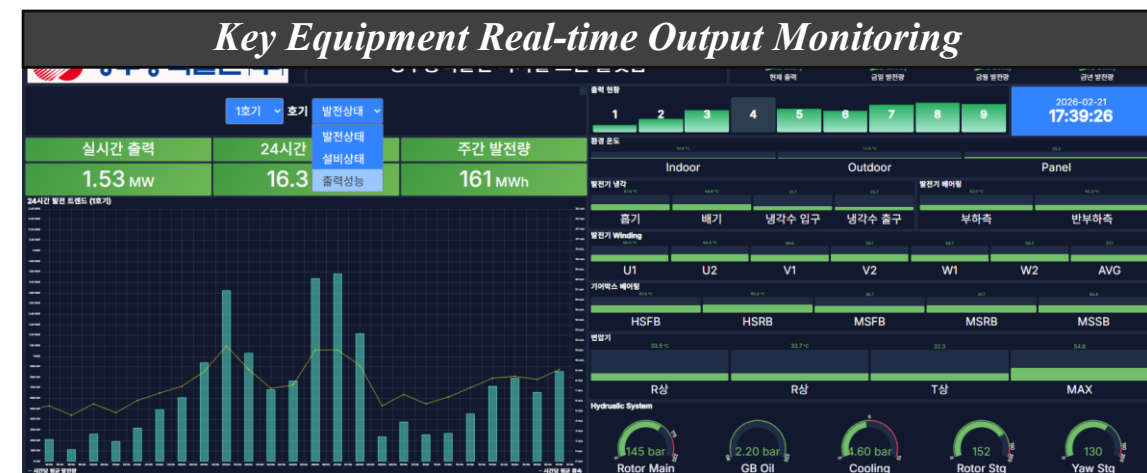
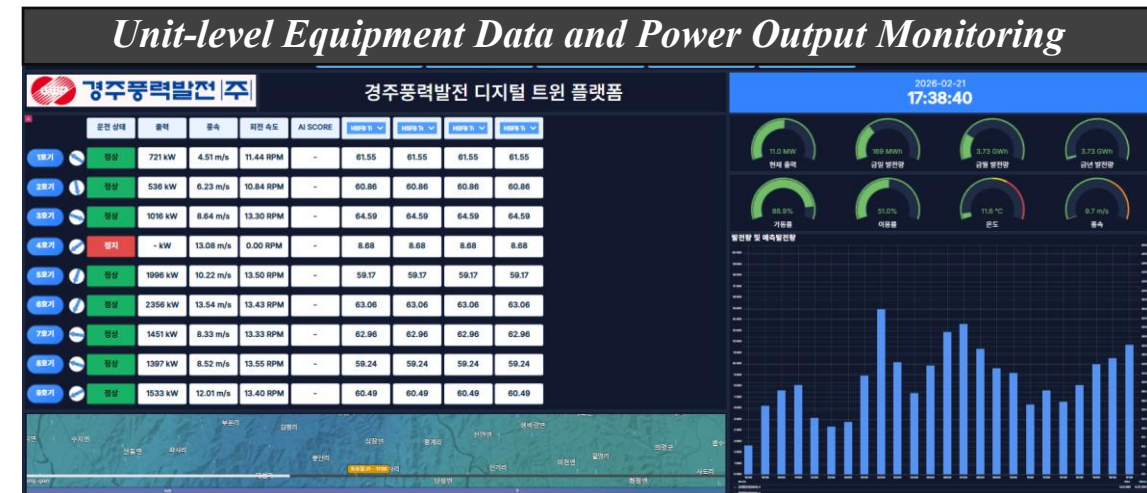
### Asset Diagnostics

#### Solar PV Equipment Diagnostics

- actual generation output VS forecasted generation
- Trigger inspection when deviation exceeds a defined threshold

#### Wind Turbine Diagnostics using Digital Twin

- Asset Condition Monitoring**
  - Diagnose vibration, bearing health status and blade conditions
- Power Output Forecasting**
  - Predict generation output(using wind speed, direction ..)
- Predictive Maintenance**
  - Recommend maintenance before failure occur
- Remote Operation Monitoring**
  - Generation performance, Operational alarm etc..





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## #4 EWP Projects

### ▪ JEJU VPP Bidding Pilot & Semi-Centralized Dispatch Market

Category	JEJU Bidding Pilot Project	Semi-Central Dispatch Market
Since	From Sep. 2024~	From March. 2026~
Market	Forecasting(Day-Ahead) + Bidding + Real-Time Control	Forecasting(Day-Ahead) + Real-Time Control
Capacity	1.1MW + 1MW ESS	11MW (Solar)
Strategy	<ul style="list-style-type: none"> <li>ESS Integrated solar PV operations based on time-of-day ( charging : 11~16, discharging : 19~23)</li> <li>Active output curtailment to minimize IMBP or compliance rate</li> <li>Real-time bid adjustments considering real-time ESS charging status and generation amounts</li> </ul>	
Result	<ul style="list-style-type: none"> <li>11% increase in customer revenue</li> <li>Imbalance penalty : 2% of total settlement amount</li> </ul>	



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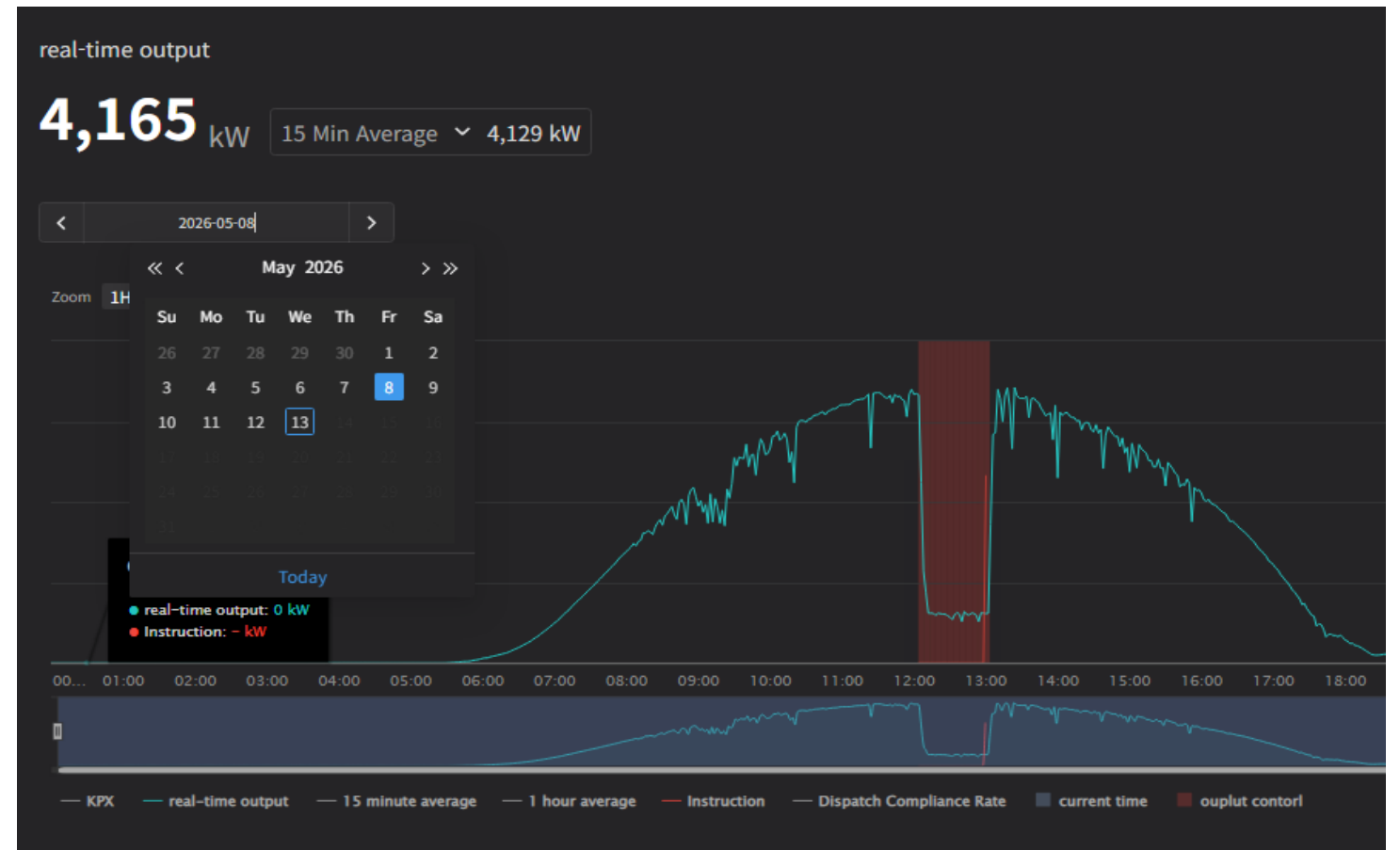
## #4 EWP Projects

### ■ VPP Platform (Forecasting, Operating)

[Forecasting analysis ]



[Real-time dispatch]





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## #4 EWP Projects

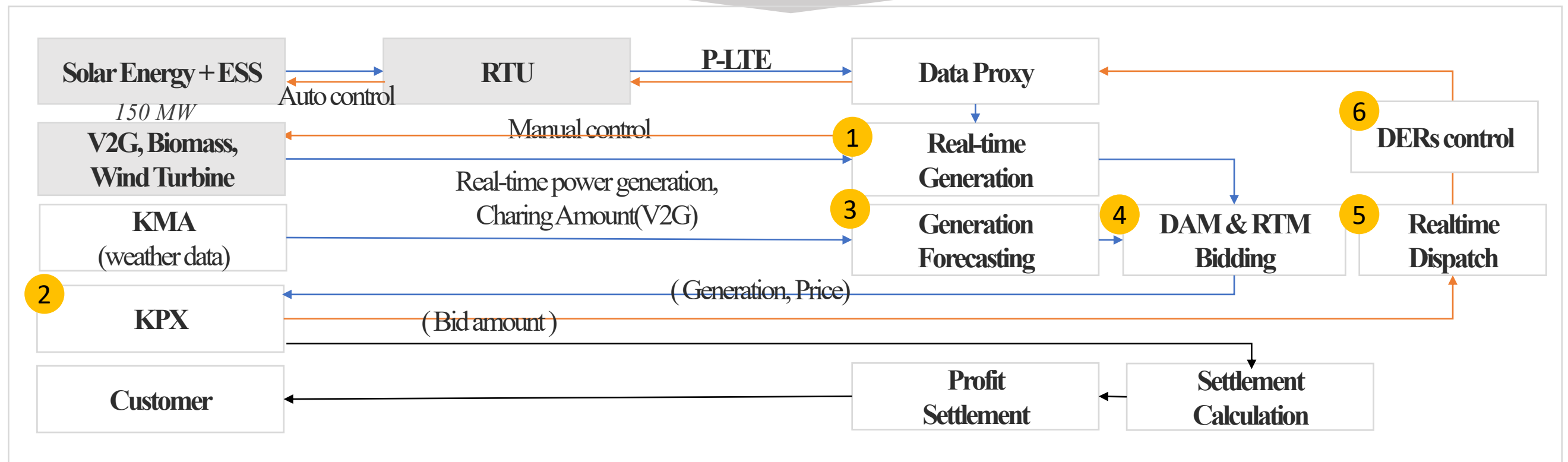
### AI-VPP Demonstration (Korea-Germany International Joint Research Project)

#### AI-Based DERs Dispatch Technology

*Agent-Based model to analyze and optimize interaction among DERs*

#### VPP Resource Demonstration

*Develop a simulation platform and conducted VPP demonstration projects to expand VPP across the entire Korean power grid*





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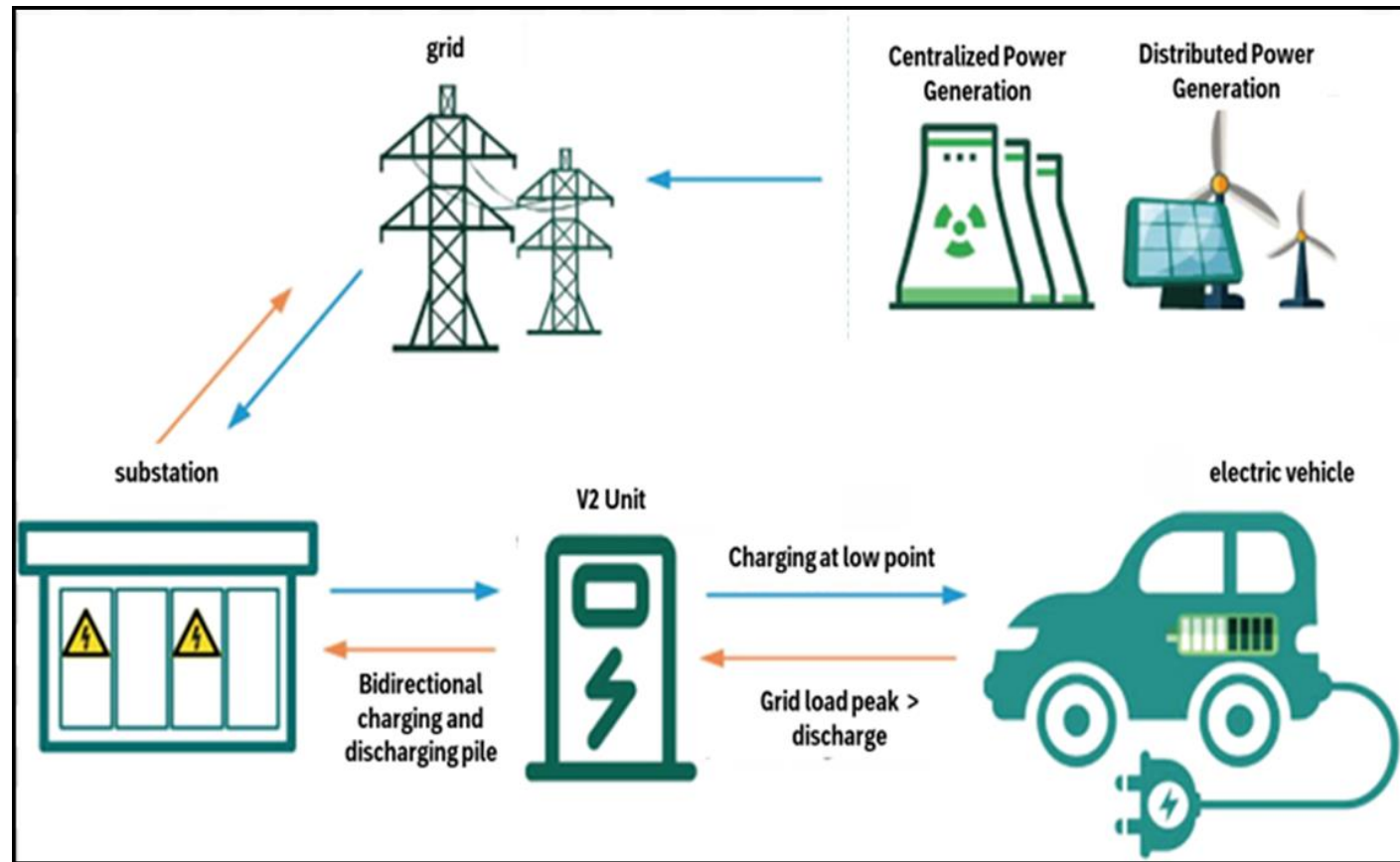
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## #4 EWP Projects

- Flexibility resources utilizing electric vehicle batteries(V2G)

[How it works]



[What AI does]

### CBL(Customer Baseline Load) Prediction Model

- Estimates the amount of electricity that would have been consumed without DR events.
- Measure load reduction during DR

### Charging Demand Forecasting Model

- Predicts future charging demand by time, location, and charger type
- Forecast peak charging hours, Prevent charger congestion

[Impact]

4.2M EVs  
 ×  
 10%  
 ↓  
**4GW**



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## #4 Lessoned Learn

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- **Strategic Pillars for Successful VPP Implementation**
  - Policy first, technology follows
  - High-quality data is the foundation
  - Diversification of flexibility
  
- **What does AI do?**
  - Resolve uncertainty
  - Make Intelligence → more profit, grid stability
  - Facility reliability