2018. 06. 14

Overview of Korea's electricity policy

Jaekyun Ahn

에너지경제연구원
Korea Energy Economics Institute

KEEi
에너지경제연구원

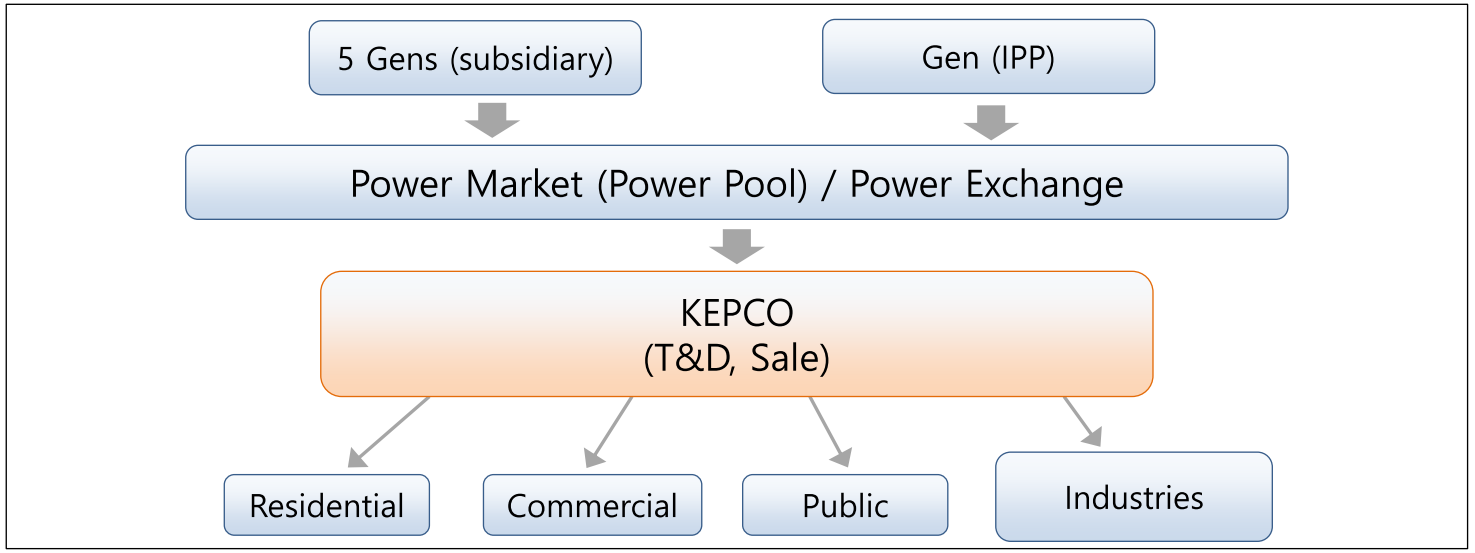
CONTENTS

■ Structure of Power Market ■

Current Structure of Power Market in Korea

- Current generation market: Competitive, CBP (Cost-Based Pool)
- KEPCO: Maintaining monopoly in T&D, and sales
- Customers buy electricity from KEPCO (For large customer, it is possible to directly buy from the wholesale market)
- Mandatory/Compulsory market: Every generation wanting to sell must be traded in the Power Exchange (PX)
- IPP having a PPA with KEPCO: paid by using a supply & demand contract price w.r.t settlement

<Korea's Power Market Structure>



Structure of Power Market

Characteristics of Power Market

Generation Competitive Market

- Biddings take place only in generation, No demand bidding
- KEPCO (T&D/Selling): Single buyer & Price conformer
- CBP system: Supply curve – based on the actual variable cost (mostly fuel price) instead of price bidding
- SMP (System Marginal Price): Set on a short-term marginal price
- In addition to SMP, separate CP (Capacity Payment) is paid for the compensation for a new marginal power plant facility

Mandatory Power Market

- Generation with capacity more than 20MW, i.e., Central Dispatch Generator must be traded in the power exchange
- Exemption: renewable generators and domestic local IPPs(district heating companies)

■ Current Status of Power Sector ■

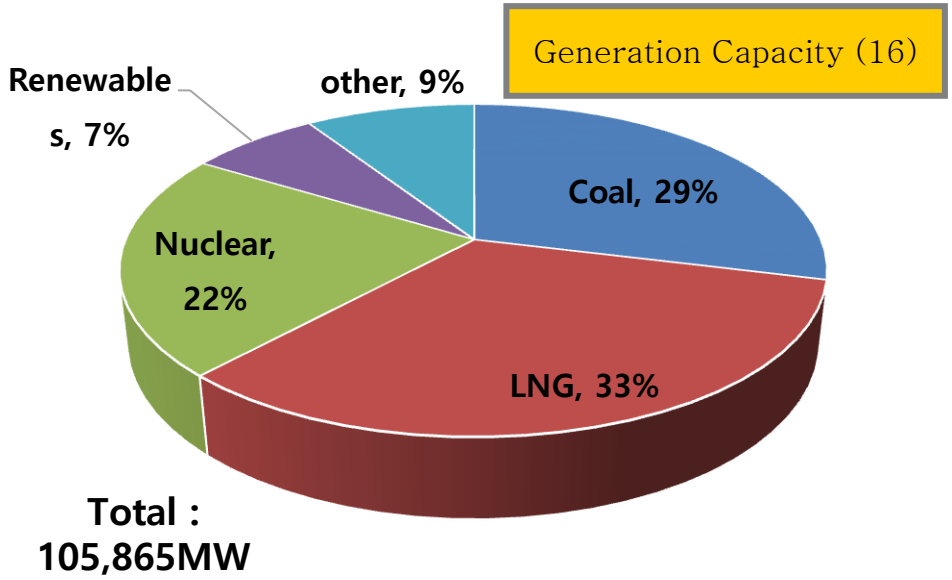
Current Status of Generation Sector

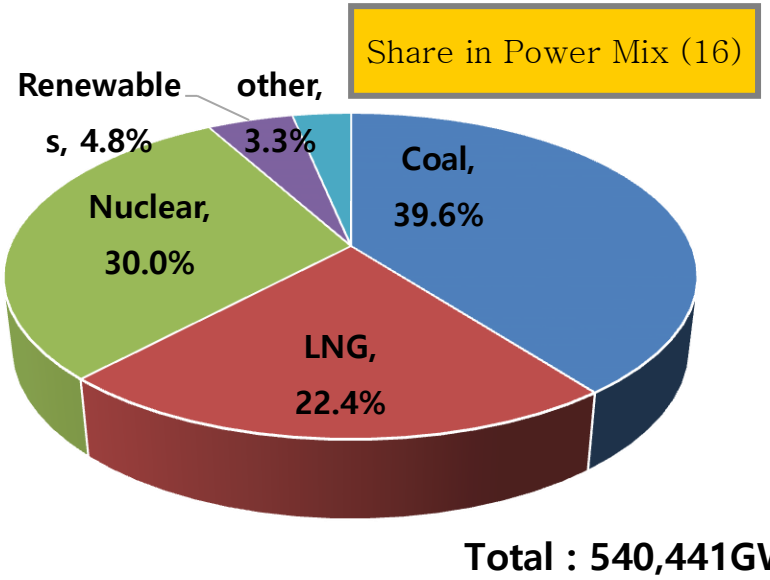
➢ Coal: The largest power source with 39% in the power mix.

- Share of coal generation: '14 39.1% → '15 39.3% → '16 39.6%
- Due to regulation of CO2 emission & pollution(ultrafine dust), the portion of coal generation will be decreased

➢ LNG-fired generation has recently decreased due to the increasing of base facilities (especially, coal PP) but would be increased because of environmentally friendly aspects.

- Share of LNG generation: '14 25.2% → '15 23.3% → '16 22.4%

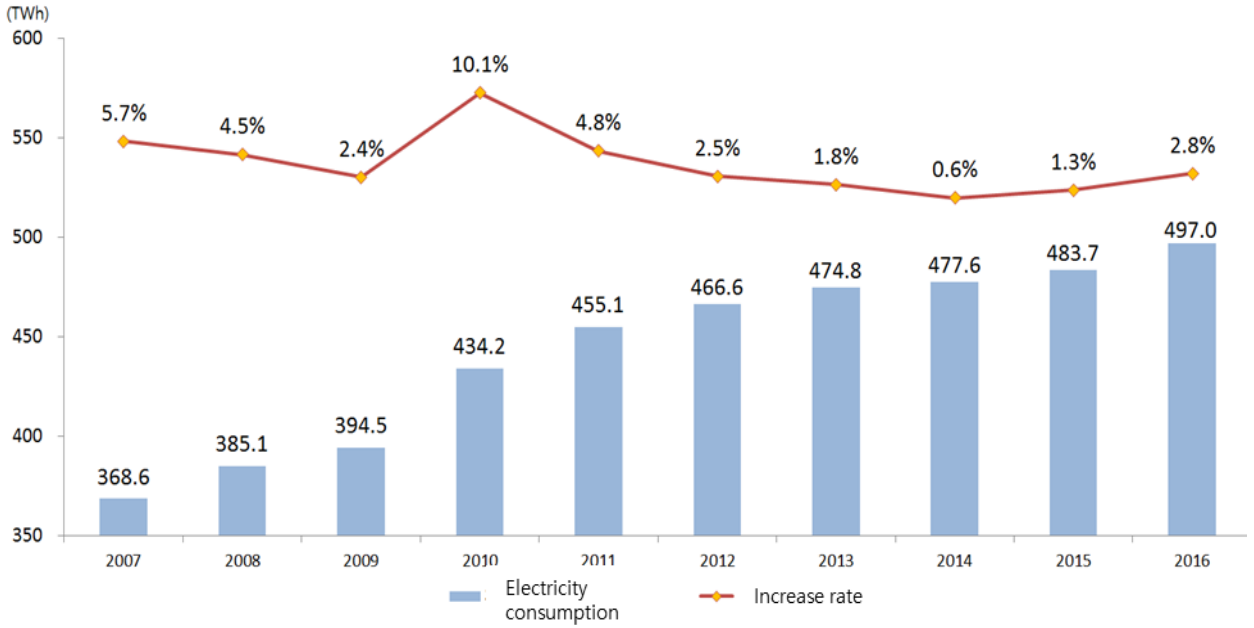




Current Status of Power Sector

Domestic Power Consumption Trends and Prospect

- The annual average of growth in power consumption has slowed down
  - 11.5%(80s) → 9.8%(90s) → 6.1%(00s) → 2.3%(10~16)



- In the 8th basic plan for long-term electricity supply and demand(2017~8), power consumption with demand management is expected to increase with an annual average of 1.1% from 2017 to 2031

■ Current Issues in Power Sector ■

KEEi 에너지경제연구원

Earthquakes near nuclear power plant

➢ Earthquakes in the Gyeongju

- In Sep. 2016, 2 earthquakes(M5.8 & M5.1) occurred in Gyeongju.
- The earthquake(M5.8) was the most powerful one ever recorded in Korea.
- There are 3 nuclear power plants(6 units) in Gyeongju, 2 nuclear power plants(6 units) in Ulsan and Busan.

➢ Changes in the nuclear power plant policy

- 24 reactors provide about one-third of South Korea's electricity from 23 GWe of plant.
- About 85% of the country's primary energy consumption is derived from fossil fuel and insufficient domestic resources mean that 98% of the fossil fuel consumed is imported.
- Nuclear energy has been a strategic priority as South Korea is a major importer of energy.
- But the new president elected in 2017 reviews the policy on nuclear power plants entirely.
- According to the plan, new power reactors would be cancelled and the operating periods of existing units would not be extended beyond their design life.

■ Current Issues in Power Sector ■

KEEi 에너지경제연구원

Air pollution due to ultra-fine dust

➢ Ultra-fine dust problems

- Particulate matter(PM) pollution, causing particularly severe discomfort in spring in Korea, has emerged as one of the pressing environmental issues.

➢ Recent policy development in the management of fine dust

- The response of the Korean government to this issue before and after is largely centered on reducing PM emissions from coal-fired power stations in the power industry.
- The previous administration sought to shut down 10 aging coal power plants that are more than three decades old, improve the performance of old power stations, and invest in environmental facilities through an inter-ministerial special measure on PM management(June 2016).
- As part of such measures, state-run utility firms will suspend the operation of five coal power plants aged over 30 years from March through June.
- In March 2017, the government passed a proposed amendment to the country's Electric Utility Act that mandated the government to consider not only economic feasibility but also the impact on the environment(including greenhouse gas and PM emissions) and public safety in determining the merit order for power supply.
- The new government won't authorize new licenses for coal power plants and will consult with utility companies to turn their coal-fired power generation projects to LNG stations.

Transformation of Energy Policy

Electric power generation mix plan in 2030

- On 19th June 2017, President Moon announced the transformation of Energy policy from nuclear and coal to renewable energy and LNG for safer, healthier and more sustainable future
  - Cancel 6 reactors' construction plan and prohibit license renewal of old nuclear power plants, stop new construction of coal fired power plants and phase out the old coal fired power plants sooner
  - Increase the share of renewable energy in generation mix by 20% by 2030 and the capacity factor of LNG power plants(CCGT) higher
  - These changes are reflected in the 8th basic plan for long-term electricity supply and demand plan(2017~31)

	Year	Nuclear	Coal	LNG	Renewables	Other
Capacity	2017	22.5GW (19.3%)	36.9GW (31.6%)	37.4GW (31.9%)	11.3GW (9.7%)	8.9GW (7.6%)
	2031	20.4GW (11.7%)	39.9GW (22.9%)	47.5GW (27.2%)	58.6GW (33.6%)	8.1GW (7.6%)
Generation	2017	30.3%	45.4%	16.9%	6.2%	1.3%
	2031	23.9%	36.1%	18.8%	20.0%	1.1%

■ Transformation of Energy Policy ■

Renewable electricity target by 20% by 2030

- The share of renewable electricity(plus others) in generation mix will increase from 7% in 2017 to 20% in 2030.
  - The target is not high compared to the status of OECD. Currently, the share of renewable electricity account for around 24% in OECD electricity generation.
  - Currently, solar PV capacity is around 5.5GW and wind is 1.1GW, that's why the target can be very ambitious for South Korea

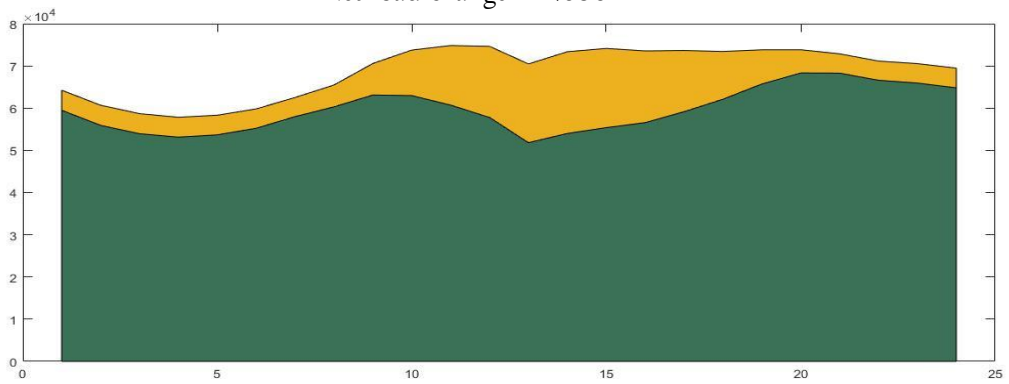
- To achieve 20% target by 2030
  - Newly 30~31GW of Solar PV and 16~17 GW of wind capacity will be added by 2030
  - Increasing RPS mandatory rate (28% by 2030)
  - Local community participation : Citizens, farmers and community power
  - Reforming site planning procedure for RE projects
  - Promoting offshore wind farms

Transformation of Energy Policy

Renewable electricity target by 20% by 2030

➢ To increase power system flexibility

<Net load change in 2030>



- Efficient demand side management
- Securing backup power : 2GW Pumped-storage power plants, 0.7GW ESS, Bypass operation in CCGT
- Introducing ancillary service market and real time market to strengthen compensation standards for flexible resources.
- T&D investment
- Establishment of a new renewable energy control center and a forecasting system for variable renewable energy

■ Conclusion ■

New regulation and market design

➢ Roles of the basic plan for long-term electricity supply and demand

- The Basic Plan for Long-term Electricity Supply and Demand(BPE) is prepared by the Ministry of Trade, Industry and Energy pursuant to Article 25 of the Electricity Business Act for a stable supply and demand of electricity
- BPE is announced biennially and builds up basic directions for electricity supply and demand; long-term outlook for electricity supply and demand, plans for generation facilities, transmission facilities, and transformation facilities; electricity demand management
- BPE keeps playing an important role in determining optimal power mix in order to efficiently cope with greenhouse gases emission and PM reduction, power system security considering renewable energy deployment

➢ New market design in the near future

- To enhance power system flexibility, the proper regulation and market design should be considered.
- Improvement of electricity markets system can be achieved by shortening the real-time market's settlement cycle, introducing an intra-day market
- We could consider mandatory start-up bids and compensation at reasonable prices such as CAISO and MISO's flexible ramping product market.

Thank you

에너지경제연구원
Korea Energy Economics Institute