



**KGID
2025**

**Green Growth:
The Path to
Sustainable Jobs**

Long-Term Distribution System Planning for Expanding Renewable Energy in Korea

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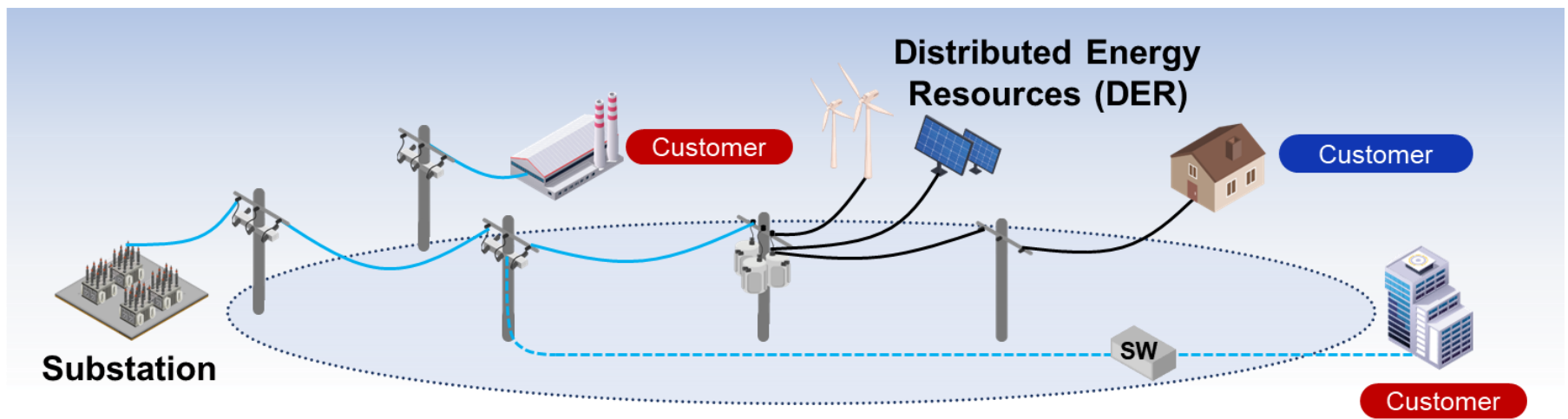
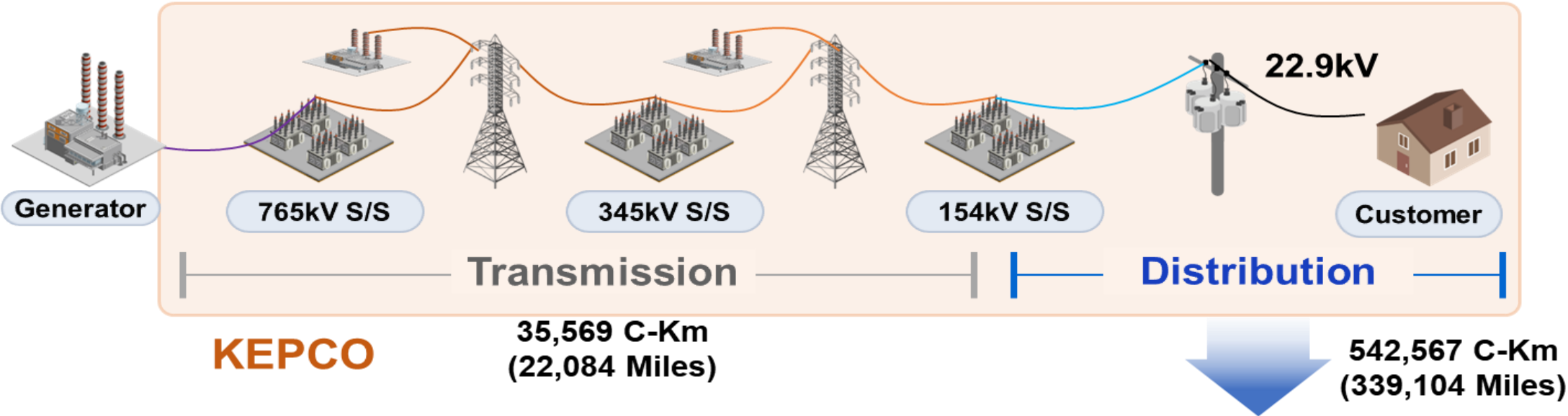
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1. Introduction of Power System in Korea

Value Chain

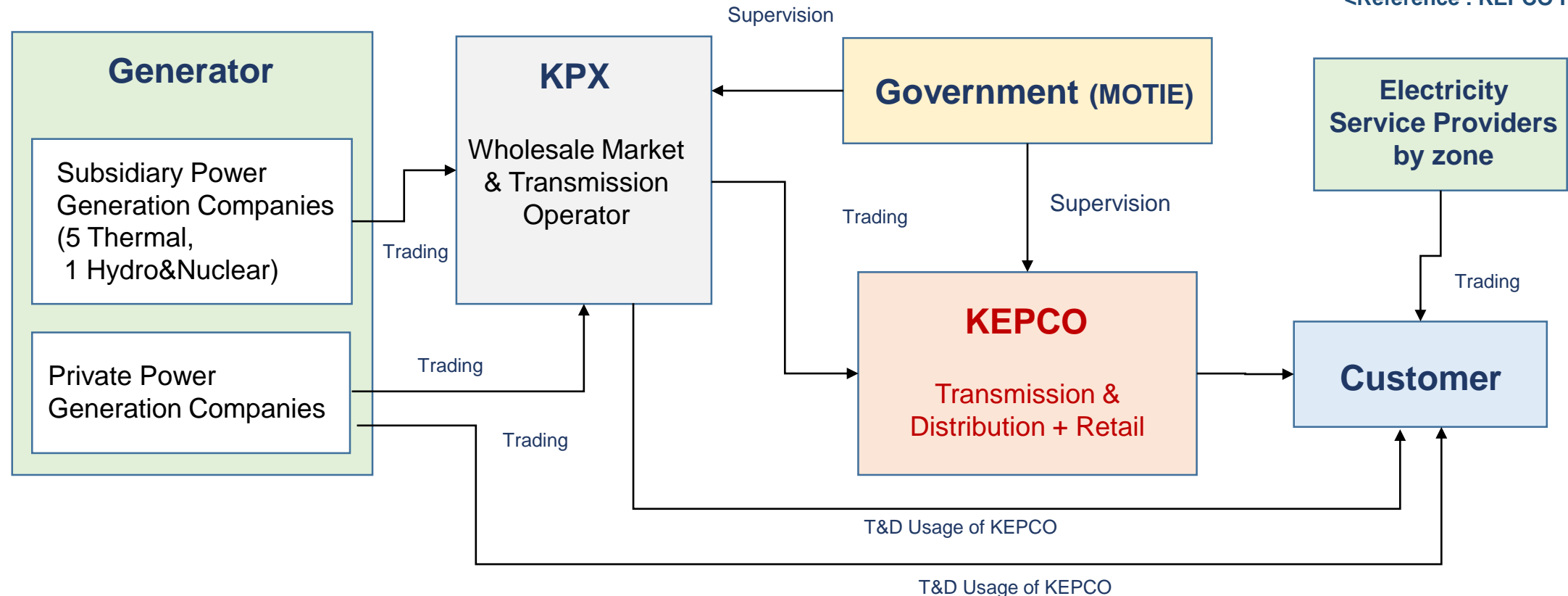
Generation – Transmission – Distribution - Retail



1. Introduction of Power System in Korea

Electricity Market(Wholesale, Retail) Structure

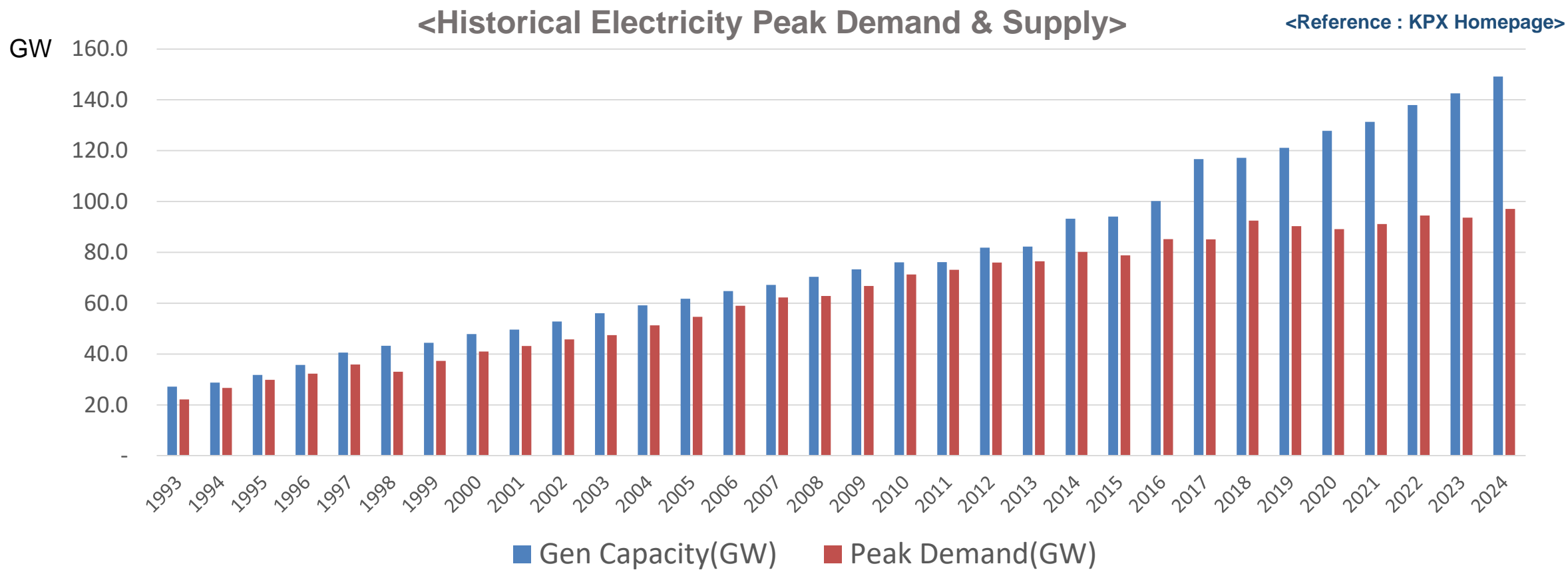
<Reference : KEPCO Homepage>



- ✓ **Wholesale Market : Mandatory, Cost-Based Pool** (Except for Jeju island)
- ✓ **Retail Market : Regulated and Monopoly** (Trading system is continuously evolving)

1. Introduction of Power System in Korea

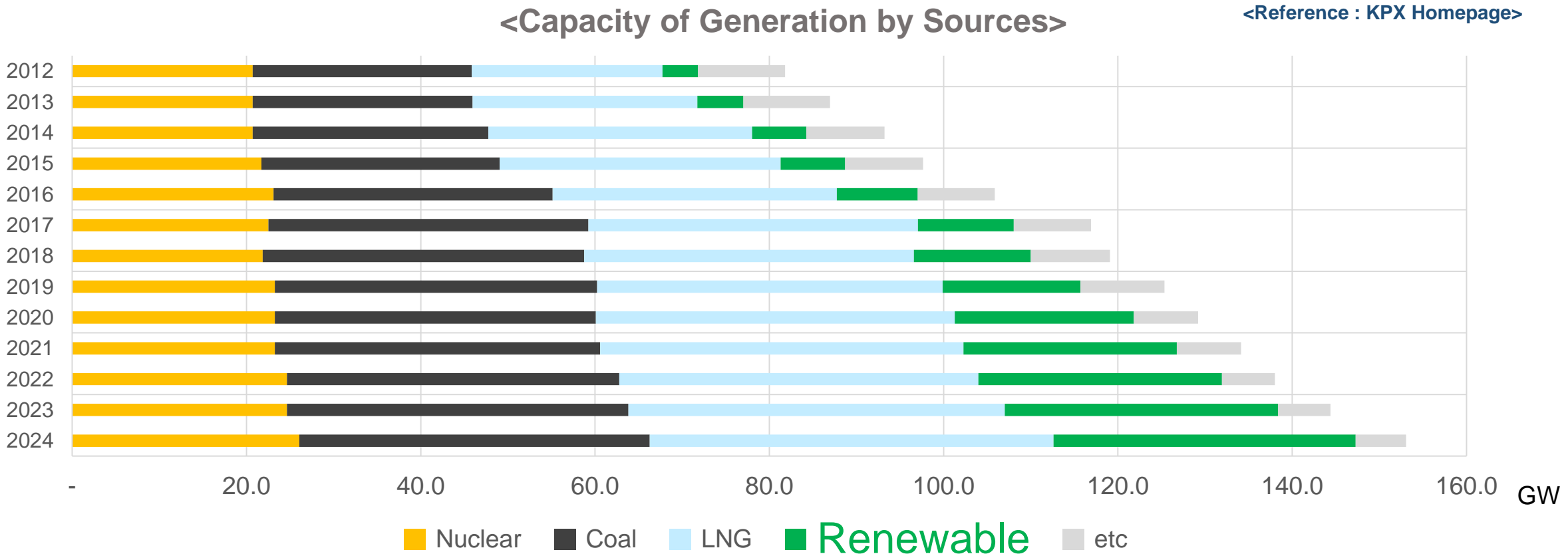
Demand and Supply in power system



- ✓ Capacity of generation is above 150GW, Peak Demand is about 97GW
- ✓ Compared to 30 years ago, Electricity demand has increased about 4~5times

1. Introduction of Power System in Korea

Demand and Supply in power system



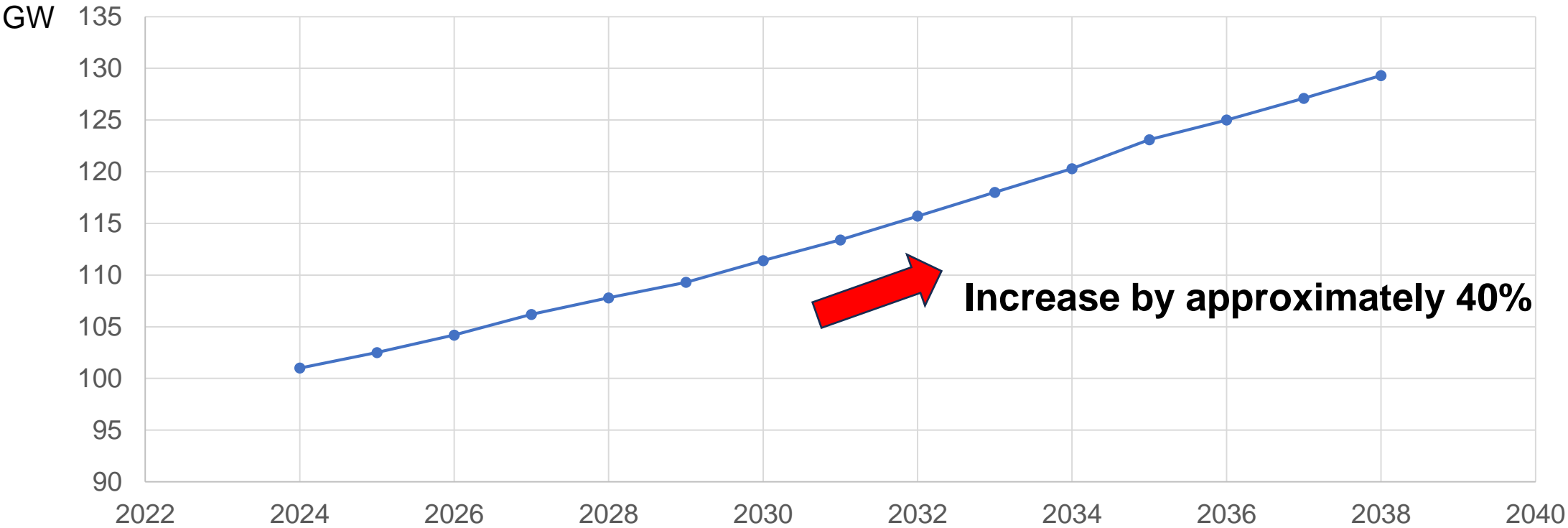
- ✓ Energy Mix(Capacity) : LNG(30.3%) > Coal(26.3%) > Renewable(22.7%)
- ✓ Compared to 10 years ago, Renewable Energy has increased about 8 times

2. Energy Policies of Government

| 11th Basic Plan of Long-Term Electricity Demand & Supply

- ✓ **The government formulates a 15-year Basic Power Supply Plan every two years**
- ✓ **Peak demand is expected to surge due to AI, Data Centers, Electrification.**

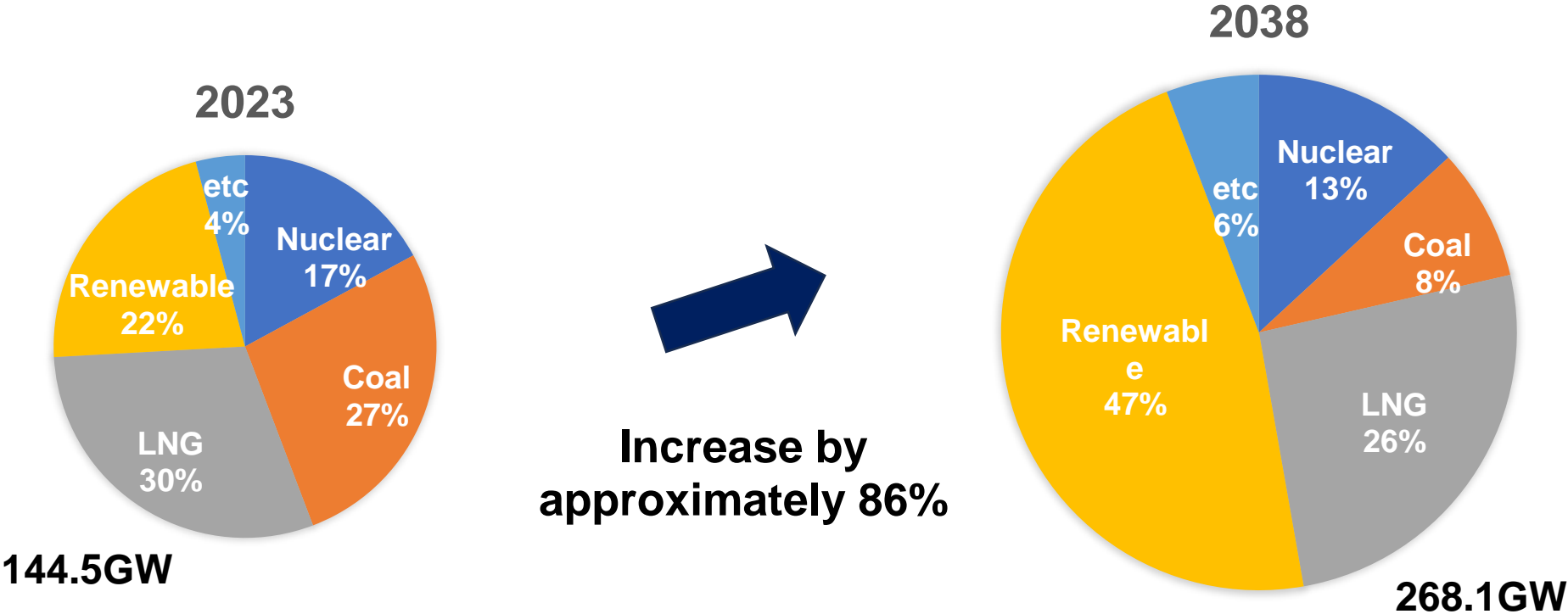
<Peak Demand Forecasting>



2. Energy Policies of Government

| 11Th Basic Plan of Long-Term Electricity Demand & Supply

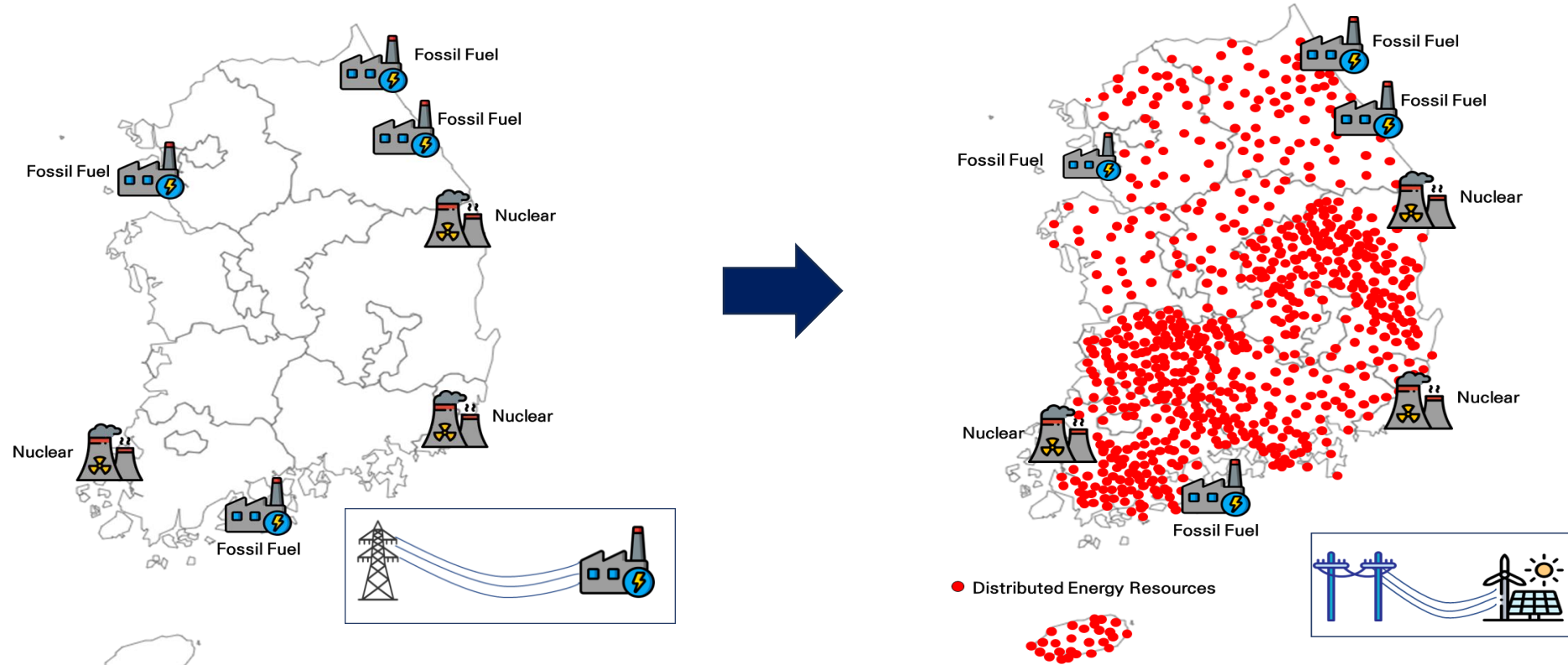
- ✓ Energy Mix('38) : **Renewable(47%)** > LNG(26%) > Nuclear(13%)
- ✓ Most of the RE will be **connected to the distribution network**(below 22.9kV)
- ✓ Restructuring the wholesale electricity market for RE and planning for distribution network facilities will be essential



2. Energy Policies of Government

| The Importance of Distribution System Planning in National Energy Plans

- ✓ Unlike in the past, with the increase in DER(Distributed Energy Resources),
distribution system planning has become crucial in the national power system plan.

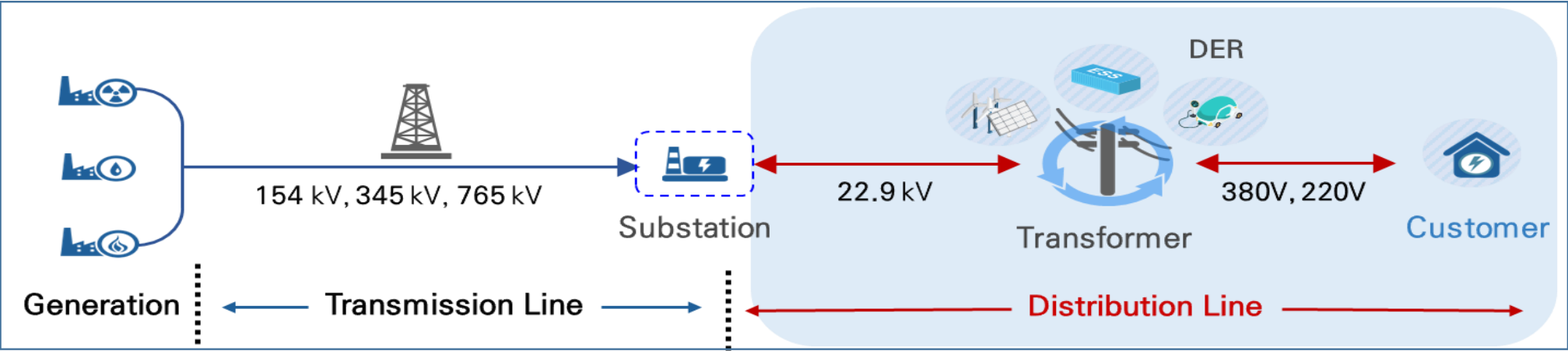


<Prior to 2010, DER made up less than 1%>

<Currently, DER accounts for 17%>

2. Energy Policies of Government

| The Special Act on the Promotions of DER ('24.6~)



	〈Transmission〉	〈Distribution〉		〈Transmission〉	〈Distribution〉
Network Owner	KEPCO	KEPCO	➔	KEPCO	KEPCO
System Operator	KPX	—		KPX	KEPCO

✓ As the integration of distributed energy resources into the distribution grid rapidly increases, **the role of the DSO has become both necessary and important**

* Obligations : **Long-Term Planning**, Grid code, DER Monitor&Operation system

3. Strategies of Distribution System Planning

| What's the main objectives of long-term planning?

- ✓ As the plan will be publicly disclosed, It aims to **strengthen the implementation of government's policies and provide the information to stakeholders**
- ① **To government** : Contribution to renewable energy policies
- ② **To local government** : Improving accuracy in establishing regional energy plans
- ③ **To private power producer** : Providing locational signals for network expansion

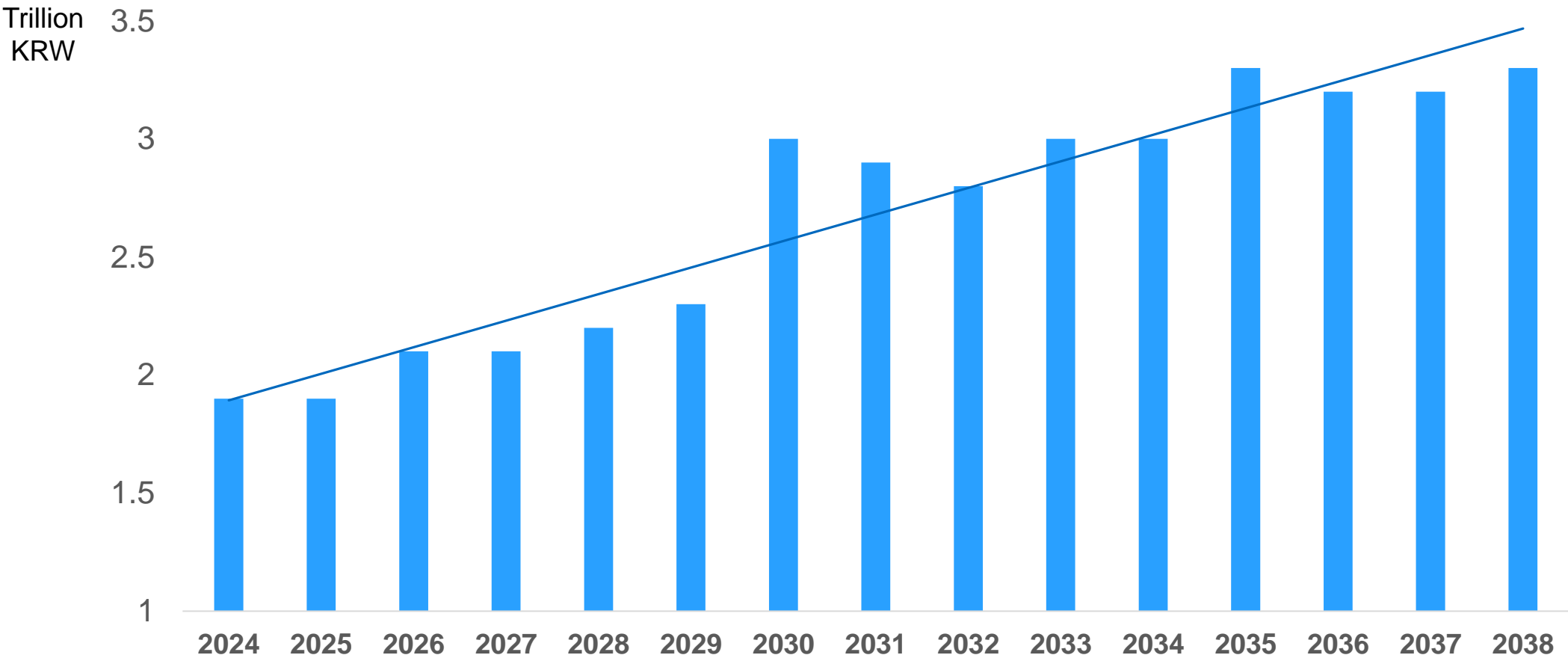
| What's the contents of long-term planning?

Duration	<ul style="list-style-type: none">• Above 5 years (Internally, 15 years plans)
Period	<ul style="list-style-type: none">• Every 2 year (Alignment for Basic plan and power system plan)
Main contents	<ul style="list-style-type: none">• Survey for Capacity of DERs which will be connected in lines• Upgrade Plan (Overhead/Underground, administrative district level)• Operation Plan (How to monitor and control DERs)• New technologies and policies (Hosting Capacity, NWAs, DSO Alliance, etc)

3. Strategies of Distribution System Planning

| Result of the 1st Long-Term Distribution System Planning (2024~2038)

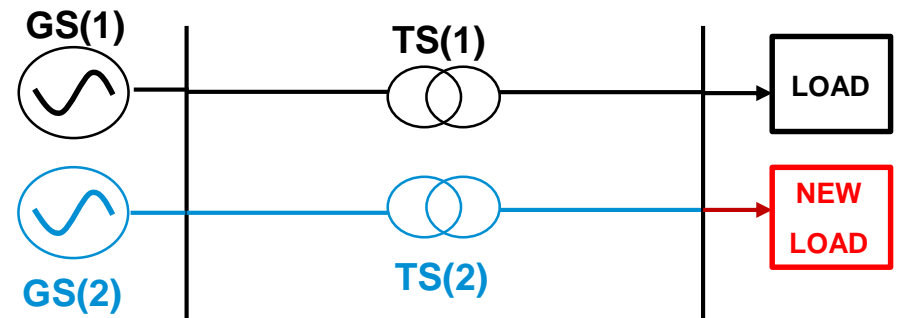
✓ **Distribution network investments are projected to increase significantly** in accordance with the government's renewable energy expansion policies.



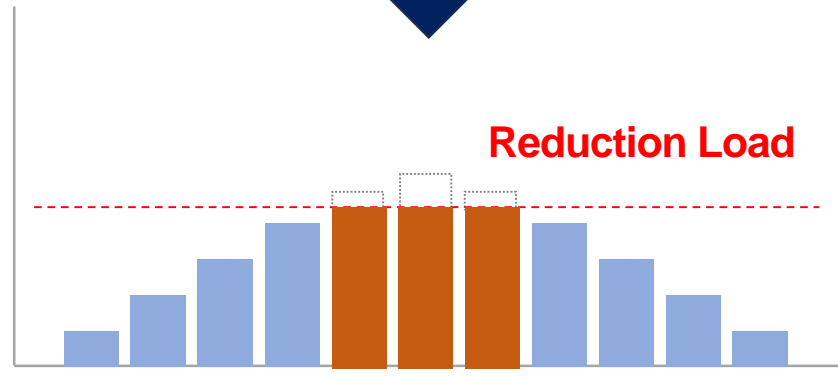
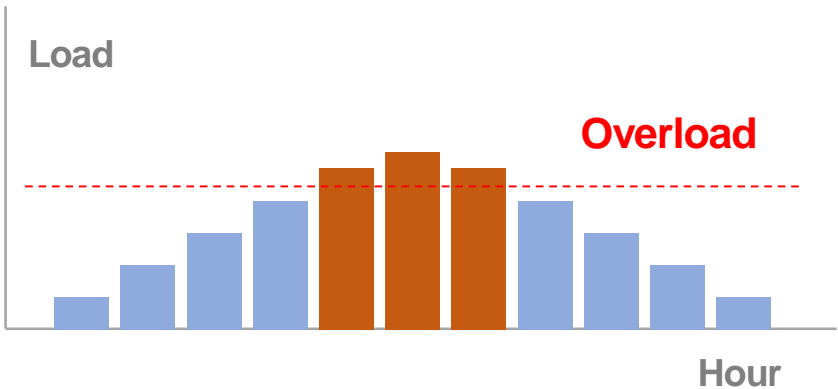
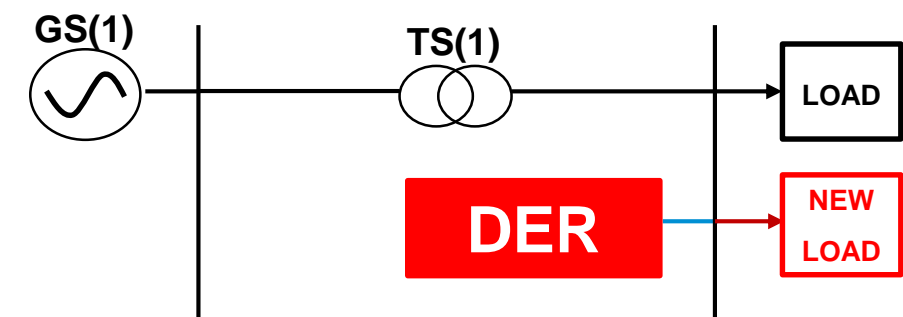
3. Strategies of Distribution System Planning

| Optimization of upgrading facilities

✓ **To effectively deploy DER and minimize the investment** in distribution networks, policies such as local flexibility services and NWA's solution will be needed.

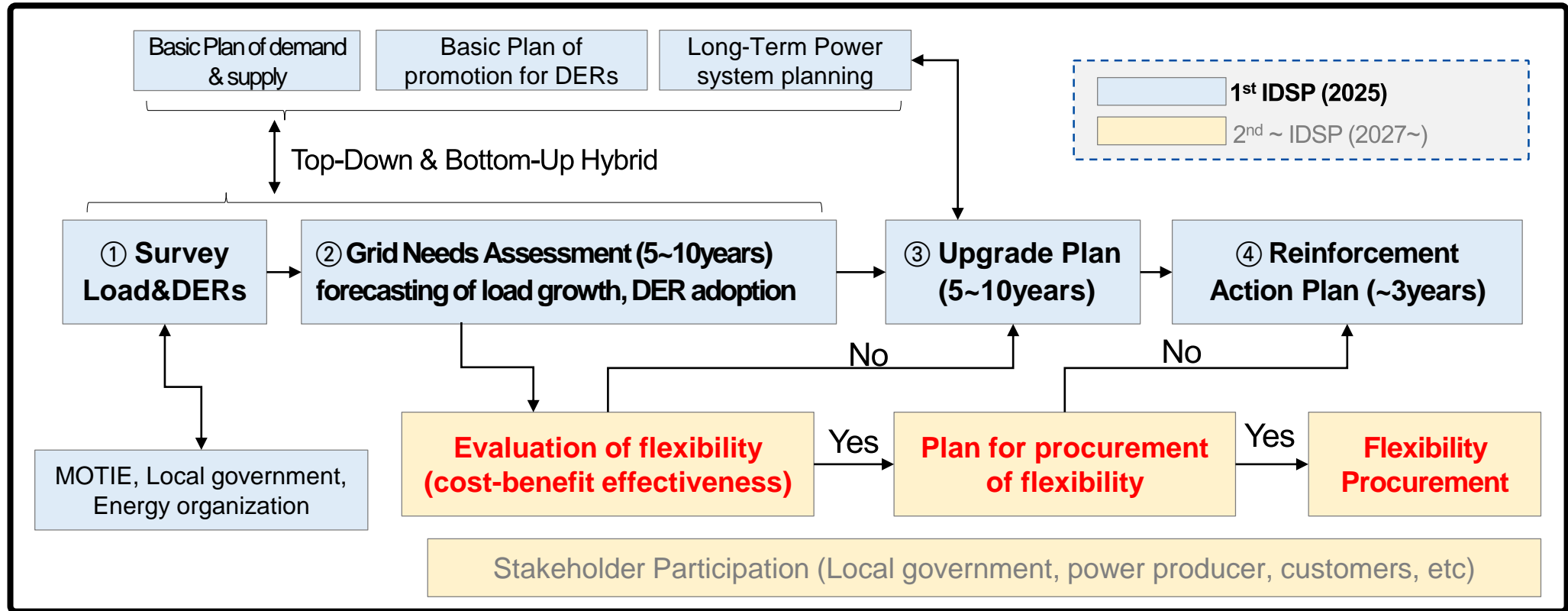


- Generating station(GS), Transformer station(TS)



3. Strategies of Distribution System Planning

| Integrated Distribution System Planning(IDSP) Framework



- ✓ 1st Plan will be focused on alignment of government's energy policies
- ✓ **From the 2nd Plan**, It will include forecasting integrated DERs scheduling(8,760h) and **NWAs solutions based on the locational valuation of DERs**

Thank You