ENERGY AI

iDERMS

#1 Platform Company in VPP

ENCORED
ENERGY AI

Energy Flexibility Platform

2024.10.31 (World Bank)

CEO of ENCORED Inc.
Dr. John ‘Jong-Woong’ Choe

ENERGY AI

COMPANY

Meet our great team

Smart may have brains, but stupid has the balls. Be stupid - ENCORED's team

Dr.
Jong-Woong "John" Choe

Technical Tracks
Smart meter & AMI,
Korean national EMS,
KEPCO realtime power
system simulator

ENCORED CEO & Founder

Chair-professor of TUK

Former President of LSIS

IEC-ACTAD International Expert

Member of National Energy Committee of Korea

National energy committee member

85 *members*

Different DNA

We are a group of *Energy experts, Data scientists, Meteorologist, Designers, and Computer scientists.*

USA : ***4***

Korea : ***47***

Japan (J/V) : ***34***

2023.12.20 ED

Offices

ENCORED Technologies
Established a foreign-funded company in 2013

ENCORED, INC
Founded in 2013 in Palo Alto (cooperate registration : Delaware)

ENCORED Japan
Established J/V with SoftBank in 2017

ENCORED P&P
Established a foreign-funded company in 2020

2023.03.08 ED

OPPORTUNITY

Energy Transition

Evolution of grid and energy markets

Centralized generation

- Bulky • Fossil-fuel generation : long-term planning
- Transmission-based : long-distance, meshed, interconnection (country, state)
- Centralized control : grid integration
- Monopolized : Asset investment by utility
- Players : utility-governance
- Market : long-term contract, day-ahead bidding
- 1 : 1 network : one-way power flow

Distributed generation

- DERs Penetration to grid : short-term planning
- Coupling with T & D : long & short-distance, interconnection(region)
- Distributed control, Power electronics-interfaced
- Dismantling of monopoly : grid integration & defection
- Players : new participation such as aggregators
- Market : day-ahead, intraday, real-time bidding
- 1 : 1 network : Limited 2-ways power flow

Energy cloud

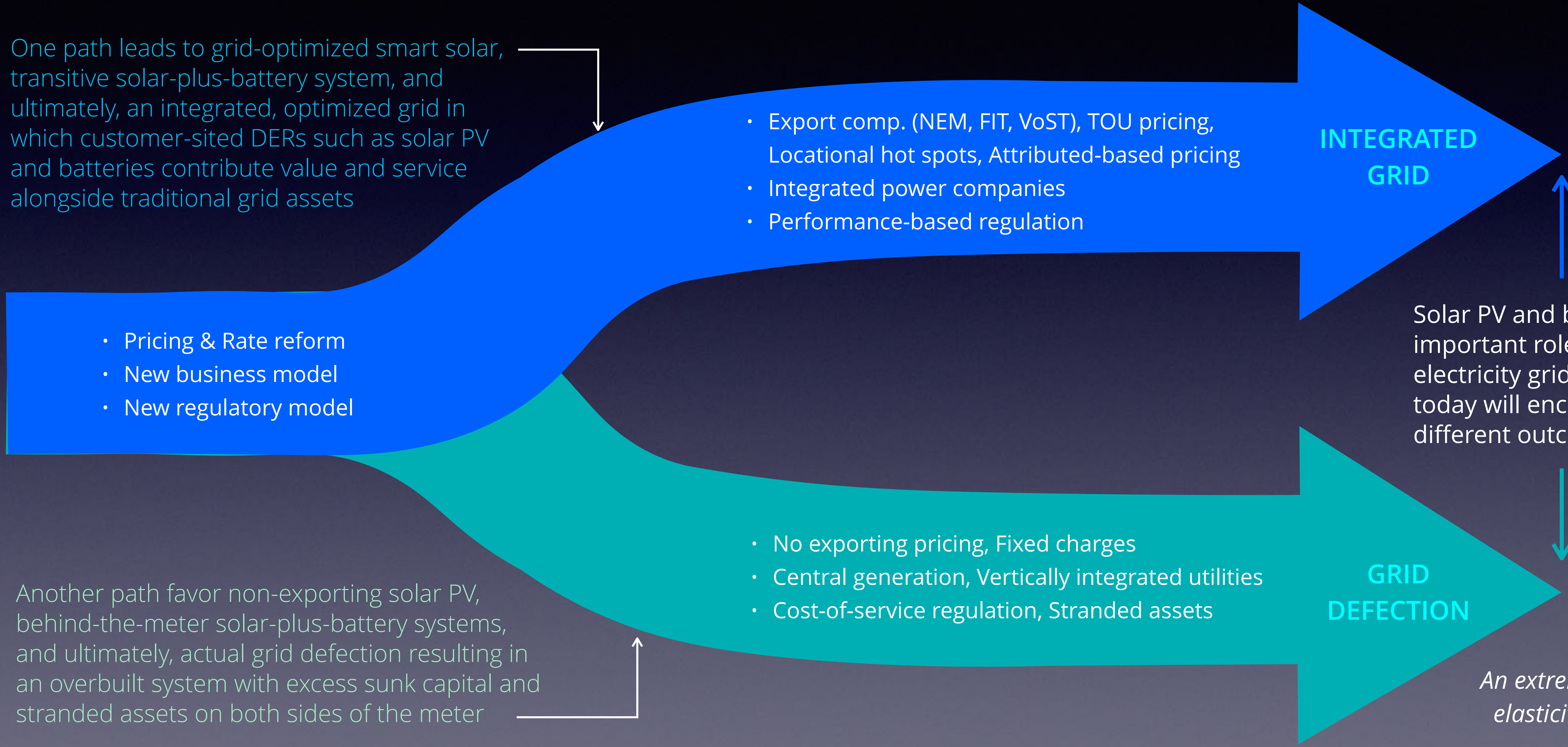
- Small DERs-based generation : MG etc
- Distribution-based : local supply, radial, non-wires alternatives
- Coupling with centralized & distributed control
- Dismantling of monopoly : grid defection, privatization
- Players : TSO, DSO, aggregator, retailers
- Market : day-ahead, intraday, real-time bidding
- n : n network : fully 2-ways power flow

2023.12.12 ED

SOURCE : ENCORED

Grid-defection or Integrated grid

One path leads to grid-optimized smart solar, transitive solar-plus-battery system, and ultimately, an integrated, optimized grid in which customer-sited DERs such as solar PV and batteries contribute value and service alongside traditional grid assets



Solar PV and batteries play an important role in the future electricity grid, but decision made today will encourage vastly different outcomes

Another path favor non-exporting solar PV, behind-the-meter solar-plus-battery systems, and ultimately, actual grid defection resulting in an overbuilt system with excess sunk capital and stranded assets on both sides of the meter

An extreme form of elasticity to price

SOURCE : ENCORED

Connectivity • Aggregation • Integration

Infrastructure for advanced energy conservation systems

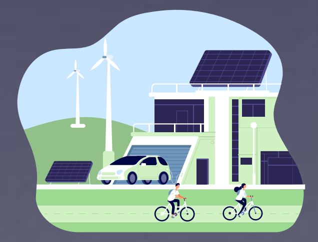
Smart Home

The integration of different services within a home by using a common communication system

- Individual
- Separated
- Small
- Functionality

Integrated platform

Interoperability



Energy Prosumer

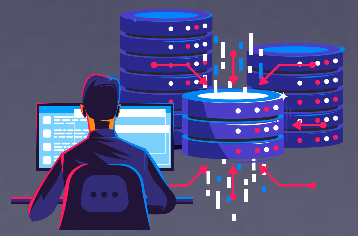
ESS Adaption

Flexibility

P2P Energy Trading

Smart Energy Mobility

Decentralization



Trading Infrastructure

Smart City

The infrastructure for telecommunication by integrating smart system (smart homes &buildings, microgrids etc.) and IoT devices

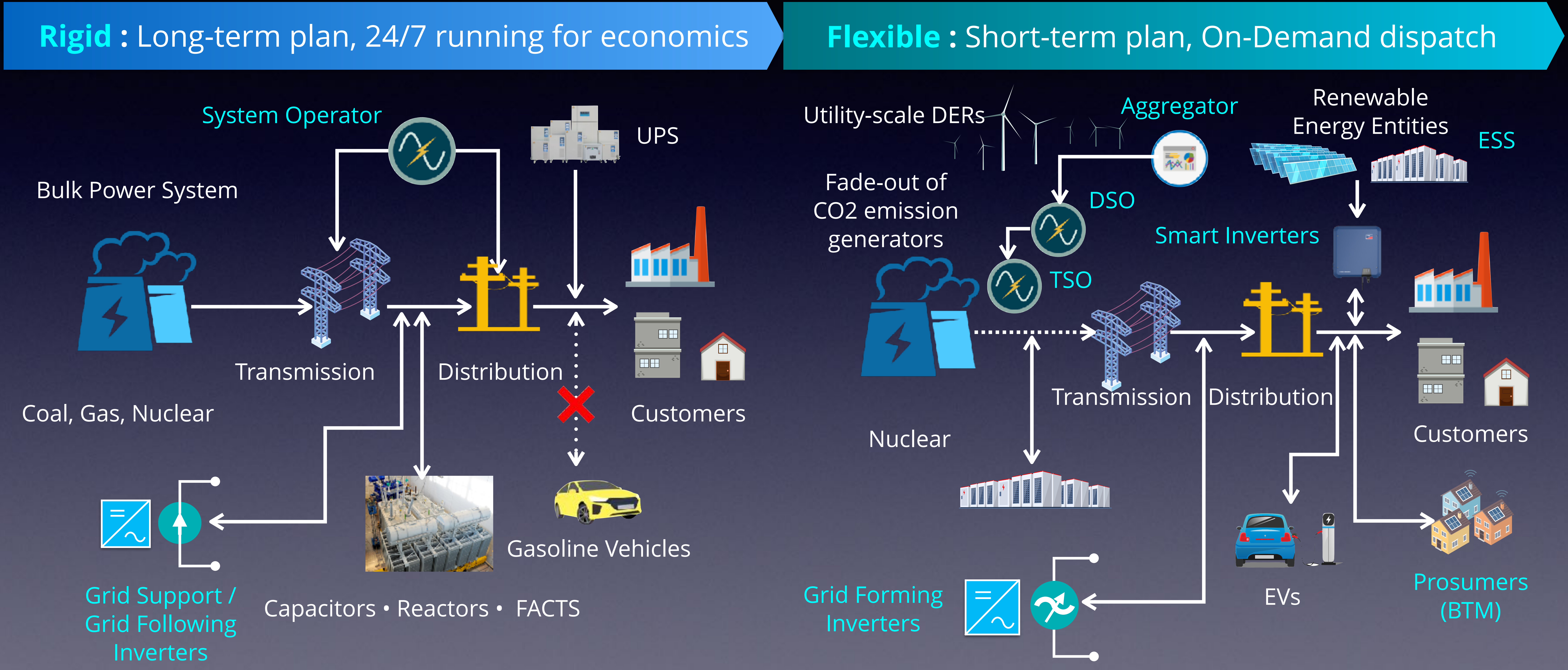
- Citizens
- Integrated
- Large
- Compatibility

Energy trading in the distributed energy system

2023.04.08 ED

SOURCE : ENCORED

New Players



2022.02.18 ED

SOURCE : ENCORED

Security of Electricity Supply

Three building blocks for security of electricity supply

Security of Fuel

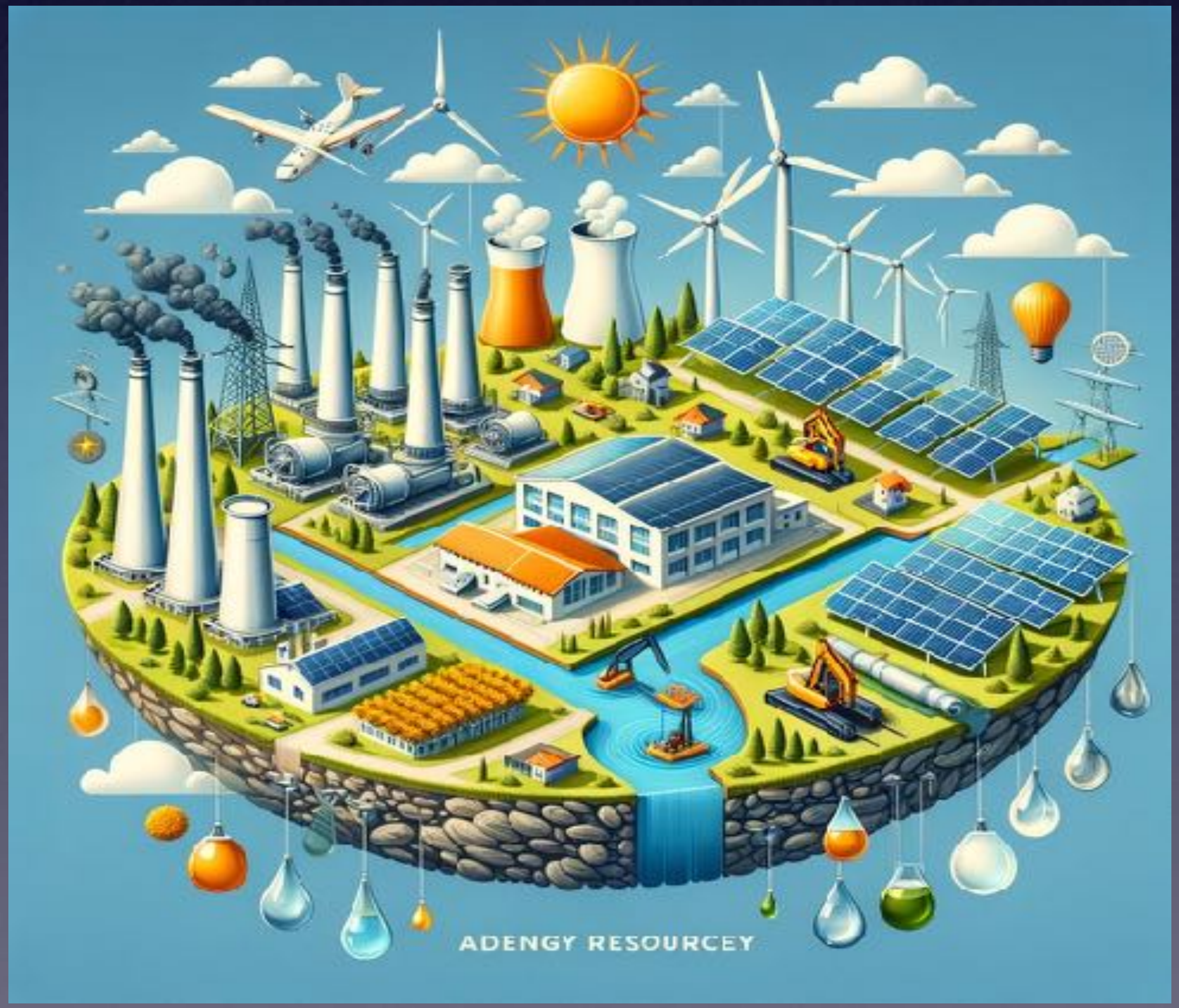
Availability of gas/coal/nuclear/hydro to generate electricity

Security of System Operations

Avoiding blackouts, Reliability & Resilience

Resource Adequacy

Avoiding load curtailment in case of capacity shortage



2022.02.18 ED

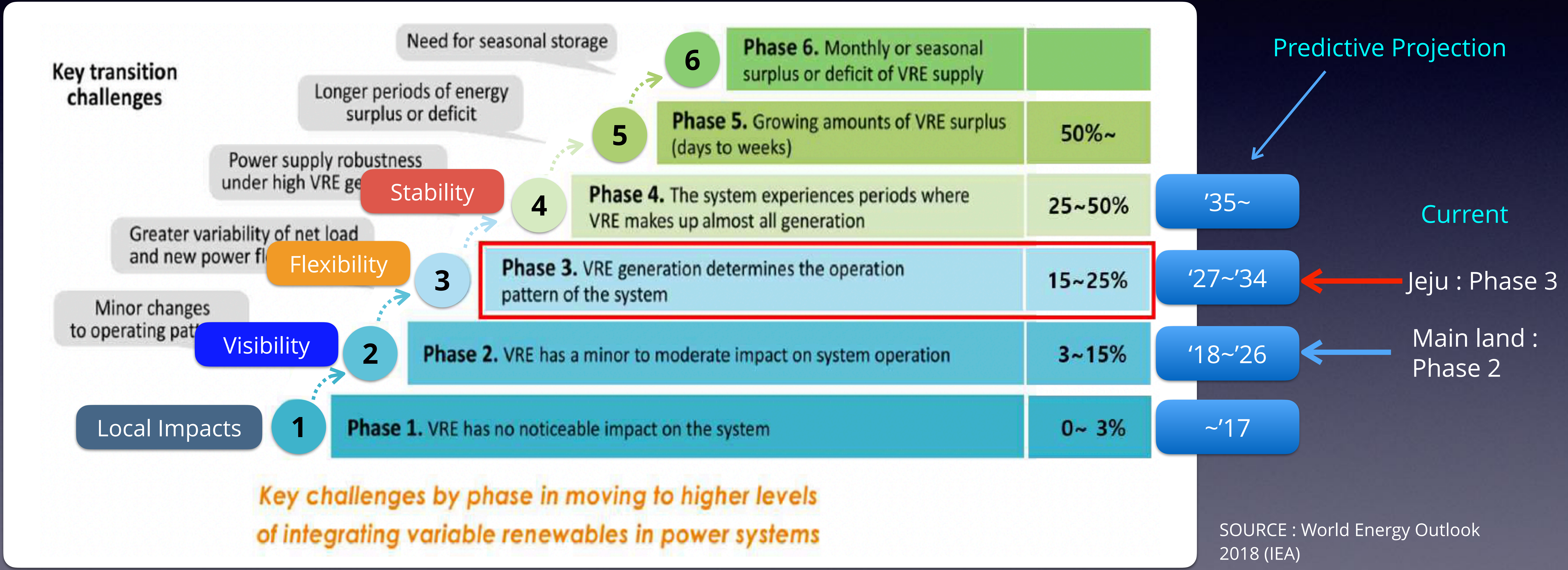
SOURCE : ENCORED

ENCORED ENERGY AI

PROBLEMS

Impacts and Challenges by RE penetration

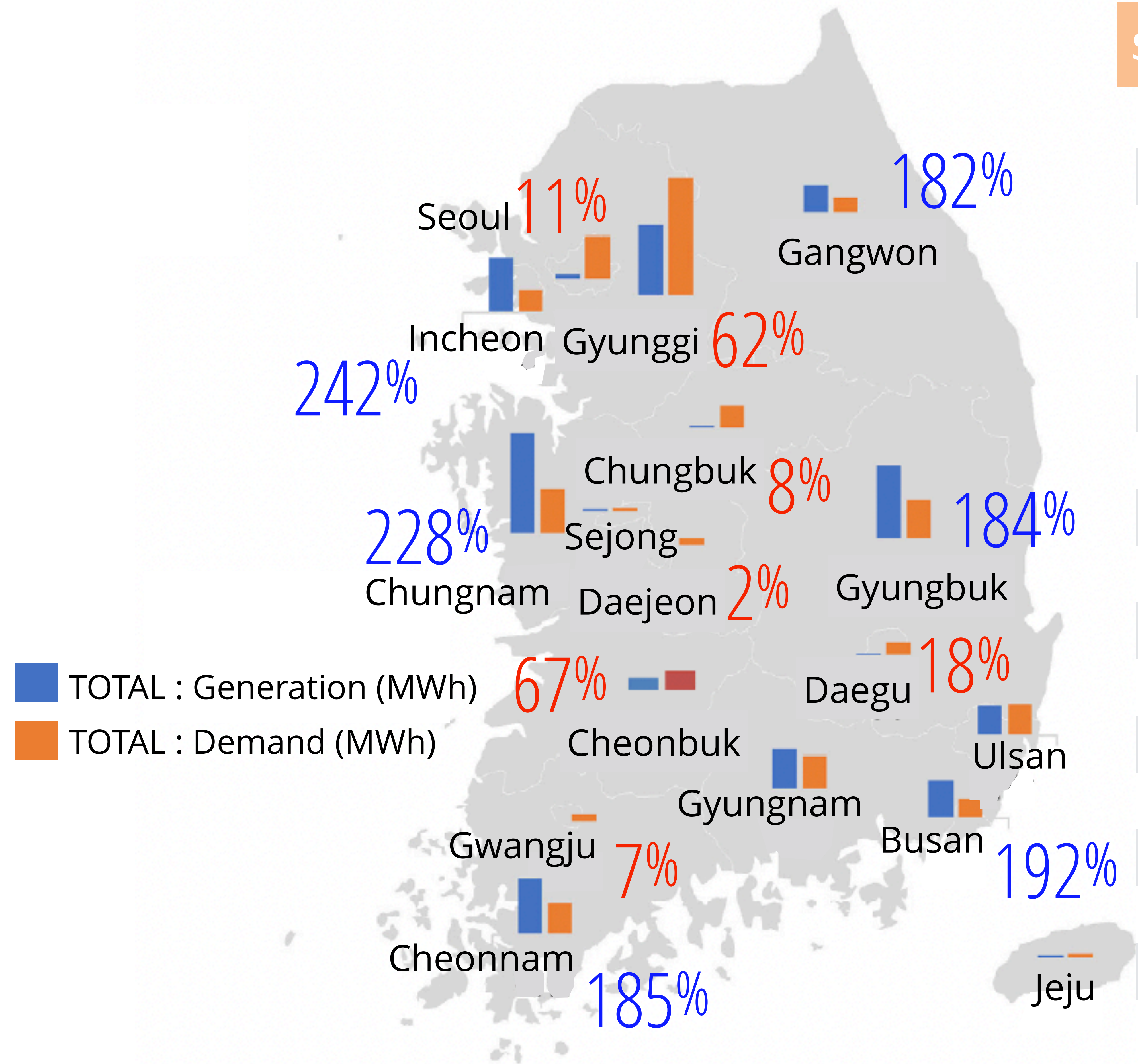
IEA divides the supply stages based on the annual share of renewable energy generation, and presents the impact of renewable energy on the power system and challenges for the next step.



SOURCE : World Energy Outlook 2018 (IEA)

SOURCE : KPX, 2022

Imbalance of Local Electricity (2021)



Self-sufficiency Rate of Local Government	
Seoul	11%
Busan	192% (Nuclear)
Daegu	18%
Incheon	243% (LNG, Coal)
Gwangju	7%
Daejeon	2%
Ulsan	94%
Sejong	88%
Gyunggi-do	62%
Gangwon-do	182%(Nuclear, Coal)
Chungbuk-do	8%
Chungnam-do	228% (Coal)
Cheonbuk-do	67%
Cheonnam-do	185% (Nuclear, RE)
Gyungbuk-do	184% (Nuclear)
Gyungnam-do	123% (Coal)
Jeju	70%

Regional power imbalance is …

- Causes problems with transmission network expansion for long-distance transmission to other regions (curtailment in surplus areas, supply instability in specific areas)

  → Contradictory purpose of Distributed energy
- Congestion of Power Flow
- Losses in grid (resistance, heat)
- Problems with power generation plan for carbon neutrality
- Fossil fuel use may increase to resolve power imbalance.
- Potential for disputes if regional variable rate system is implemented in the future : Social inequality, energy-vulnerable areas • Greater negative impact on low-income groups

SOURCE : KEA(2022), ENCORED

Regionally Concentration of Renewables

- Increasing Regional Unbalance regionally & Voltage instability
  - Currently, solar and wind power are concentrated in the southern region(64%) (May 2022), and the concentration in the southern region is expected to deepen (70%) by 2030.

< Status of solar & wind power by region (end of May 2022) >

Items	Nation-wide	Metropolitan	Gangwon	Chungcheong	East-South	West-South	Jeju	Remarks
Facility Capacity (GW)	**21.6**	1.4	2.0	3.7	4.9	8.8	0.8	Excluding BTM
Ratio (%)	**100**	6.7	7.6	18.4	22.3	42.1	2.8	

< Forecast for solar & wind power by region (projected for 2030) >

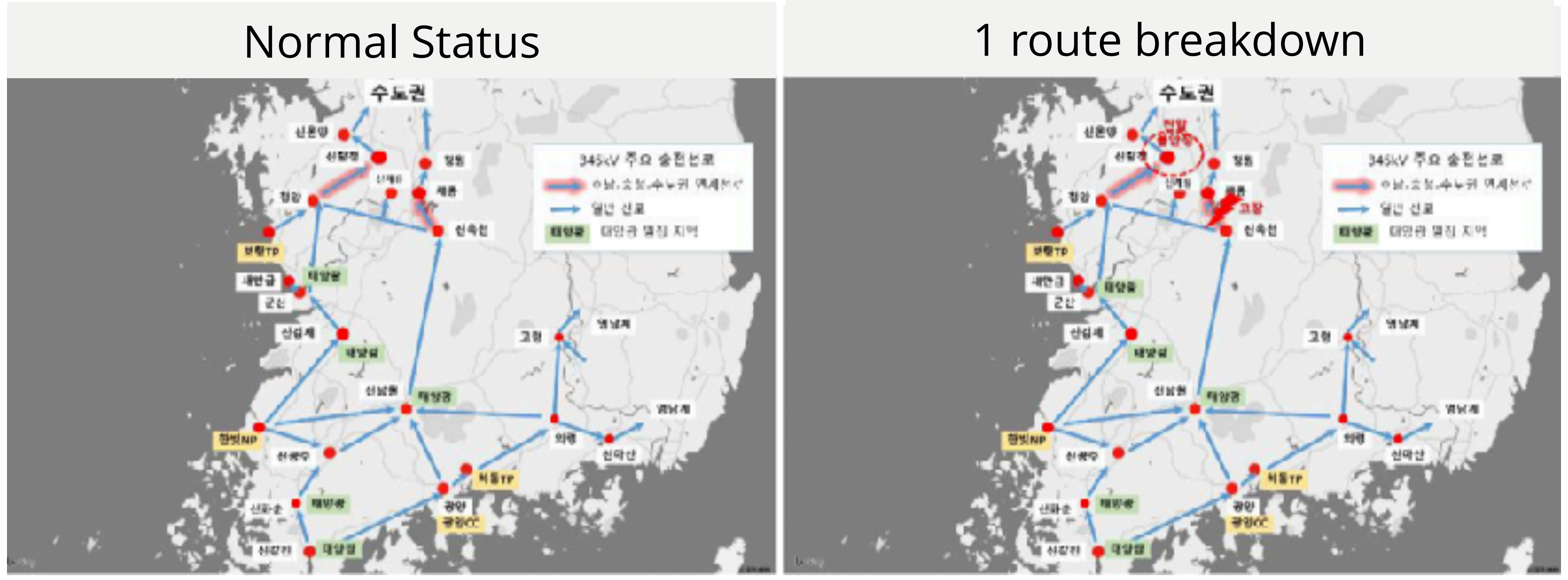
Items	Nation-wide	Metropolitan	Gangwon	Chungcheong	East-South	West-South	Jeju	Remarks
Facility Capacity (GW)	64.2	1.5	6.8	7.4	17.7	27.0	3.8	Excluding BTM
Ratio (%)	100	2.4	10.6	11.6	27.6	42.0	5.8	

* 2030 is projected to reflect the volume of power generation business permits and T&D contracts in the current supply facilities.

- Among the 345 kV inter-regional and 154 kV transmission lines in the southern region • Voltage instability occurs when the system fails due to overload.
  - The 345 kV line between Honam-Chungcheong-metropolitan area, which supplies Honam power generation to the metropolitan area, has two routes (*1), and if one route fails, there is a possibility of a regional power outage due to voltage instability.

  (*1) 345 kV Shinokcheon-Sejong 2 line (3,977 MW),
  345 kV Cheongyang-Sintangjeong 2 line (4,028 MW)

< Impact on Chungcheong area during normal & breakdowns >



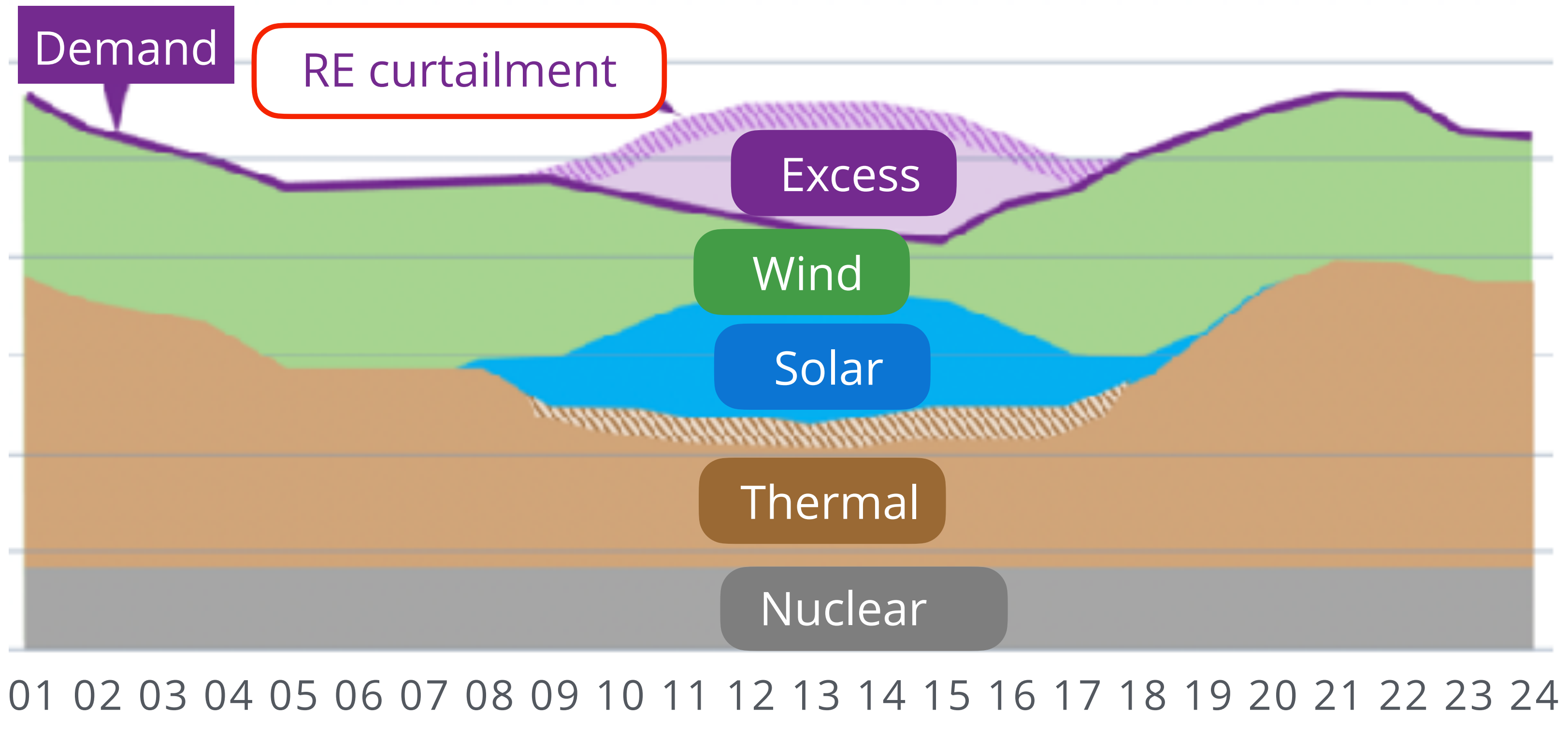
2022.12.23 ED

SOURCE : KPX, 2022

Curtailment

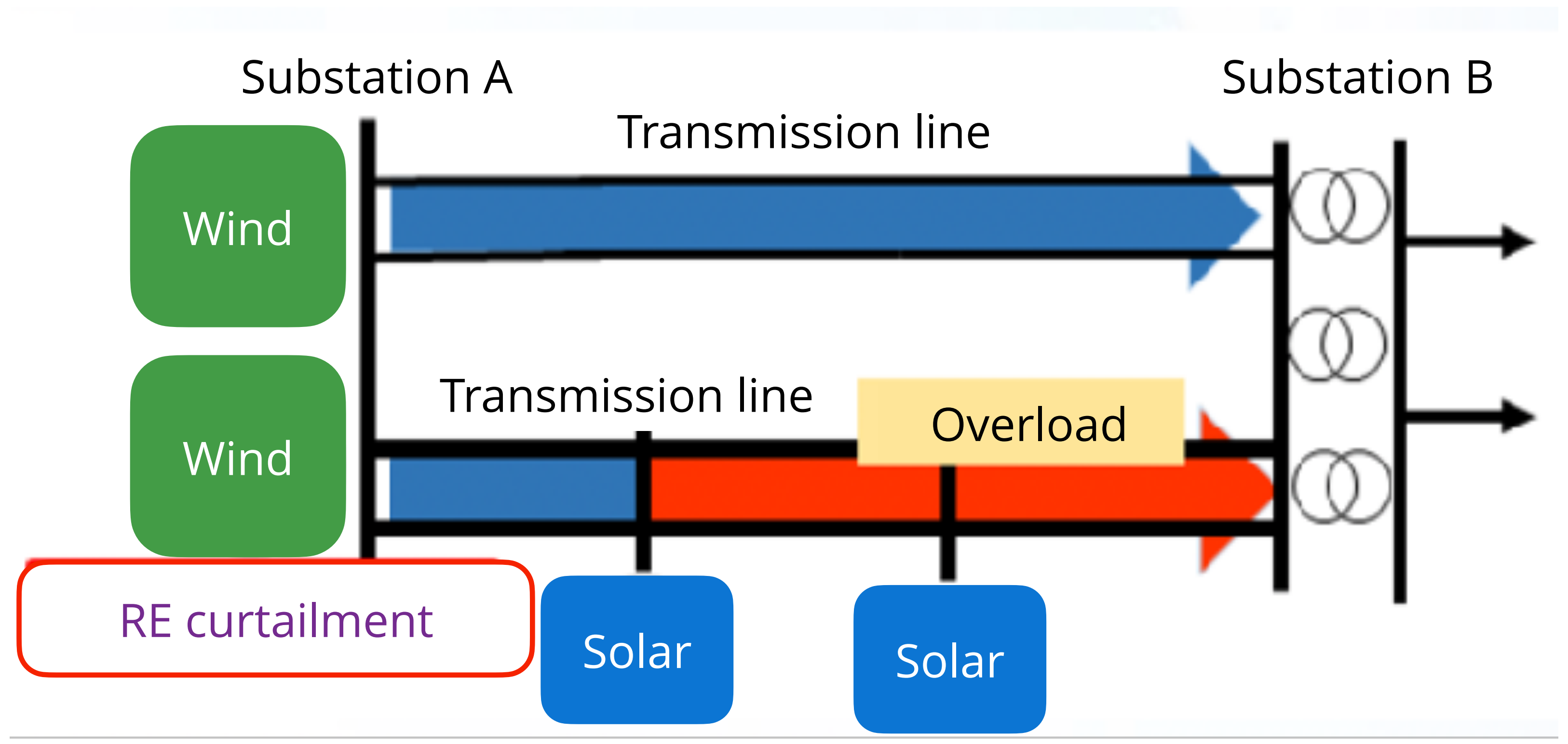
- Causes and status of curtailment

< Supply Surplus (Excess) >



Curtailment of generation in excess of demand to ***maintain power supply and demand balance*** (prevent frequency fluctuation)

< Transmission Constraints >



Curtailment of generation to ***relieve power grid overload (exceeding capacity) and maintain stable voltage and frequency***

- Curtailments in Jeju
  - Spring and fall are periods when electricity demand is low and renewable energy generation capacity is high. Curtailments are in effect due to oversupply(surplus).

    * 2015 : Solar energy 0 times out of 3 times

    * 2021 : 1 time solar power out of 64 times

    * 2022 : Solar energy 22 times out of 60 times
    (Solar power curtailments are rapidly increasing)
  - In particular, curtailments are worsening due to the lack of grid connection performance (Fault Ride Through) of inverter-based renewable energy.

    * Curtailment is increased due to the suspension of back-transfer (after April 2022) due to concerns about wide-area outages due to the additional suspension of renewables

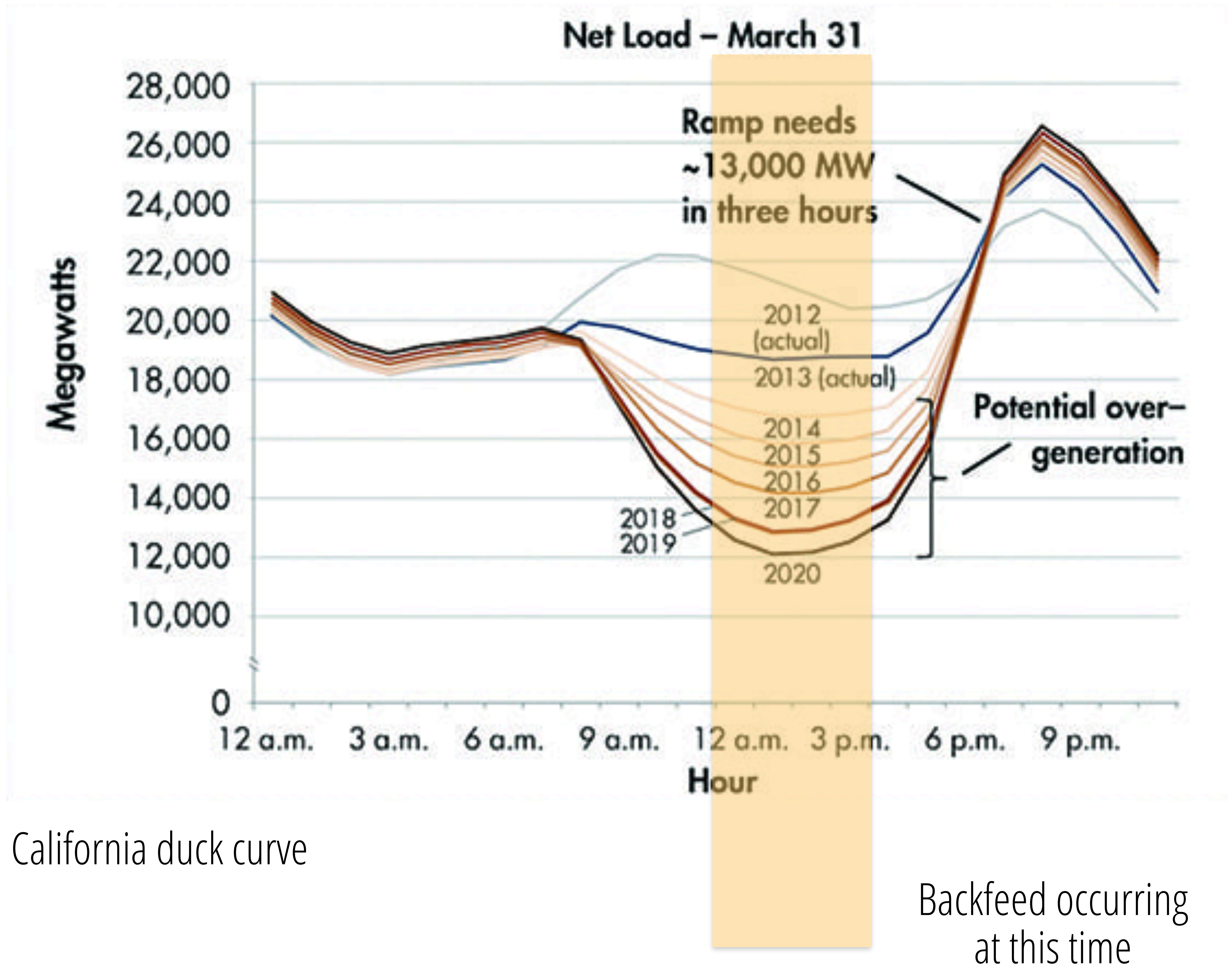
< Jeju renewables FRT performance unsecured status (unit : MW) >

Items	Wind	Solar	Total
End of May 2022	75	341	416

2022.12.23 ED

SOURCE : KPX, 2022

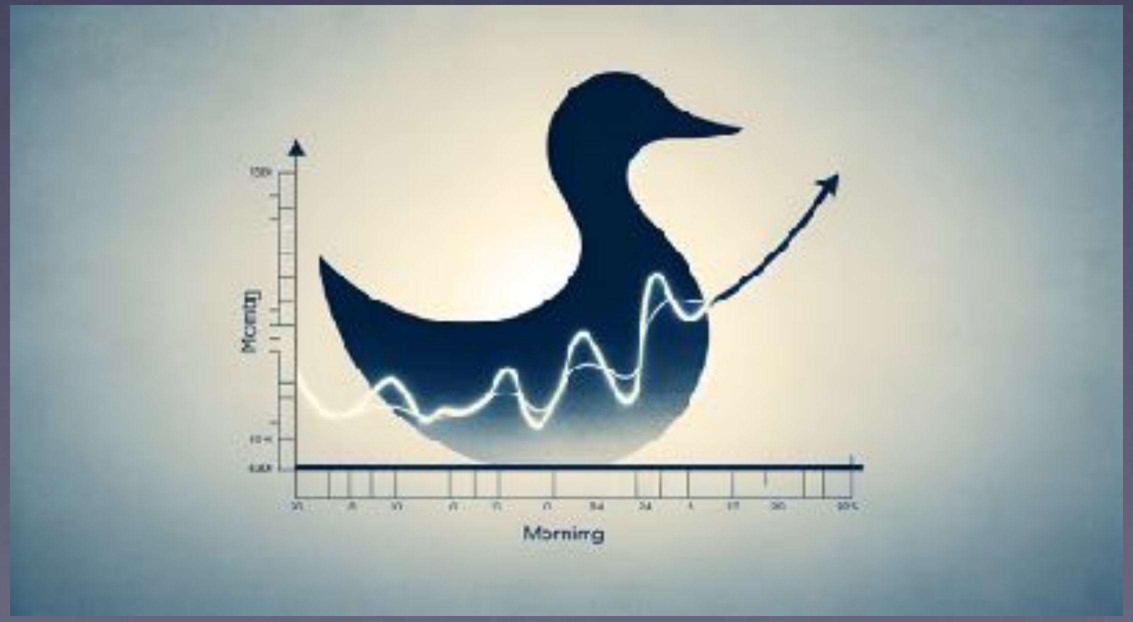
Duck Curve & Load Following



California duck curve

What's wrong with a duck ?

- Steep tall ramps
  Forced to take a bunch of power plants offline/inline, rapidly
- Over-generation and curtailment
  "Backfeed" into grid, which can mess with voltage and stability.
- A generator must have load following capability, which is the process of adjusting output in real time to changes in power demand. However, conventional large-scale generators with poor load-following speed and responsiveness are not economical.



Many world should be done to flatten the duck

2022.03.26 ED

SOURCE : CAISO

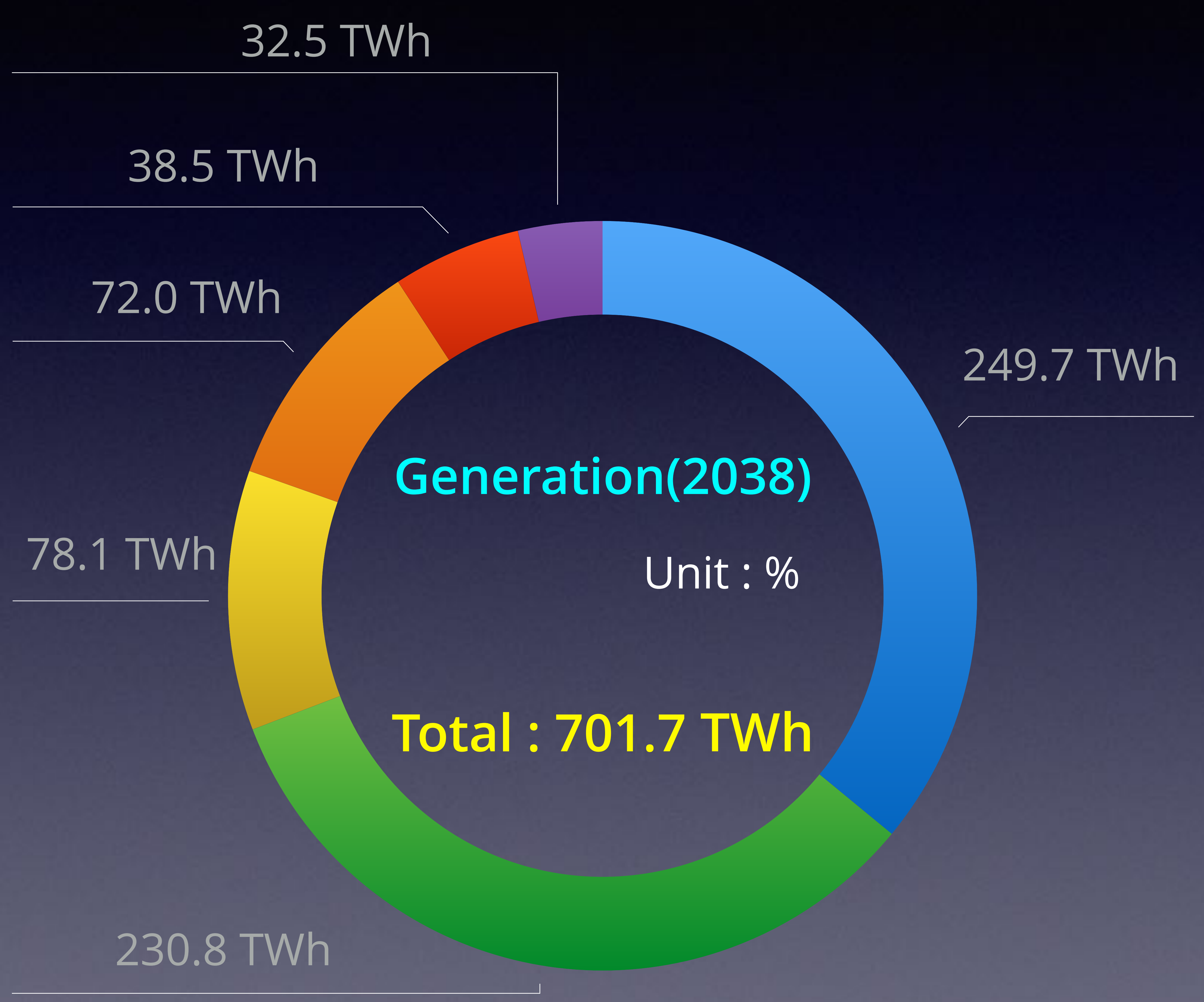
Risks of an Interdependency

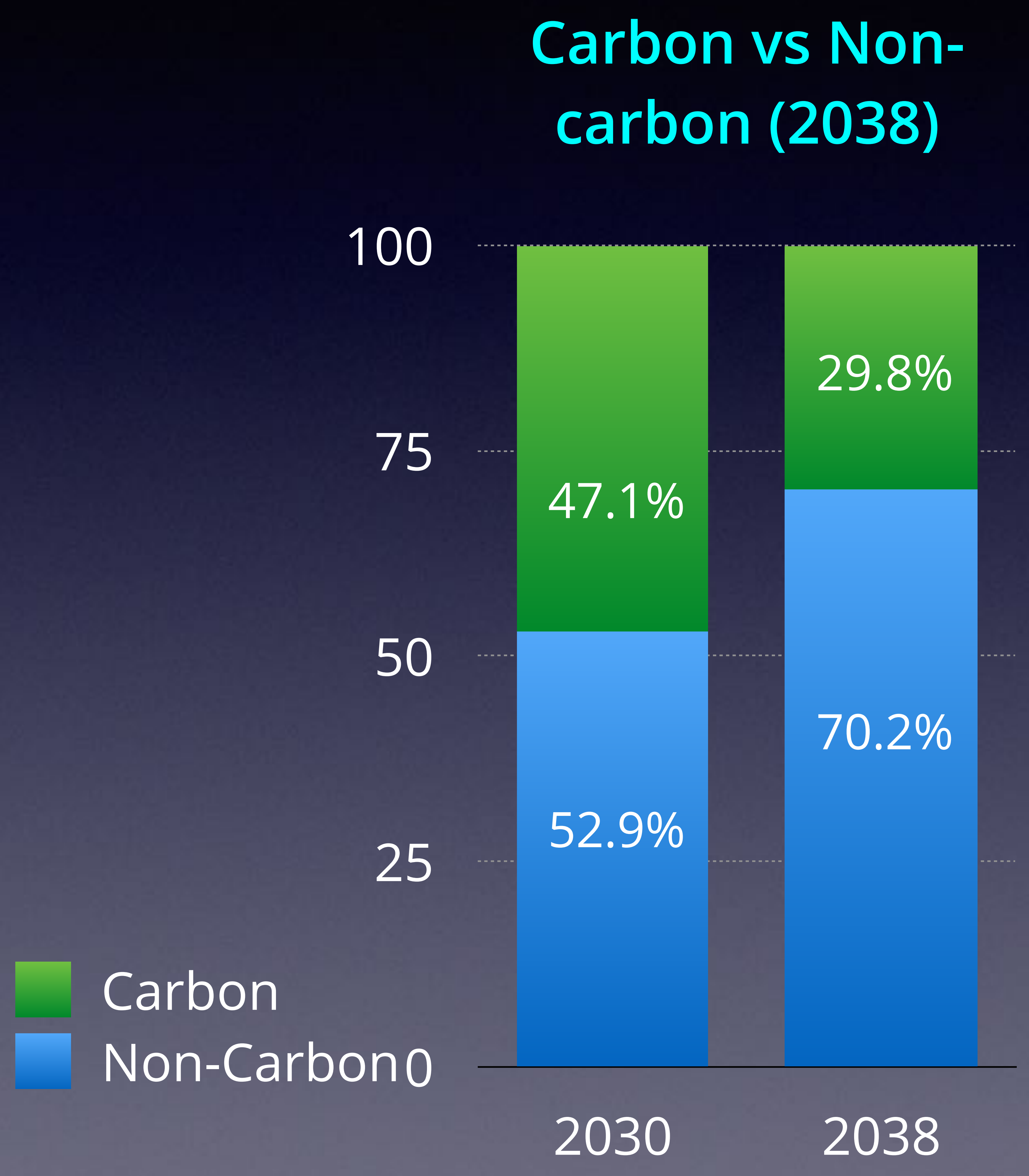
Risks of an interdependent society → the need for local resilience

SOURCE : ENCORED

ENERGY MARKET CHANGES

11th Electricity Supply & Demand Plan

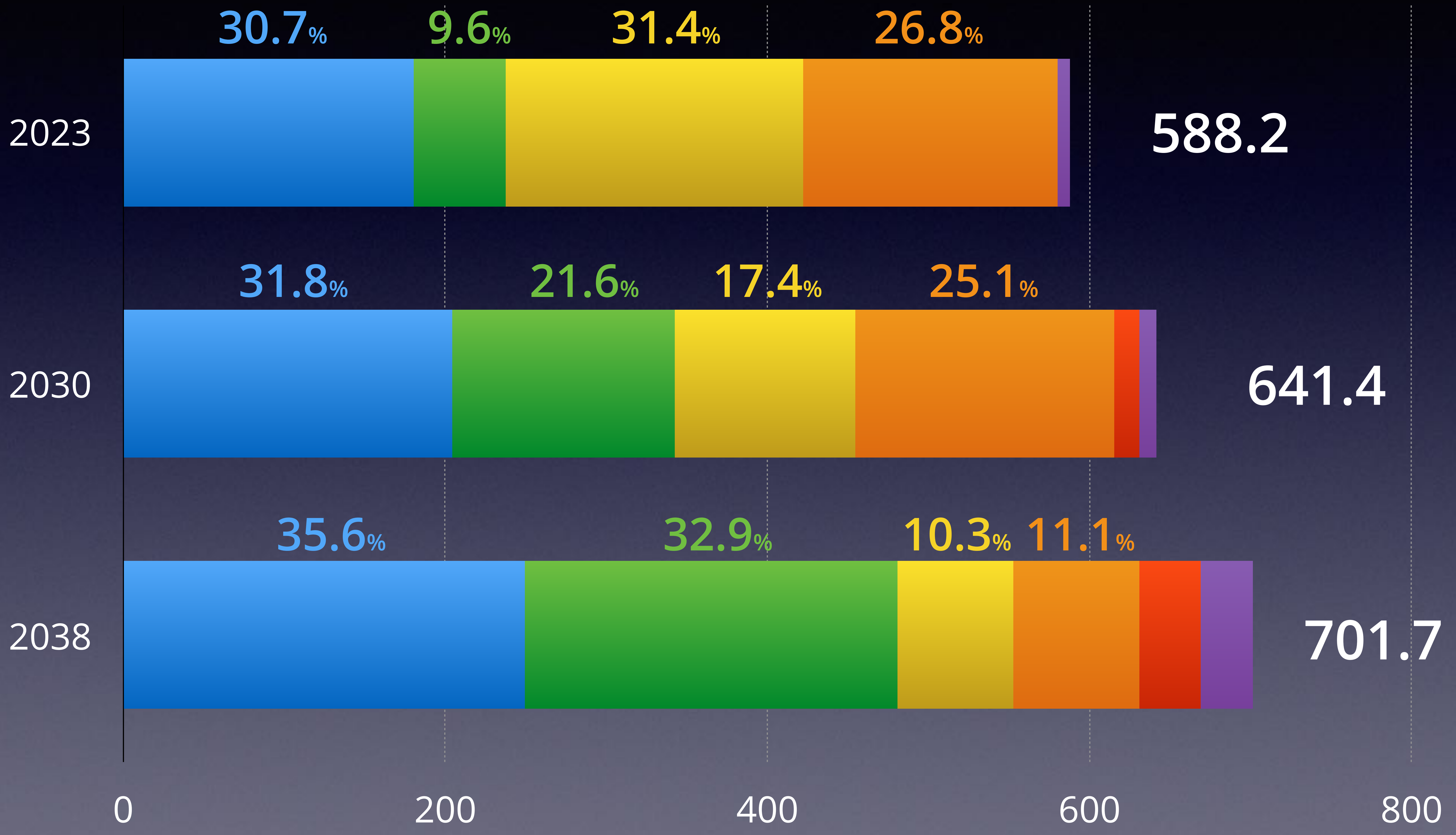




2024 05.31 ED

SOURCE : MOTIE

11th Electricity Supply & Demand Plan



Proposed Power Generation & Generation Mix for Achieving NDC Targets

Unit: %(By color). Based on Achievement, Values :Generation(TWh)

- Nuclear
- Renewables
- Coal
- LNG
- H2 / Ammonia
- Etc

2024 05.31 ED

SOURCE : MOTIE

From Centralized to Decentralized System

Korea has primarily built large-scale fossil fuel (500 MW) and nuclear (1 GW) power plants along coastal areas such as Chungnam, Gangwon, Gyeongbuk, Gyeongnam, and Jeollanam-do. The electricity generated from these plants is transmitted to concentrated demand areas via large transmission lines, resulting in a northward electricity flow to the Seoul metropolitan area. To address future demand, there is a need to shift to a decentralized energy system where production and consumption occur locally.

Comparison of Existing Energy Systems and Future Distributed Energy Systems

	Existing Korean Energy system	Future Distributed Energy System
Basic Direction	• Centralized large-scale generation	• Decentralized power generation focusing on small-scale power plants
	• Power generated remotely and consumed in metropolitan areas	• Energy production and consumption within local areas by themselves
Infrastructure (Grid)	• National grid with radial design	• Area-wide microgrids
	• One-directional power flow (Generation ⟶ T&D ⟶ Consumer)	• Bi-directional grid system based on prosumer-type power platforms
Power Trading	• Efficiency-driven power market based on scale	• Self-consumption and demand-driven transactions
	• Difficulties in dispatch of variable renewable energy	• Strengthened management of renewable energy through mechanisms such as real-time markets
Governance	• Centralized government-governed energy system	• Cooperative system between central and local governments + active participation of residents • Clear Definition and Cooperation of roles between TSO and DSO

2022.12.23 ED

SOURCE : MOTIE

Power Market Reform

- Spot electricity market reform schedule
  - Phase 1 (September 2022) : Contraints-based day-ahead market (already completed)
  - Phase 2 (October 2023) : Jeju pilot project (Real-time & reserve market + renewable bidding system)
  - Phase 3 (October 2025) : Expand to nationwide (Real-time & reserve market + renewable bidding system)

PHASE 1 ('22.9)		PHASE 2 (end of '23)		Phase 3 (end of '25)	
Jeju	Nationwide	Jeju	Nationwide	Jeju	Nationwide
Day-ahead market based on actual system		Day-ahead market based on actual system		Day-ahead market based on actual system	
		RT/AS Market		RT/AS Market	
		RE bidding		RE bidding	

- Day-ahead market based on actual system : Resolving the gap between real grid operation and the electricity market
- Real-time market + Reserve market : flexibility through market incentives
- Renewable energy bidding system : Inducing the conversion of renewable energy into base & emergency resource

RT : Real-time
RE : renewables
AS : Ancillary services

2022.12.23 ED

SOURCE : KPX, 2022

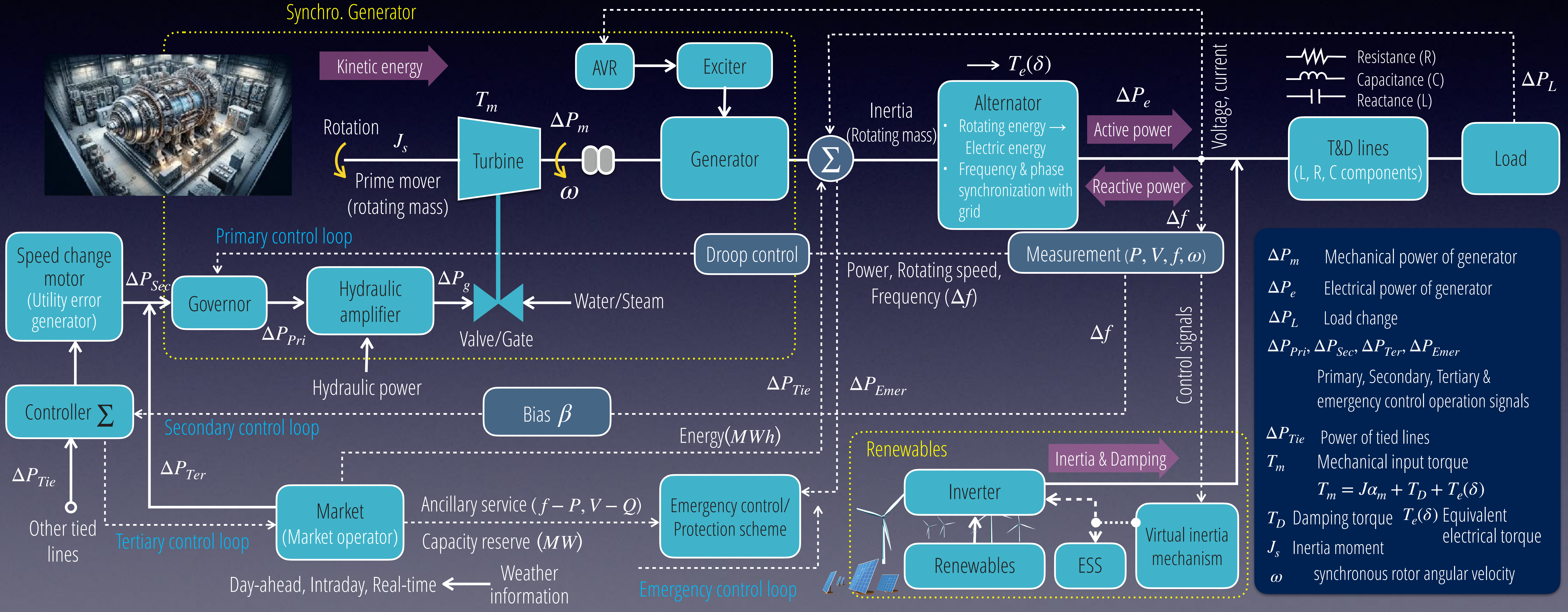
SOLVING PROBLEMS

ENCORED ENERGY AI

GRID SERVICES

From Generator to Load

Understanding how electricity is produced, how and why it is sold, and how traded resources are used.



2023.12.26 ED : Power System

SOURCE : ENCORED

New Operational Requirements

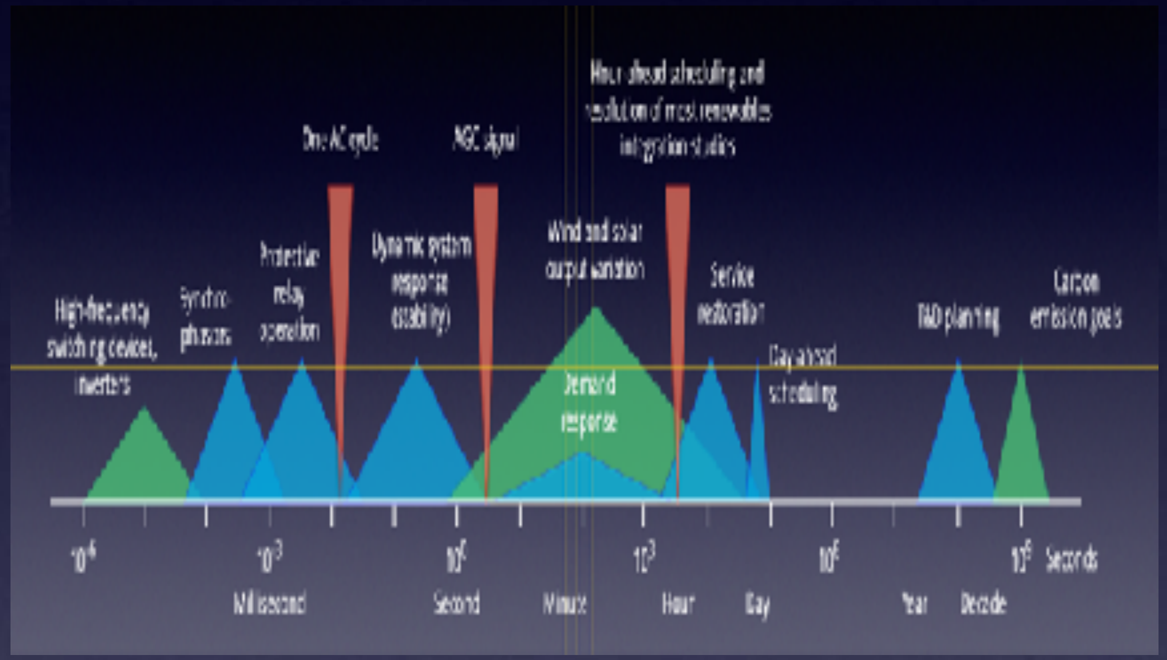
Short-term market must allow for greater adjustment in the hours before operation in order to function “efficiency and security.”

Controllability of distributed generation

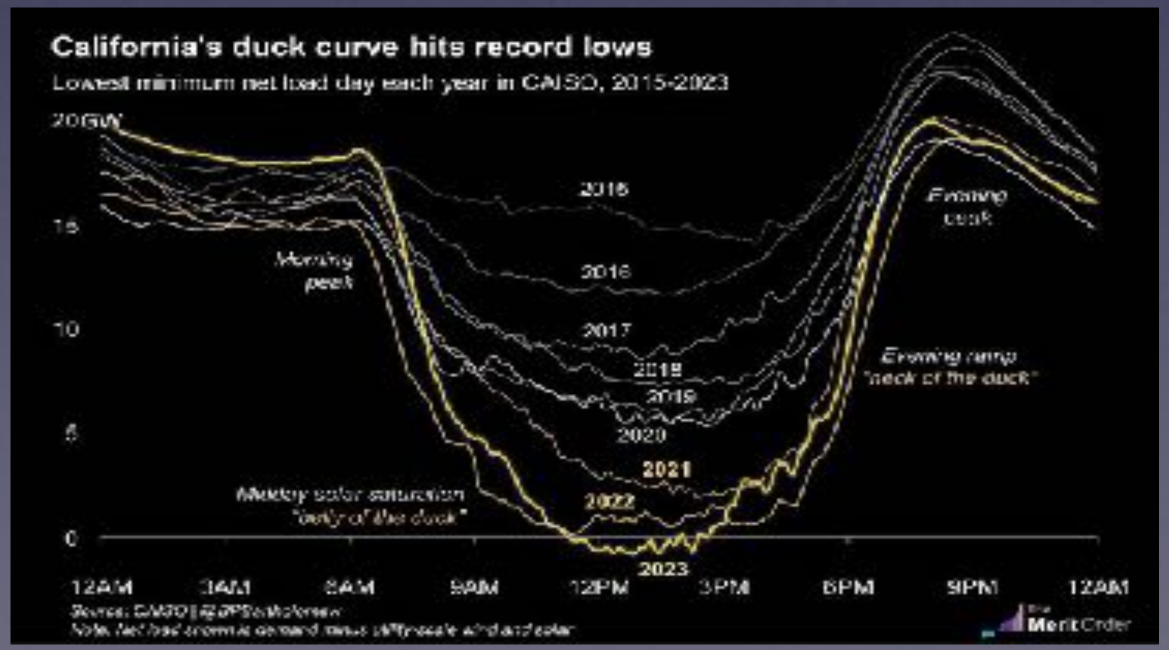
Availability of dispatchable generation : Firm Capacity

Over-generation : Curtailment

Short-term Adequacy



Fast Ramp-up Requirements



Network Congestion : TSO/DSO, interconnection

Predictability and Forecast errors : Reduction, Real-time

Other Technical challenges

- Inertia/Frequency Control ($f - P$)
- Voltage & Reactive power control ($V - Q$)
- Droop control
- Ride-through capability
- Black start & Grid forming

2023.05.06 ED

SOURCE : ENCORED

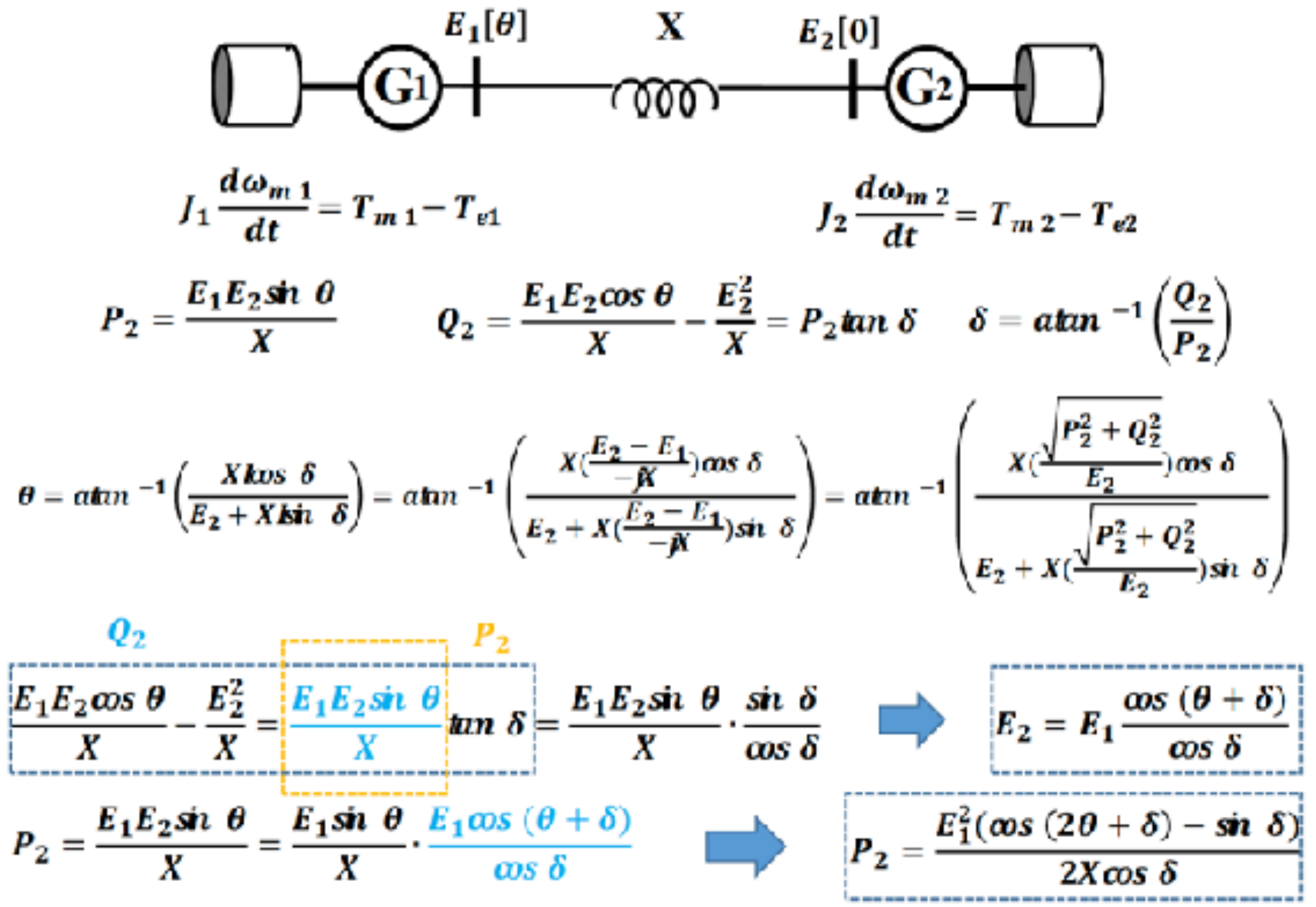
Grid control change by PE converter

Traditional Grid (AC)

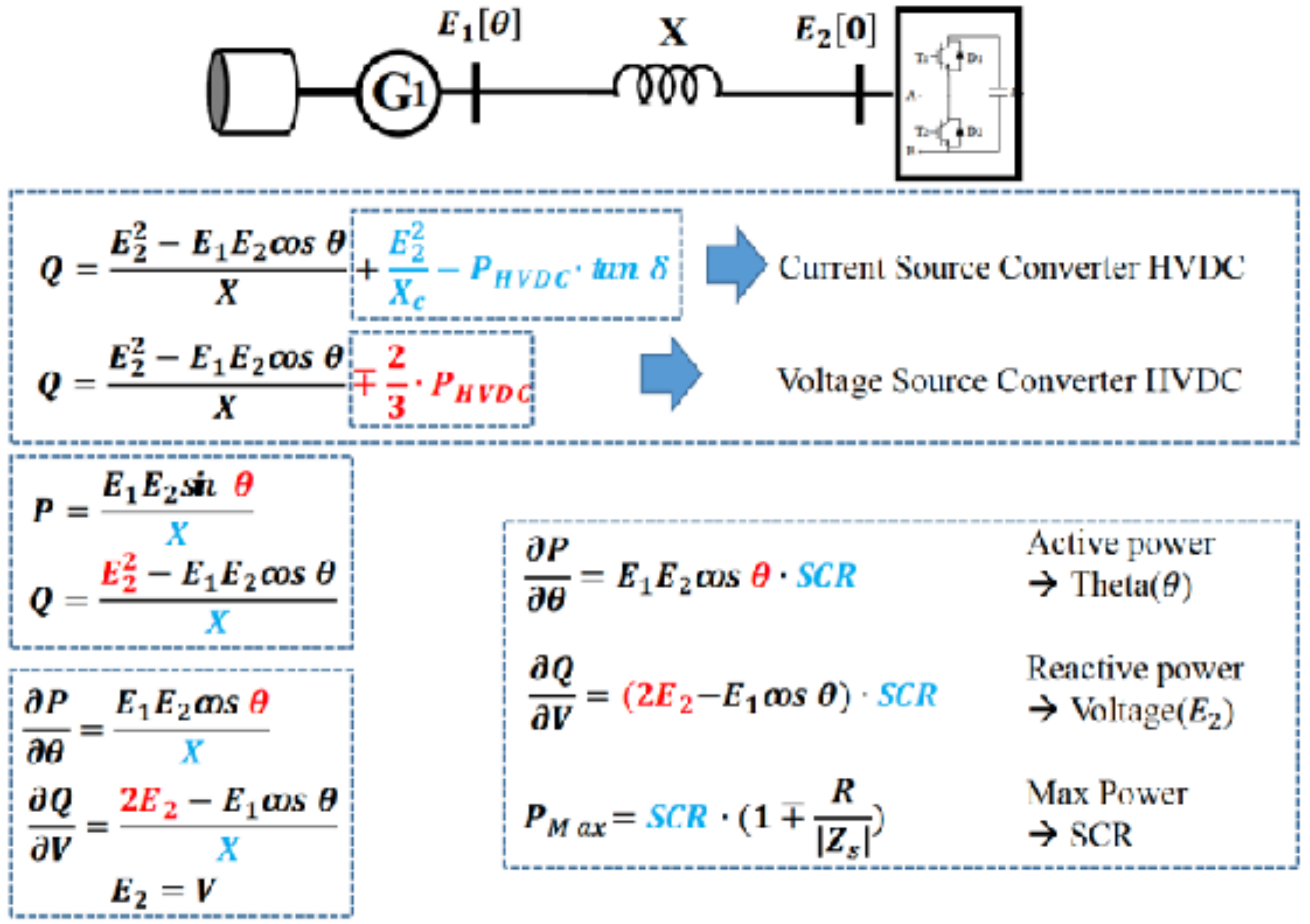
Voltage • Phase Angle • Load is Interdependent.

Power System with Power Electronics (DC)

Voltage • Phase (angle) • Inertia is controlled independently, so the controllability and stability are determined by the size of the converter.



Power System Stability in AC System

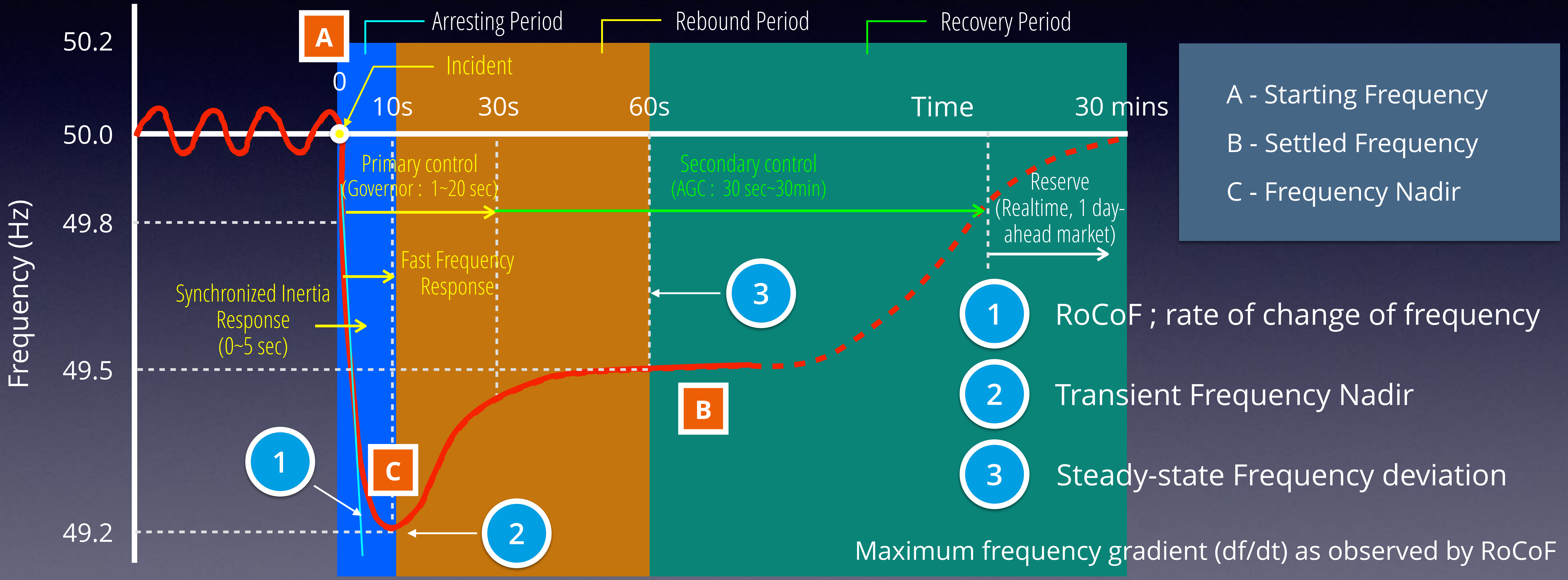


VSC HVDC Power System Stability

SOURCE : KEPRI

Frequency Control Process

“To maintain three frequency indices”



2022.02.10 ED

Virtual Inertia Synthesis with ESS

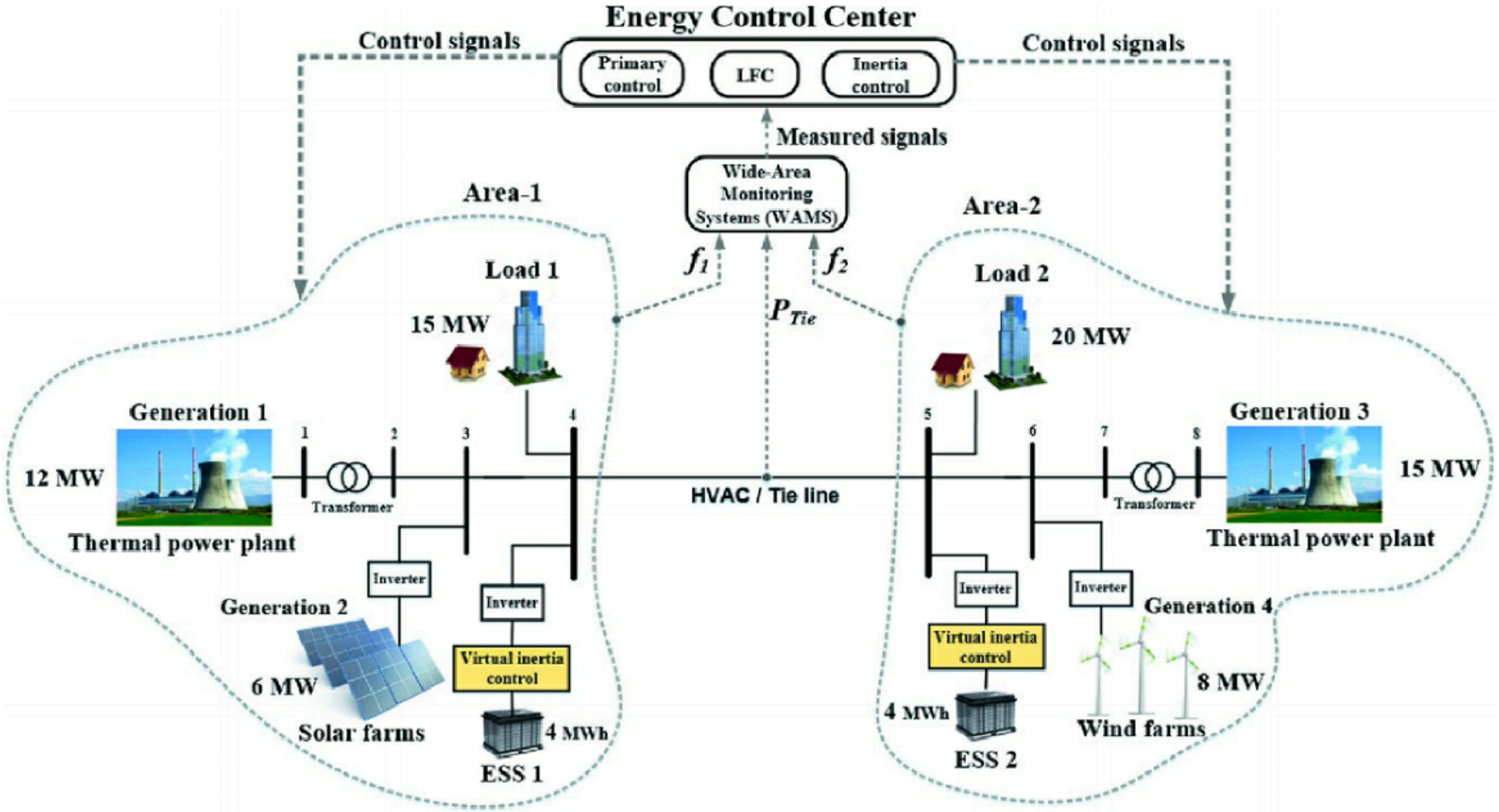


Fig. 4.1 Schematic structure of the interconnected system with virtual inertia control units

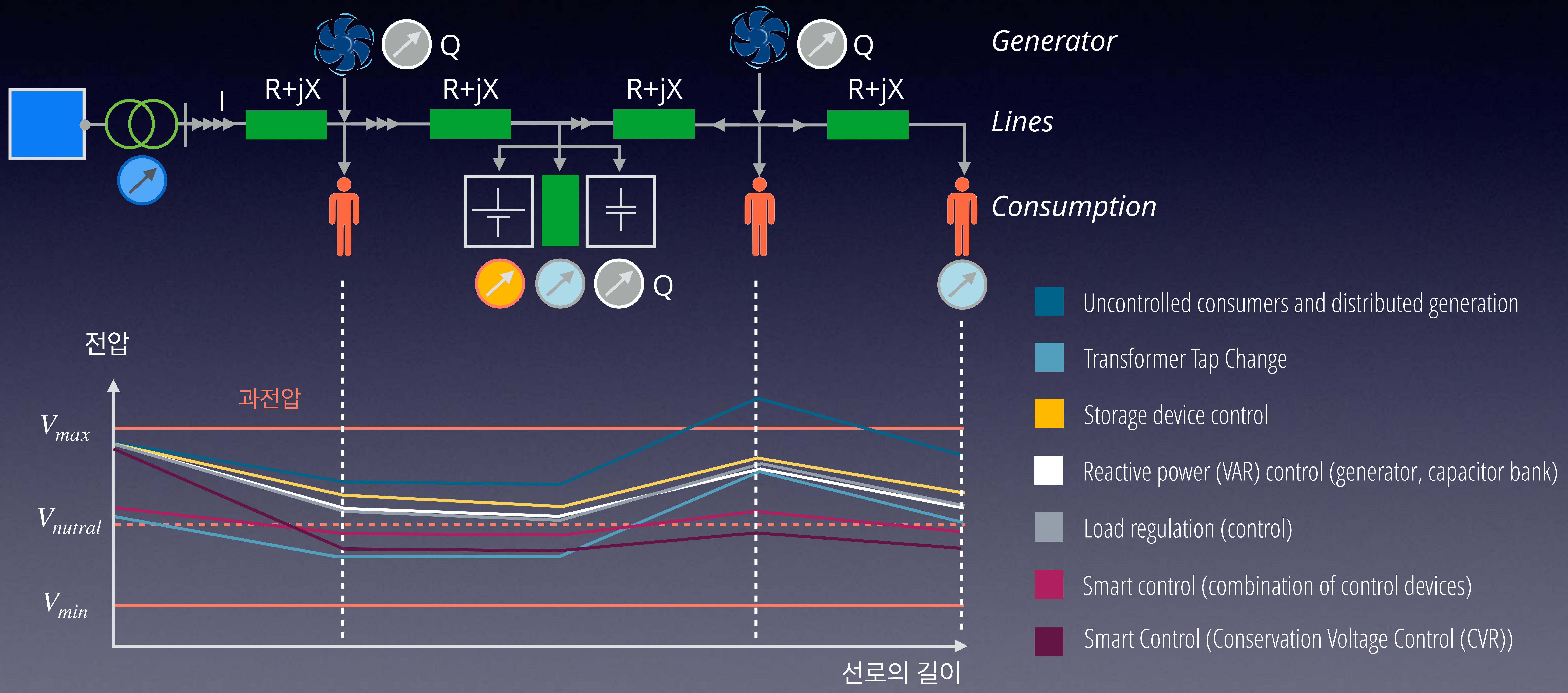
2023.10.13 ED

SOURCE : Springer, 2021

Voltage Control ($V - Q$)

Over-voltage, Low voltage

Z = R + jX
Z : impedance,
R : resistance
X : reactance

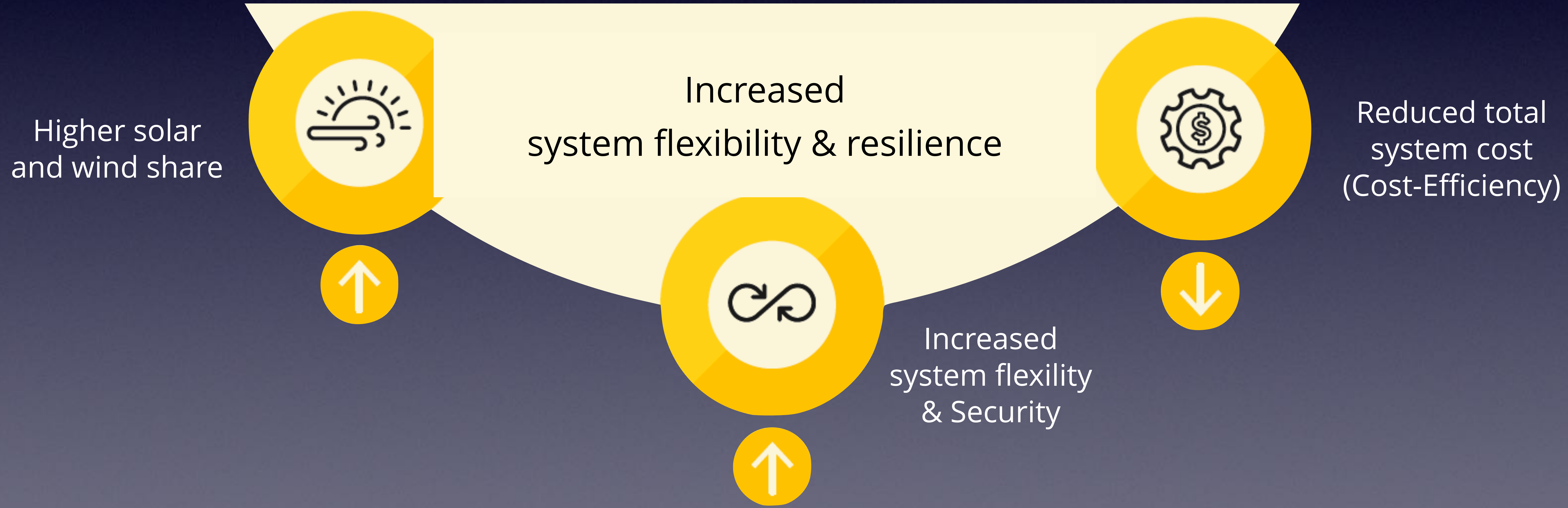


SOURCE : Accenture 2017

Solutions for A Renewable-powered future

Flexibility solutions result from combining innovations across the power sector :
Smart, Virtual, Optimize

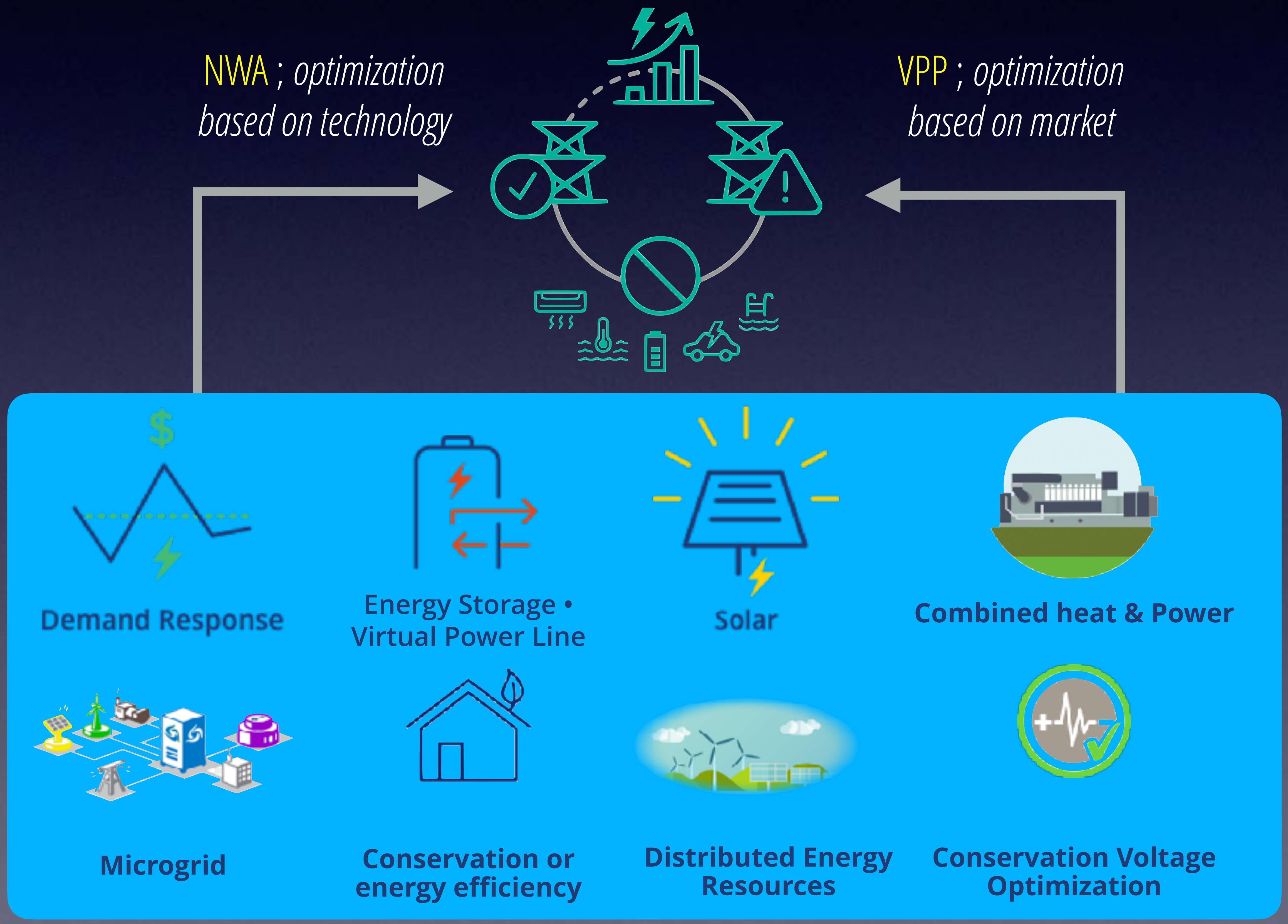
FLEXIBILITY SOLUTIONS : Controllable • Dispatchable + RESILLIENCY SOLUTION



SOURCE : IRENA, ENCORED

Non-wires alternative grid

NWA is the inclusive term for any electrical grid investment that is intended to defer or remove the need for traditional equipment upgrades or construction, or wires investment to T&D systems.



- NWA(Non-wires alternative), sometimes referred to as NWS(Non-wires solution)
- These NWA investments are required to be cost-effective compared to the traditional wires investment and are required to meet the specified electrical grid need.
- The fundamental pillars of NWA : Safety, Reliability, Customer experience, and Affordability
- An NWA can include any action, strategy, program, or technology that meets this definition and these requirements.
- Some technologies and methodologies include demand response, solar, energy storage, combined heat and power (CHP), microgrid, conservation or energy efficiency measure, conservation voltage optimization, and other distributed energy resources (DERs).
- NWA projects can include these investments individually or in combination to meet the specified need in a cost-effective manner.
- NWA provides the grid reliability that are comparable to those provided transmission lines and related equipment at a lower cost and with significantly more flexibility

2021.08.30 ED

SOURCE : SEPA, ENCORED

ENERGY AI

MARKET DESIGN

Renewable Energy into the Power Market

Renewable Energy
(By 20 Mega Unit)

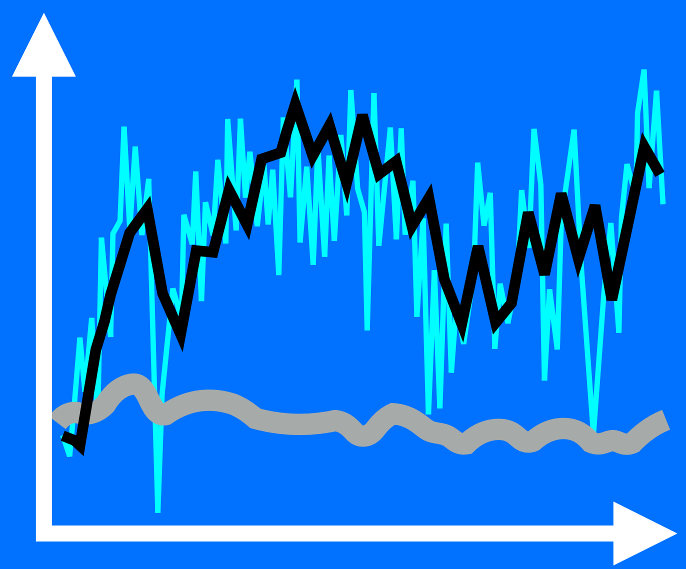
\+ i-DERMS =

Central Power Generator
(Base Generation)

Visibility

- Realtime Data Monitoring
- Forecast the Renewable Generation
- Correction of prediction through ancillary resources
- Mitigate the risks of long-/short-term contracts

Responsibility



- Curtailment
- Realtime output adjustment
- Positive/Reverse Demand Response

2022.03.22 ED

SOURCE : ENCORED

Delivery of Flexibility

Need adequate resources that can respond to the system with real-time on-demand (controllable, dispatchable, balancing, ramp up/down))

Rapid Increasing penetration of DERs to grid → System Vulnerability by intermittency/ Variability (Complexity, Inaccurate forecast) → Unable to response with existing rigid resources → Flexible resources in the wholesale market (bid)

Legacy bulky generation →

- 24/7/365 of operation to secure ROI (OPEX, CAPEX)
- Construction by 10 years long-term balancing plan

- Energy (short-term)
- Capacity (long-term)
- Ancillary services

2022.07.09 ED

Transactive Resources in Market

Entities can participate through market products and reliability services in day-ahead

Energy

- ✓ Physical supply and demand
- ✓ Virtual supply and demand

Financial

- ✓ Congestion Revenue Rights (CRR, FTR)
- ✓ Inter-SC trades

Reliability

- ✓ Ancillary services : Instantaneous Contingency reserve
- ✓ Residual unit commitment

A full day's operations are covered by two markets :

Day-ahead market + Real-time market

SOURCE : CAISO, 2022

Commodities in Power Market

Benefits of market integration of distributed energy resources

Distributed energy resources (DER) participation in

Wholesale electricity markets
- Day-ahead market
- Intraday market

Ancillary service markets
- Reserves provided to TSO
- Services provided to DSO

Capacity markets
- Firm capacity

Benefits

Power system benefits

- Demand-side management through load shifting & peak shaving
- Provide flexibility to operate the system (primary and secondary reserves)
- Provide voltage control to stabilize the grid
- Provide flexibility for managing network congestion
- Improved generation capacity planning

DER owner benefits

- Short-term revenue streams
- Short- to mid-term revenue streams
- Increased deployment of DERs with available revenues

Integrated DER in the grid and increased flexibility in the power system

2021.09.21 ED

SOURCE : IRENA

Changes in Market System

Background of Renewable energy bidding : To solve the problems caused by DER's penetration

- As the variable renewable energy increases, forecasting errors and volatility of supply are expanding.
- As the forecasting errors and volatility are expanding, the costs of the constrained non-generation are increasing.
- Through REC and prediction incentives, etc., finally we can solve them in the form of centralized & aggregated dispatch resources.

Participation in the electricity market of aggregated DERs

Non-centralized RE + ESS (2015 ~) → **Predictive aggregated DERs (2021~2025)** → **Dispatchable aggregated DERs (2023 ~)**

Non-centralized RE + ESS (2015 ~)

- Composition : Renewable energy + ESS
- Settlement : SMP + REC
- Participation restrictions : None
- REC weight by time

Predictive aggregated DERs (2021~2025)

- Composition : Renewable Energy + ESS
- Settlement : SMP + REC + Predicted Settlement
- Participation restriction : Over 20 MW of aggregated capacity
- Registration condition : passing prediction accuracy test (error less than 10%)

Dispatchable aggregated DERs (2023 ~)

- Composition : Renewable Energy + ESS
- Settlement
  - Energy (double-settlement)
  - Additional settlement
  - Ancillary service
  - Capacity
  - Imbalance penalty
  - REC
- Participation restriction : Over 1 MW of aggregated capacity
- Capability condition
  - Remote curtailment, urgent load shedding
  - Output upper limit adjustment, ramping control

Through gradual reform of the market system, the efficiency of the market is being improved. As a result, the constraints, requirements and settlement for market participation are becoming increasingly complex.

SOURCE : ENCORED

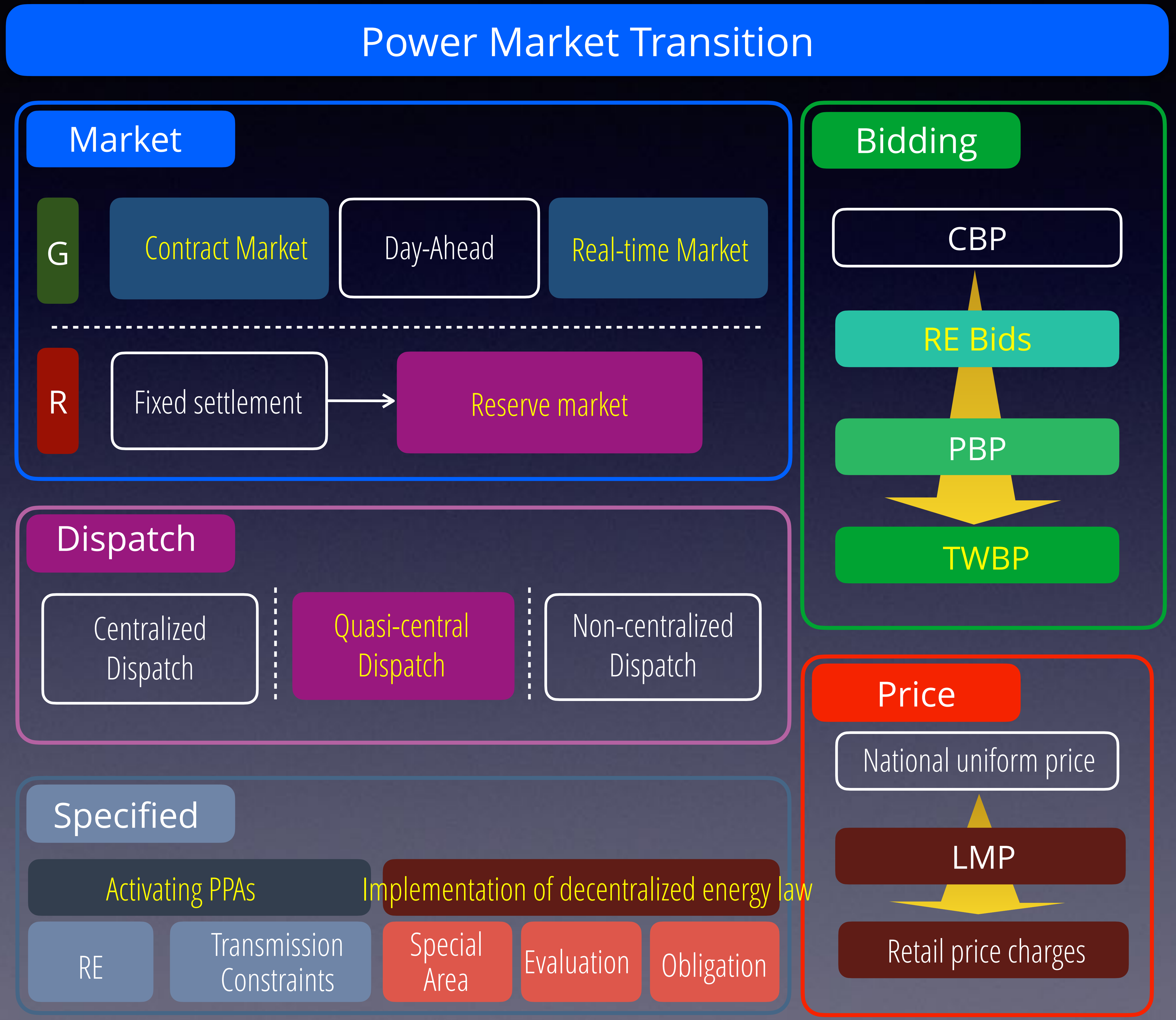
Korean Power Market Design

VISION — A sustainable power market that resolves power industry issues through market principles

Promotion Strategy

- Establish a compensation structure that reflects contributions and responsibilities in the power market system
- Strengthen market competition from the construction stage to real-time operations.
- Minimize intervention by market authorities, except in exceptional circumstances.

Price Competition based on Flexibility	Efficient Regional Distribution	Medium-Term Supply Stability
• Real-time and reserve markets • Transition from central to distributed resources • Price cap-based bidding (PBP)	• Regional and Locational signals • Activating distributed energy • Strategic PPAs	• Long-term contracts (VC, CfD) • Capacity market • Fostering and utilizing aggregated resources



2024.05.31 ED : 시장제도설계(한국시장)

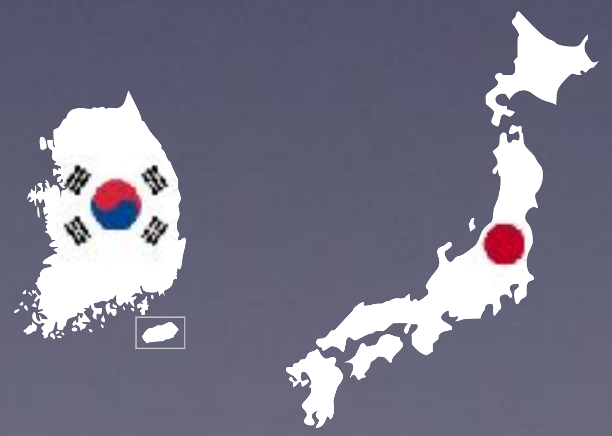
SOURCE : MOTIE

SOLUTIONS

Strategy of Portfolio

Aggregation(fleet) / DERMS

- DERs
  - Solar PV, Wind, Small Hydro
  - ESS, EVSE, Fuel cell(H_2)
- Flexible demand resources
  - C&I, Residential Demand Response



Microgrid / MG Controller

- MaaS (MG-as-a-service)
- Hybrid Microgrid
  - On-grid, Off-grid
  - Combination with ESS & Natural gas
- Community Microgrid
  - CCA programs

Transaction / VPP

- Transactive Energy
  - EaaS
- Commercial VPP
  - Arbitrage : Energy, Capacity
  - PPA
- Technical VPP
  - Grid Services
  - Ancillary Services
  - f, Q, Spinning, Inertia

2024.03.07 ED

SOURCE : ENCORED

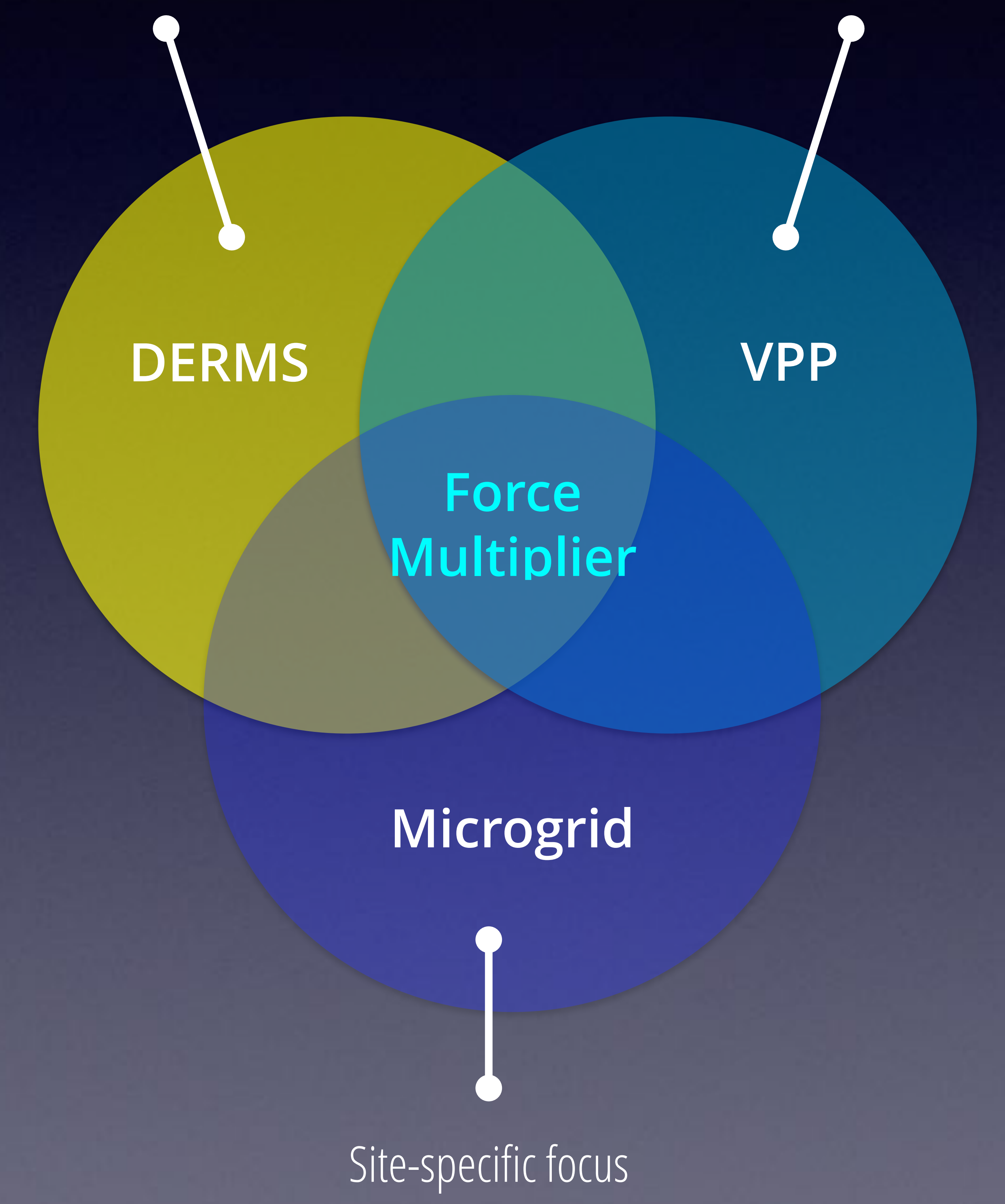
Value Stream

	Aggregation	Fleet	Transactive Energy	Services
Resources	DERs • Supply • Storage • Demand	Flexible DERs Microgrids	Energy (MWh) Capacity (MW) P-f, V-Q, Reserve, Inertia	
Products	RTU Edge Computer	DERMS MaaS A.I Engine	VPP • CVPP → • TVPP → EaaS, PPA	 Arbitrage Grid Service
Values	economies of scale	Forecast Optimize	Flexibility & Stability(Reliability), Resilience & Security, Revenue(Profit, Net surplus)	

2024.03.17 ED

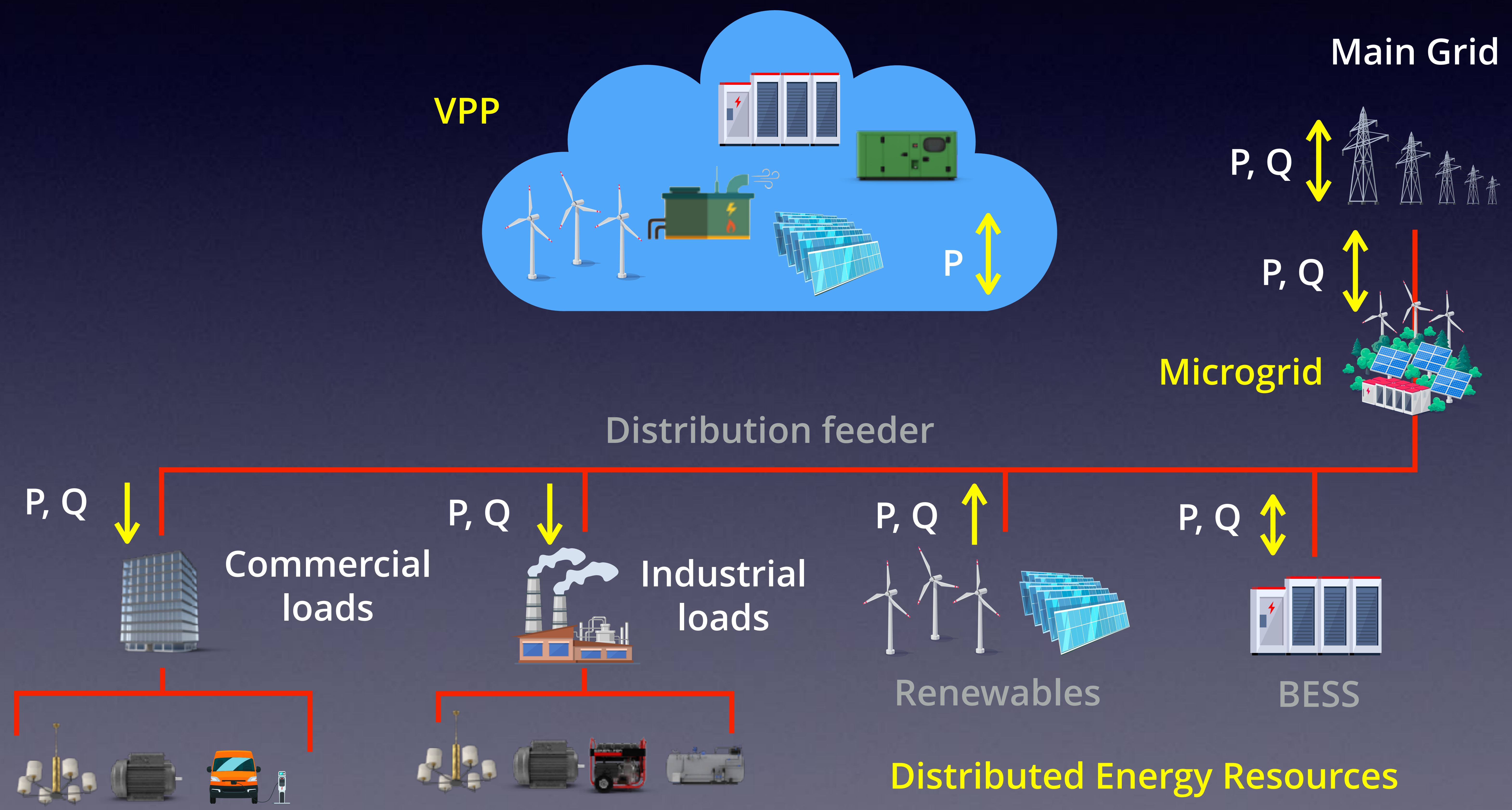
SOURCE : ENCORED

Convergence on Digital Platforms : TEM



Force Multiplier by the Connectivity : Increase resilience through energy decentralization, and maximize reliability by connecting these DERs

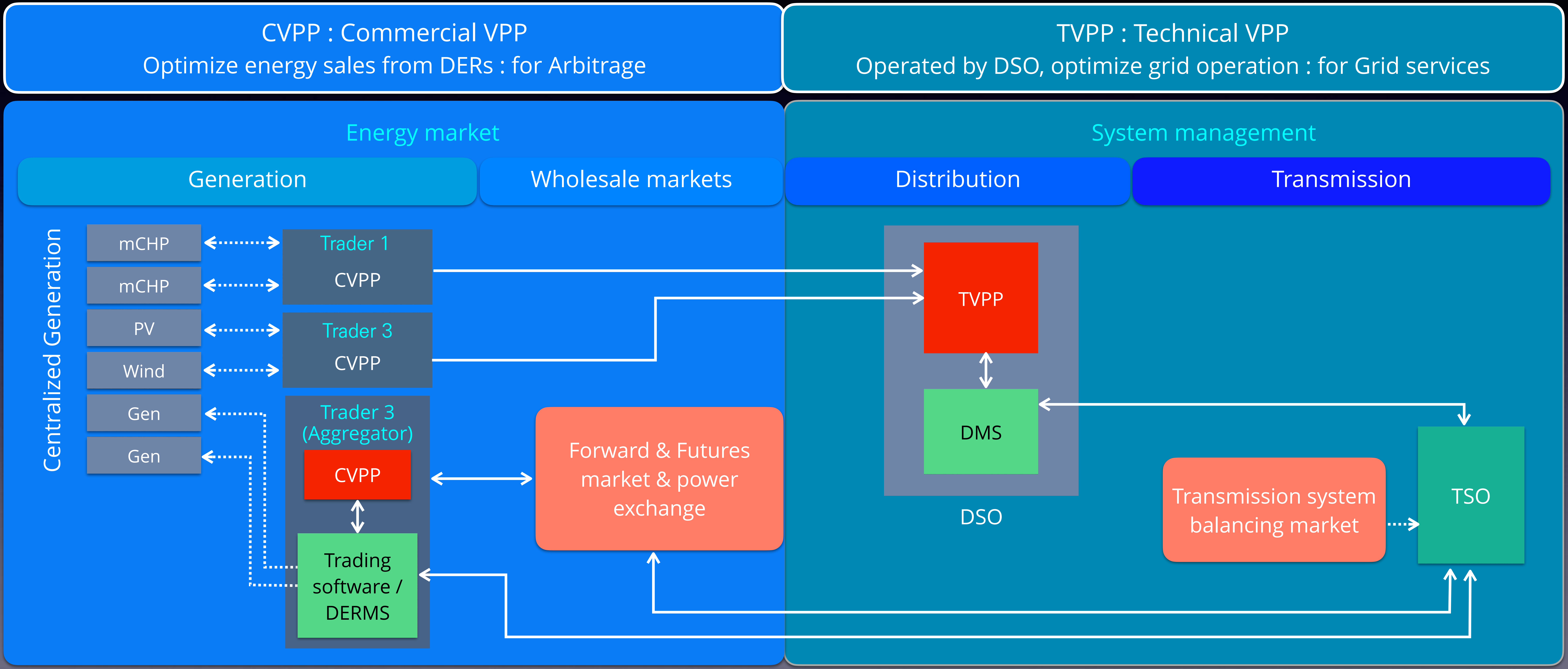
(TEM : Transactive Energy Management)



2023.01.15 ED

SOURCE : Guidehouse Insights, ABB, ENCORED

Two kinds of VPP



2022.03.22 ED

SOURCE : ENCORED

DER & Demand Forecast

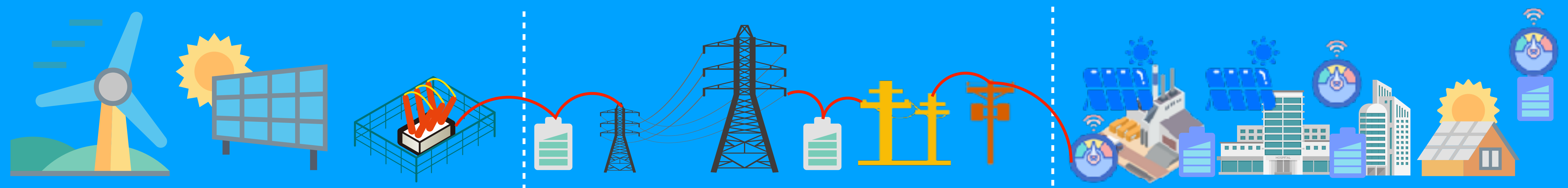
Generation, ESS charge/discharge, Demand forecast

iDERMS

Realtime data and AI potential are being unlocked by the generation of big data and increased processing power.

In the energy sector, Energy AI can enable fast and intelligent decision making, leading to increased grid flexibility and integration of VRE.

Energy AI for Distributed energy resources



Renewable energy generation forecast	Grid stability and reliability	Demand forecast / Demand-side management

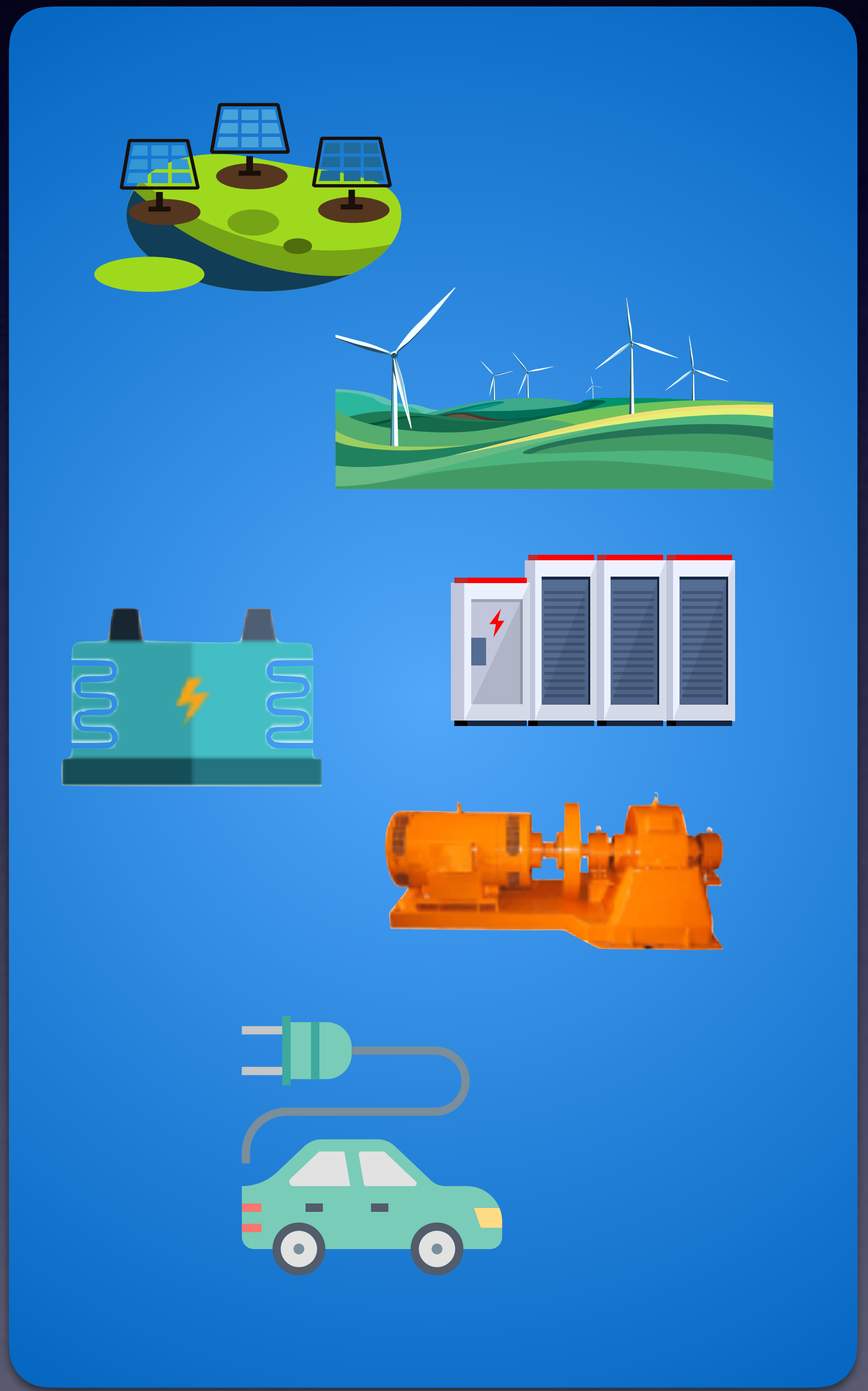
Optimized energy storage operation

Optimized market design and operation

2021.09.18 ED

SOURCE : ENCORED

Energy AI



Aggregated Resources
(Renewables)

Virtual Fleets
(Convergence)

Physical Resources
(Microgrids)

Energy A.I

- Forecast : Weather, Demand, Generation, Power Flow, Price(SMP, LMP)
- Optimization (Dispatch, Revenues)

Energy Market

Physical Bid, Convergence Bid

F, P, Q, V, i

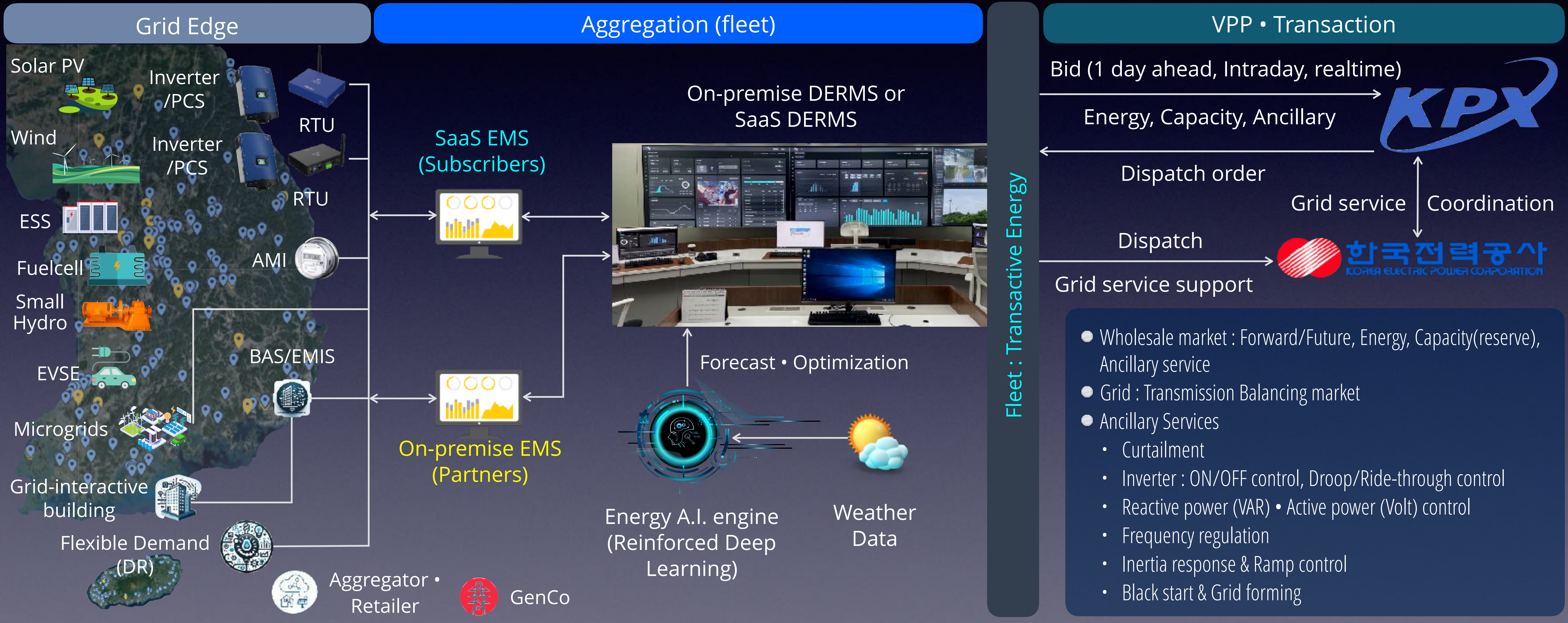
Grid Services for
Stability & Regulation

2024.07.22 ED

SOURCE : ENCORED

PRODUCTS : DERMS & VPP Platform

Integrated Energy Platform based on A.I : DERMS(Aggregation, Microgrids) + VPP(bidding, DR, grid services)

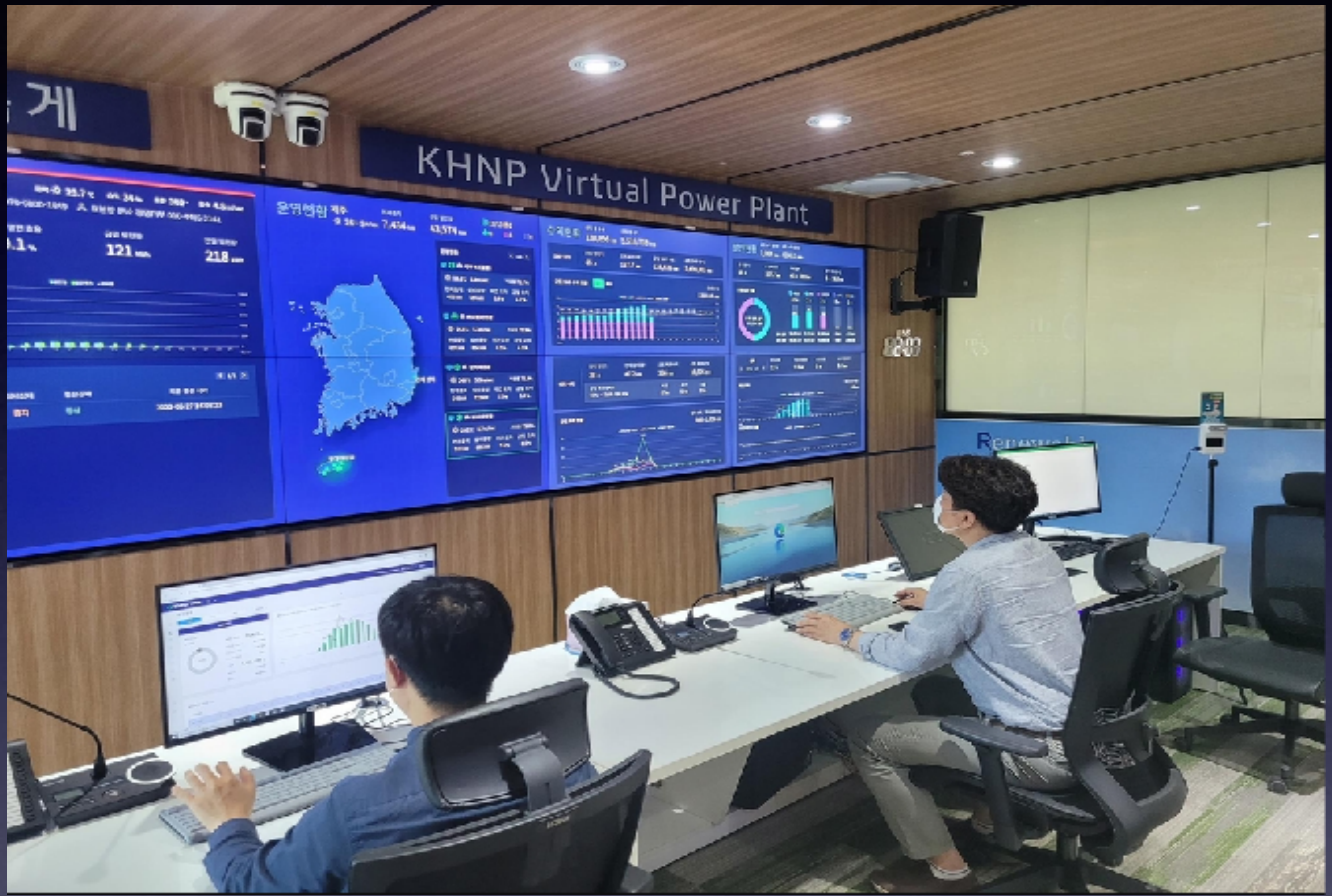


2024.07.22 ED

SOURCE : ENCORED

CASES & TRACK RECORDS

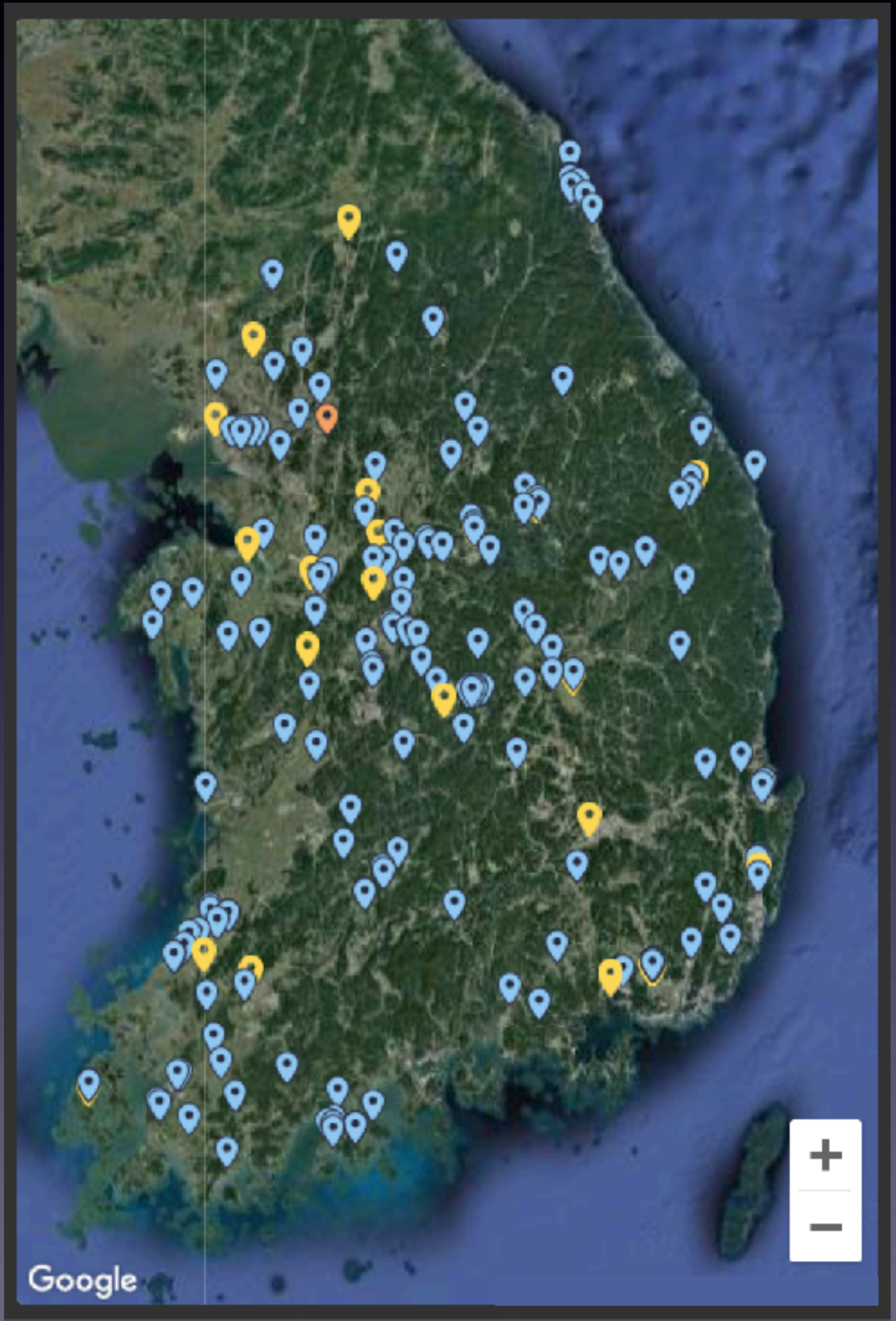
iDERMS VPP Control Centers



2021.08.16 ED

SOURCE : ENCORED

Track : Connectivity of i-DERMS in Korea



Renewable generation
over 1 MW capacity (2021.8)

SOURCE : ENCORED

Track : MAIN CUSTOMERS

한국수력원자력(주)
KOREA HYDRO & NUCLEAR POWER CO., LTD

한국동서발전(주)

wp
한국서부발전(주)

한국남부발전(주)
KOSPO

KOMIPO
한국중부발전

KPX

NELHA

LG Energy Solution

S-Power

DOOSAN
두산에너빌리티

HYOSUNG

Smart Energy / RE100 Platform

SK 에너지

kt

HYUNDAI ELECTRIC

GS 동해전력

SK ecoplant

SOURCE : ENCORED

Track : Microgrids (Hawaii, US)

- Coordination control
- Frequency control
- Black start
- Automatic synchronizing

PMS

i-DERMS Cloud

- Optimal generation planning (cost or CO2 emission)
- Monitoring distributed energy resources and analysis field data
- Peak monitoring and estimation
- Cost analysis

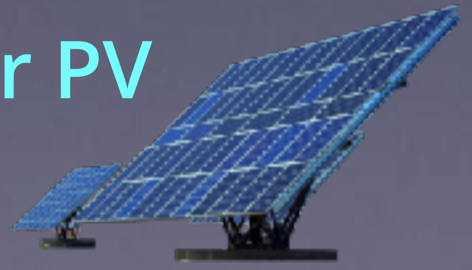
National Weather Service

- Big data collection / pre-processing / analysis
- Load and solar forecasting with deep reinforcement learning
- Optimal generation plan based on deep reinforcement learning

SaaS EMS

AI energy meter & Gateway

Solar PV



- 512 kW x 2 ea
- N-Type
- Bifacial module (+5 ~ 30%)

ESS

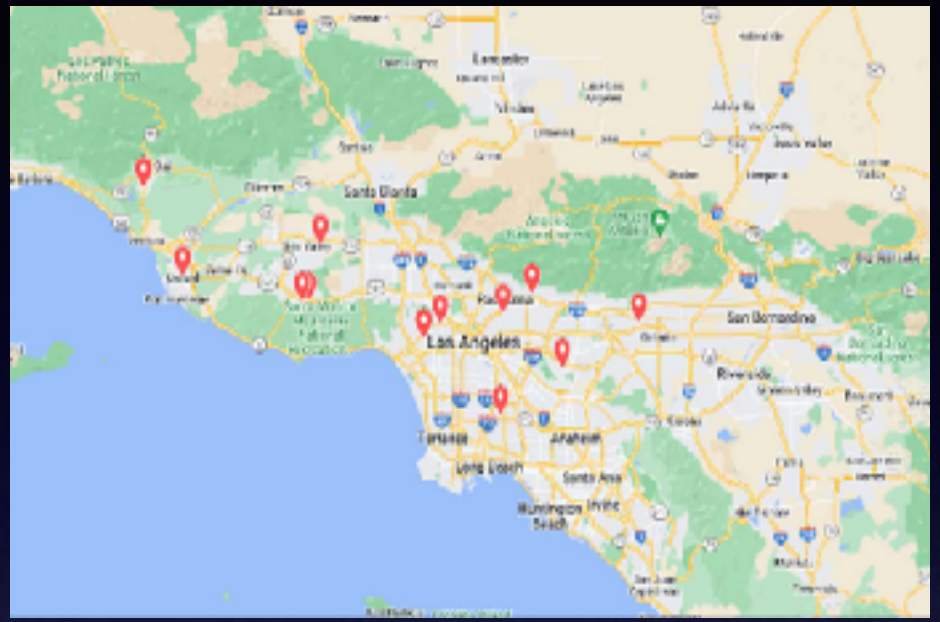
- 250 kW PCS
- 500 kWh Battery
- 98.7% efficiency

- Wireless connection
- Low power consumption
- Realtime data transmission

2024.07.22 ED

SOURCE : ENCORED

Track : 11 CCA Microgrids (Los Angelis, US)









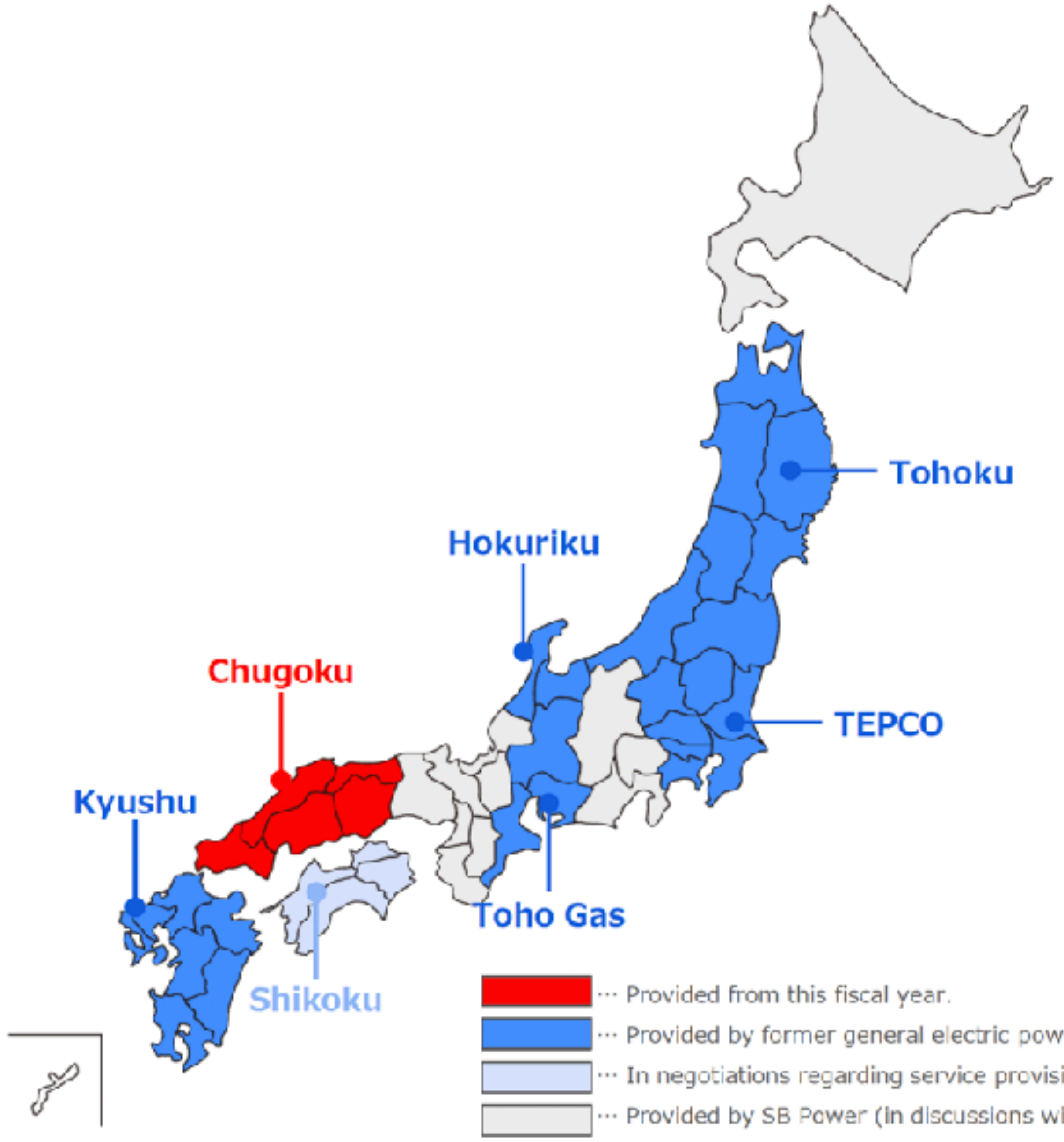



2024.07.22 ED

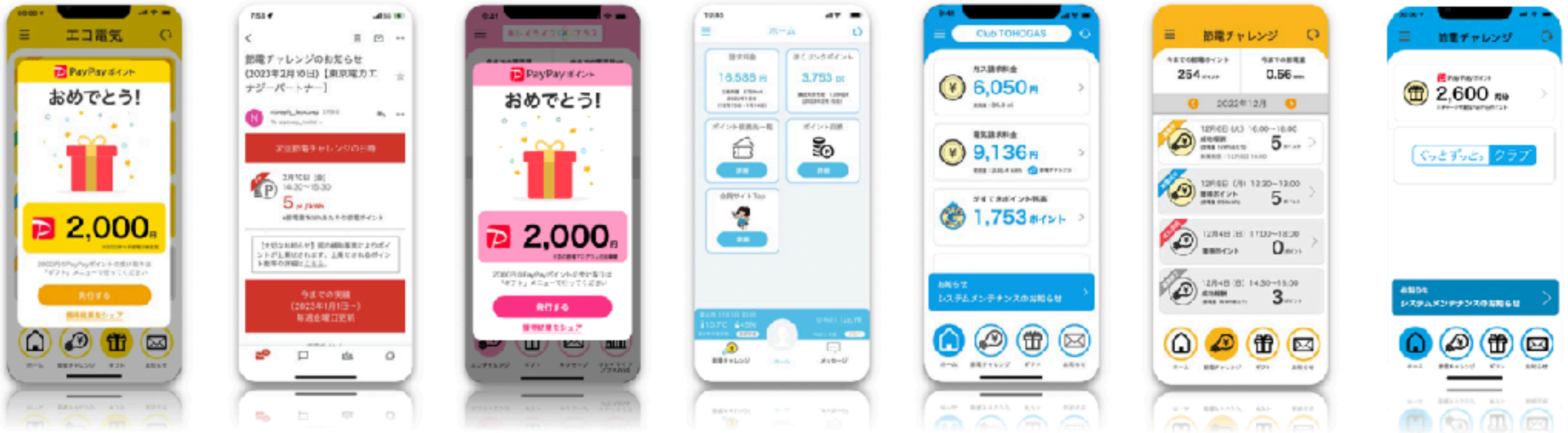
SOURCE : ENCORED

Track : Residential Demand Response

ENCORED Japan is currently in ongoing discussions with each company about further expansion and increasing the number of users.



SB Power	TEPCO	Kyushu	Hokuriku	Toho	Tohoku	Chugoku
			Official app	Official app	Official app (Planned)	Official app (Proposing)
1,210k (As of Jun. 2023)	1,150k (As of Apr. 2023)	270k (As of Jun. 2023)	240k (As of Jun. 2023)	190k (As of Jun. 2023)	170k (As of Jun. 2023)	60k (As of Jun. 2023)



2024.07.22 ED

SOURCE : ENCORED

No. 1 in Japanese household DR

Surpassed 1.88 million households (Jan. 2024) : No. 1 in household demand response in Japan
(FY24 Plan : 4.2 million households / Potential customers : 120 million households of SB Power)

STEP1
Push notification

STEP2
Participating

STEP3
Increasing DR Action

Actions during the day

Laundry (Washing machine)
Iron (Iron)
Cleaning (Vacuum cleaner)
Cooking (Oven·IH)
Remote work

Actions of resource holders

Electric water heater
Charging an EV
Charging a storage battery

STEP4
Checking result

STEP5
Earning incentives

2023.03.21 ED

SOURCE : ENCORED

Connecting People with Energy

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