

2nd Global DSO Conference

Carbon Neutrality Policy in Korea and DSO Demonstration Plan of KEPCO

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Chang-hoon Shin
(hoony1968@kepcoco.kr)



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Carbon neutrality policy in Korea

- Carbon Neutrality Act in Sep. 2021
 - 40% reduction until 2030 (NDC in Oct. 2021)
 - 100% reduction until 2050
- Very challenging goal
 - 4.17% of annual average reduction rate
 - ※ (EU)1.98 (US)2.81 (JP)3.56
- Expecting active role in energy sectors
 - 45.5% of the total emission in 2018

Generation

- Renewable energy
- Hydrogen
- LNG-CCUS
- Nuclear(controversial)

T&D

- Network enhancement
- Reliability & resiliency
- Market Innovation
- Super-grid(controversial)

End-Use

- Electrification
- Energy Efficiency
- Flexibility Support
- New Biz Creation

Background of DSO in Korea

- Active Distribution Network
 - Requesting innovative role to distribution utility for enhancing DER hosting capacity and actively managing the DER to mitigate the system uncertainty and unbalance
- Distributed Energy Activation Act in Jul. 2021 (under review)
 - Authority and responsibilities of DSO
 - * (Authority) Integration, Disconnect and Curtailment of DER
 - * (Responsibility) Non-discrimination, Regulatory audit, Information sharing
 - * (Activation) Legal basis for regulatory free zone
- KEPCO developing the ability of DSO, step by step
 - DSO 1.0 : Limited flexibility support through network operation
 - DSO 2.0 : Integrated flexibility support through DER management
 - DSO 3.0 : Active management of DER through market-based operation

DSO Demonstration Plan of KEPCO

- KEPCO plans to demonstrate DSO 2.0 in Jeju Island
 - Jeju Island is located on the southern part of the Korean peninsula, seeking carbon free island 2030, already integrated considerable amount of renewables in the network, and so needs frequent curtailment due to the excessive renewable generation
 - Renewable capacity(690MW), portion of generation(16.2%), curtailment (77cases, 19.5GWh) in 2020
 - From 2022 to 2024, KEPCO participate as a DSO in the government assisting joint demonstration project with KPX(TSO), VPPs and DER providers
- Contents of demonstration
 1. Deploying ADMS for Integrated operation of DER in the network
 2. Hosting capacity analysis, flexibility and curtailment control
 3. TSO-DSO-VPP cooperation on system operation
 4. New market operation on VPP, VGI, +DR and P2X

Considering Issues

- Roles and responsibility between related entities on DER curtailment
 - Requests and responses, priority
- Flexible operation to mitigate DER curtailment
 - Utility owned / Participating resources
- Support and cooperation for TSO market operation
 - DER is bidding for TSO but connected in the distribution network
 - Evaluating effects of distribution network and pre-qualification
- IT system architecture satisfying cyber security requirements
 - Secure connection with grid IT and renewable IT
 - Restrictions on information sharing
- Cost-effective measurement and control infrastructure
 - Ranging renewable generation
 - Classifying measurement and control device

Summary

- Korean government finalized 2050 carbon neutral scenario and nationally determined contribution(NDC) target for 2030, which is a 40% reduction from the 2018 level.
- Energy sector plays a vital role in emission reduction
 - It accounts for 40% of total carbon emission
- Distributed energy activation act establishes the legal foundation of the Distribution System Operator, DSO for national net- zero vision.
- Demonstration project for DSO and integration of DERs will be launched in Jeju island in 2022
- Jeju island will be designated for the regulatory-free zone for distributed energy activation by the government and future grid operation, market rules and related systems will be demonstrated and a new business model will be evaluated by lifting regulation.