South Korea nuclear power policy change and its implications

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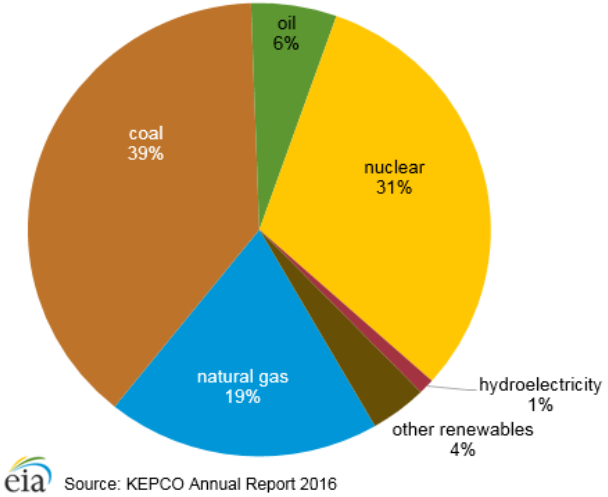
Outline

1. Nuclear energy policy change



2. Korea energy overview

3. Germany experience

4. Korea nuclear technology self reliance

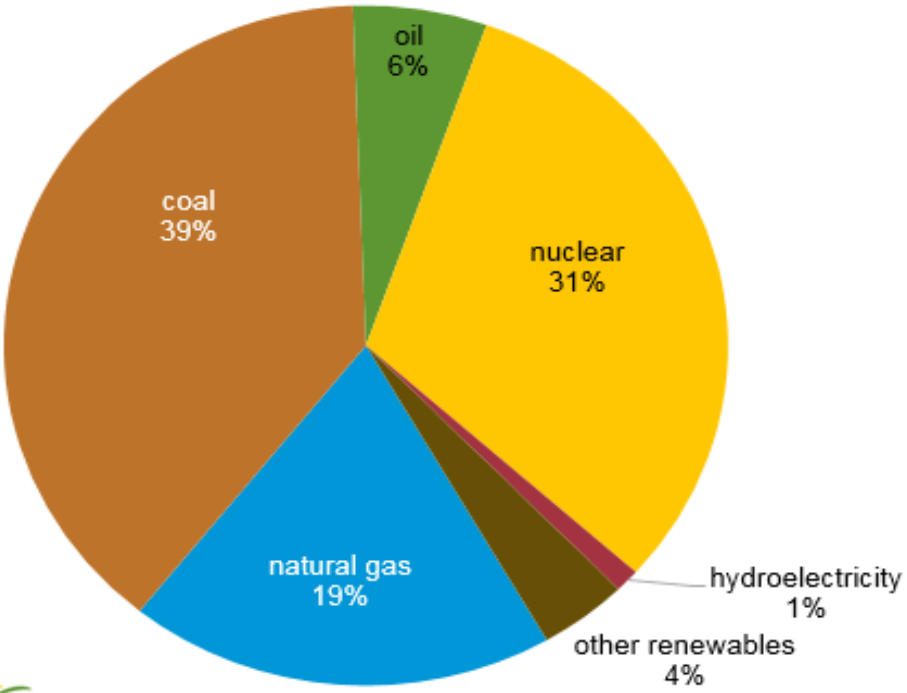
Nuclear energy policy change

"So far South Korea's energy policy pursued cheap prices and efficiency. Cheap production [costs] were considered the priority while the public's life and safety took a back seat. But it's time for a change. We will abolish our nuclear-centered energy policy and move toward a nuclear-free era."

President Moon

- **Phase out of coal and nuclear power**
- **Increase percentage of renewable sources**
- **Construction of Shin-Kori 5 & 6 resumed**
- **No further construction of new NPPs**

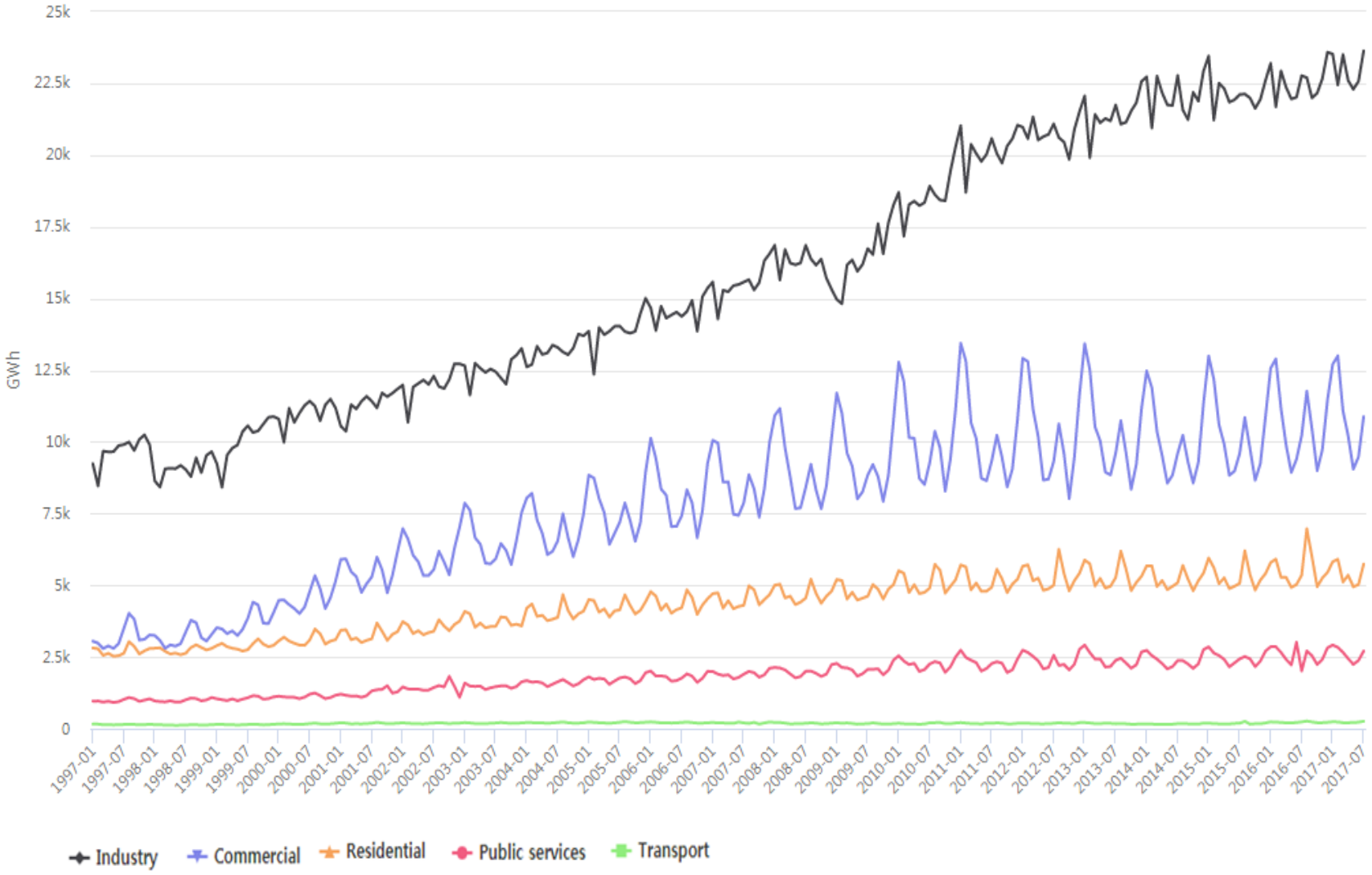
Energy overview in S. Korea



eia Source: KEPCO Annual Report 2016

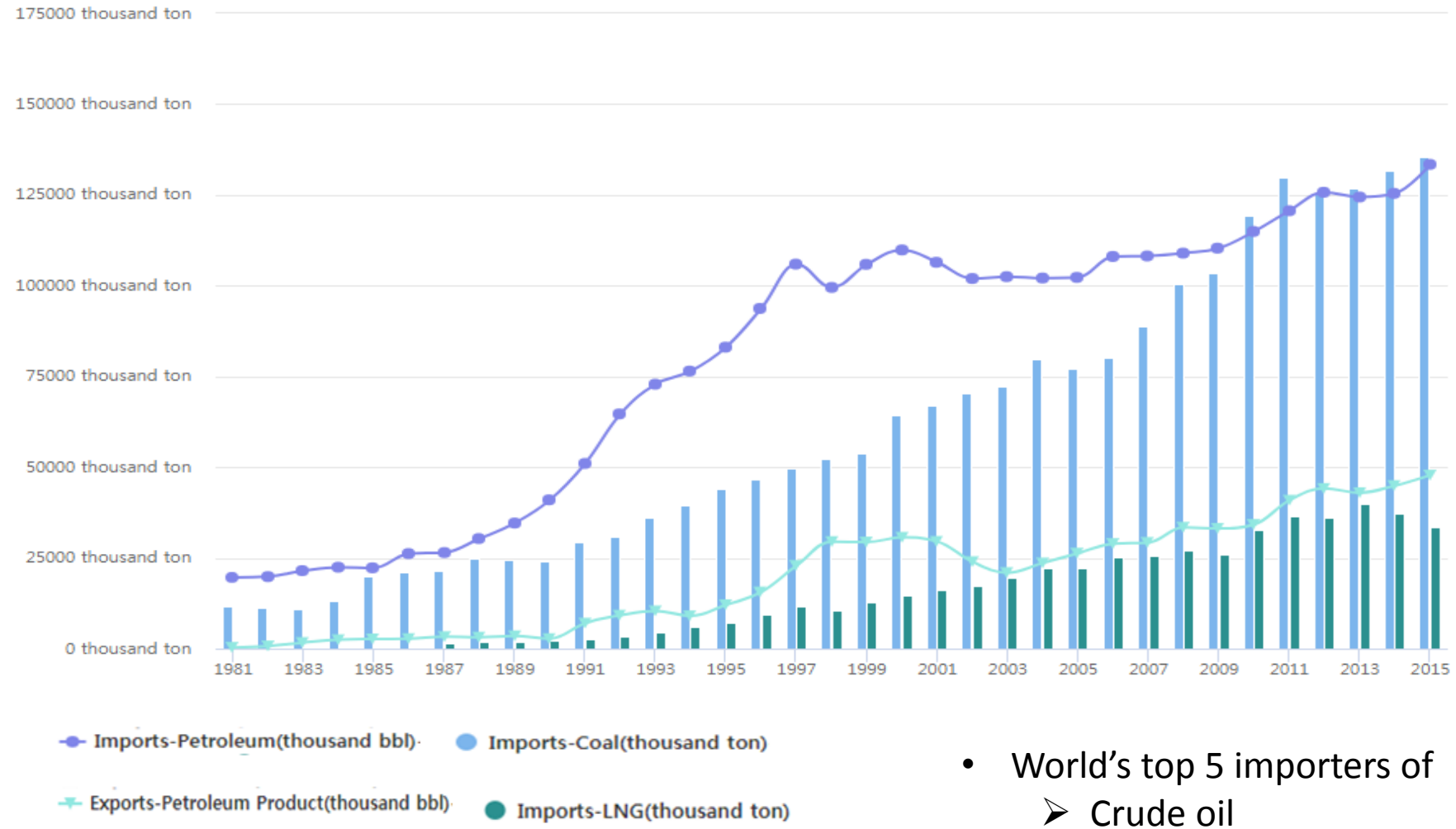
- Base load generation
  - Coal
  - Nuclear
- Peak demand
  - LNG imports.

Electricity consumption



Source: http://www.kesis.net/sub/subChartEng.jsp?report_id=33140&reportType=0

Import vs export



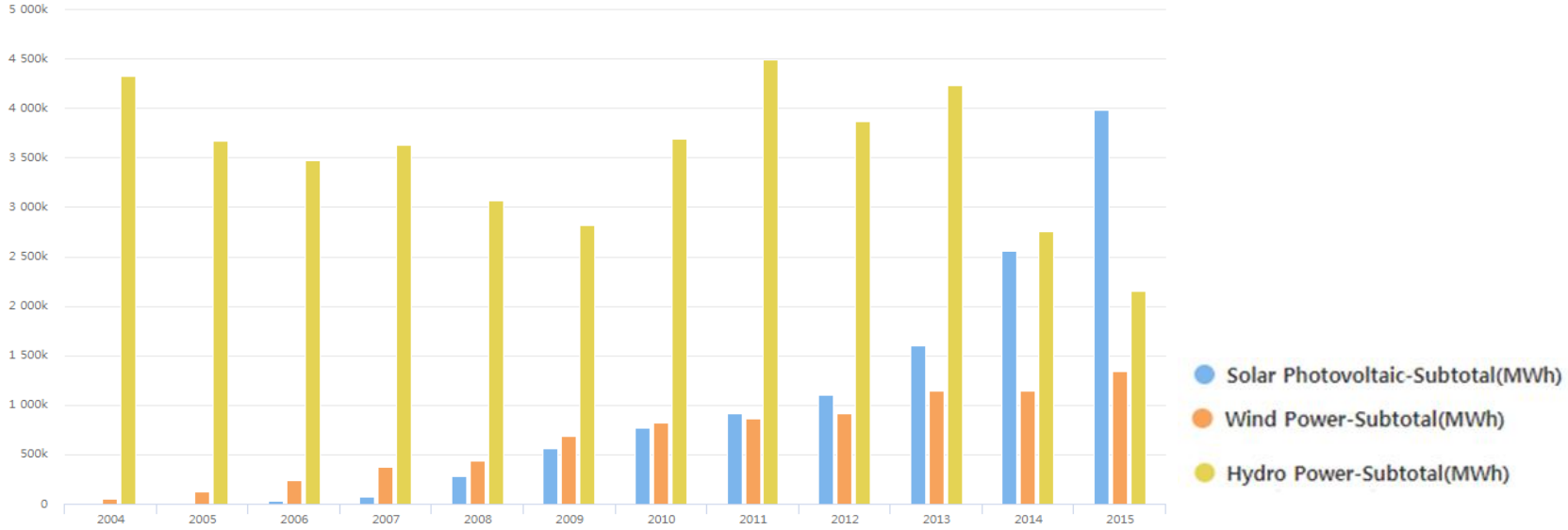
- World's top 5 importers of
  - Crude oil
  - Coal
  - LNG

http://www.kesis.net/sub/subChartEng.jsp?report_id=910304&reportType=0

Renewable sources

➢ Yeongnam-40 MW

➢ Yeongwol-38.9



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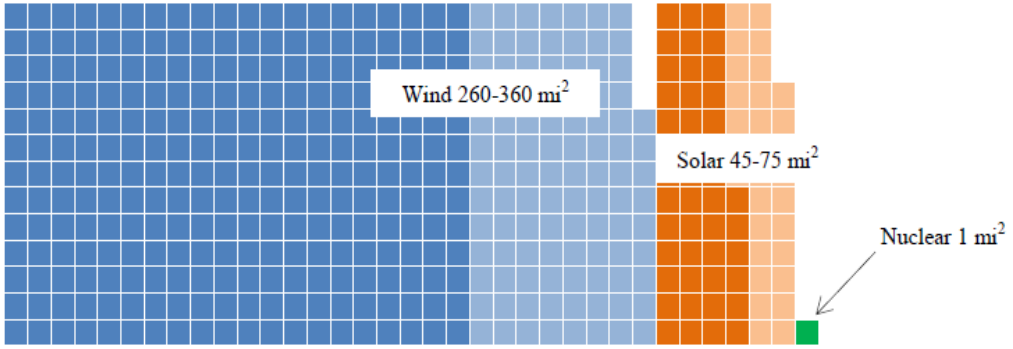
Land vs energy sources

- 3 MW

- 2000 MW

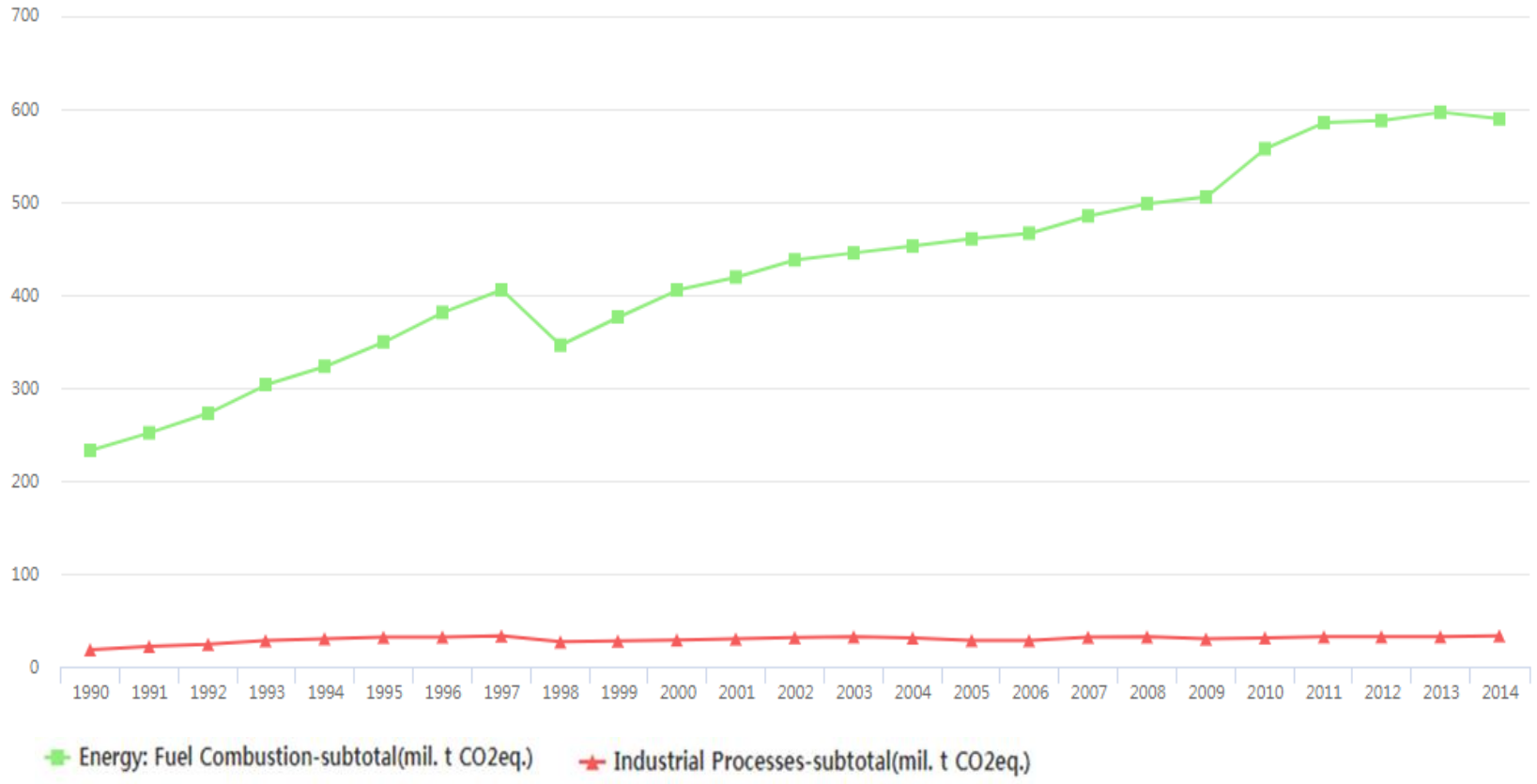


Technology	Capacity Factor, %	Square Miles Needed for 1,000 MW
Wind	32-47	260-360
Solar	17-28	45-75
Nuclear	90	1.3

- Challenge to replacement of NPP equivalent RE
  - Mountainous topography,
  - High population density

1. http://blog.iparu.com/2015/06/solar-pv-power-plants-constructed-and_90.html
2. https://www.nei.org/News-Media/News/News-Archives/Nuclear-Power-Plants-Are-Compact,-Efficient-and-Re

Reduction of CO_2 emission



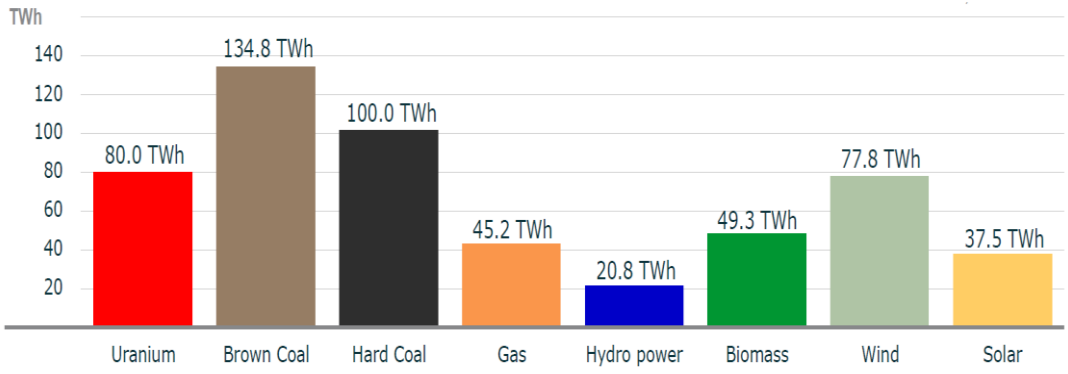
- 5th largest GHG emitter
  - ➢ Energy sector- 87.2% of total emission

https://www.kesis.net/sub/subChartEng.jsp?report_id=50208&reportType=0

Inter-regional grid connection

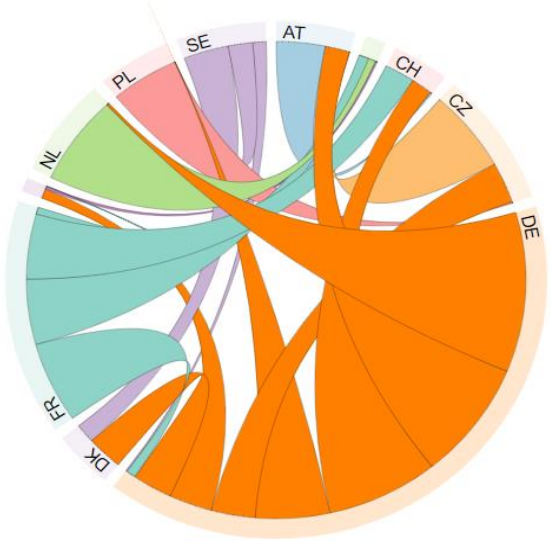
- Scarcity of natural resources
  - ➢Import electricity
- Unstable relationship with North Korea
- Construct transmission lines-expensive

Germany experience

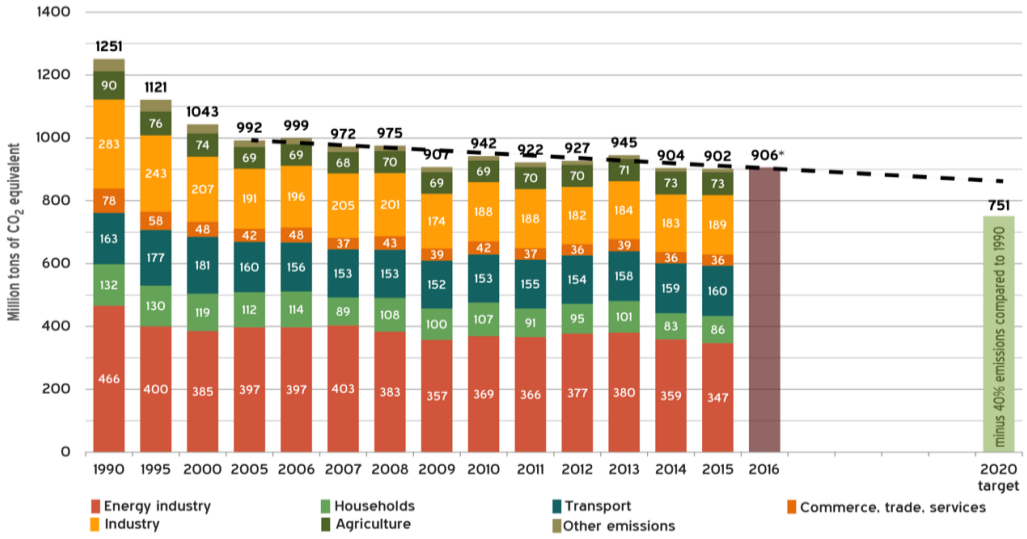


➢ Electricity production-2016

➢ 145MW Neuhardenberg solar power plant



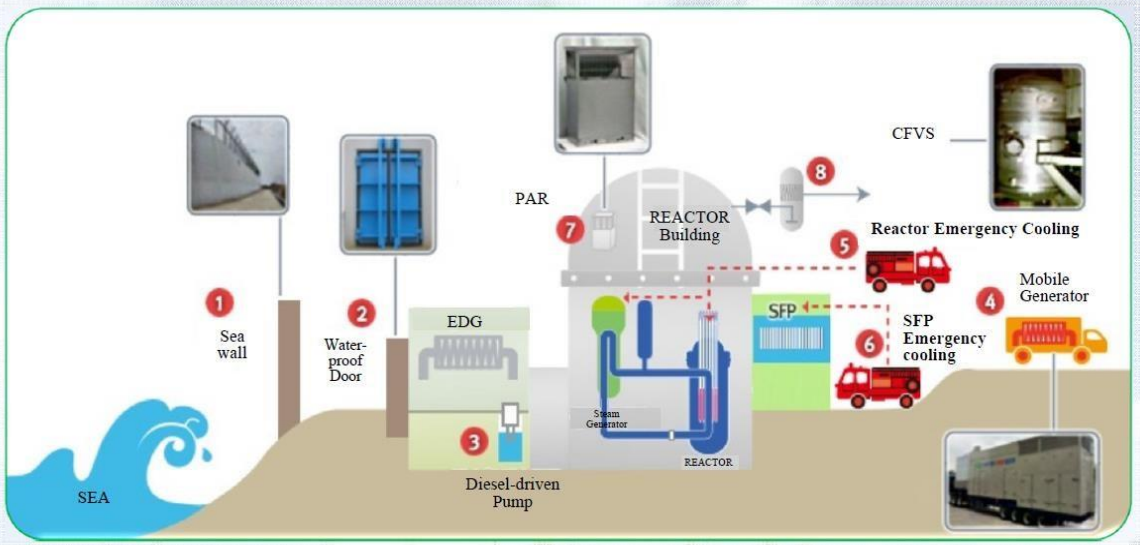
➢ Grid inter-connectivity



➢ CO_2 emission target

https://www.energy-charts.de/index.htm
http://www.power-technology.com/projects/templin-solar-power-plant/

Post Fukushima measures



① Height extension of the seawall at NPP
② Waterproof doors
③ Waterproof drain pumps (diesel-driven)
④ Mobile generator vehicles
⑤ External injection emergency cooling loop
⑥ Injection loop for SFP
⑦ Passive hydrogen removal equipment
⑧ Vent or depressurizing facilities

- APR1400 reactor
  - Advanced safety features-SIS
  - Safe Shutdown Earthquake =0.3g
  - Automatic seismic trip system

Korea NPP self- reliance

➢ Barakah NPP in UAE

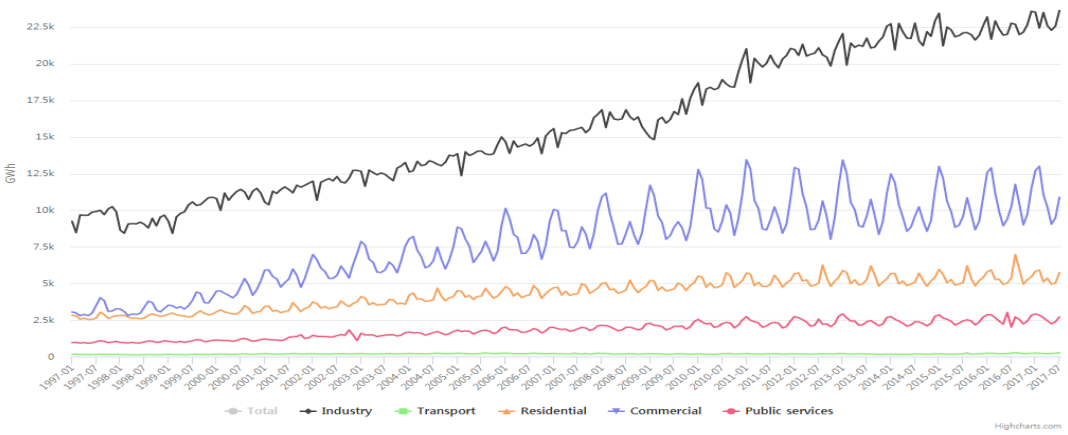
	Type	MWe gross	Construction start	Start up
Barakah 1	APR-1400	1400	July 2012	2018
Barakah 2	APR-1400	1400	May 2013	2018
Barakah 3	APR-1400	1400	Sept 2014	2019
Barakah 4	APR-1400	1400	Sept 2015	2020
Total		5600 MWe		

➢ Planned units in UAE

➢MOU agreements

➢ APR1400 NPP at Shin-Kori 3 &4

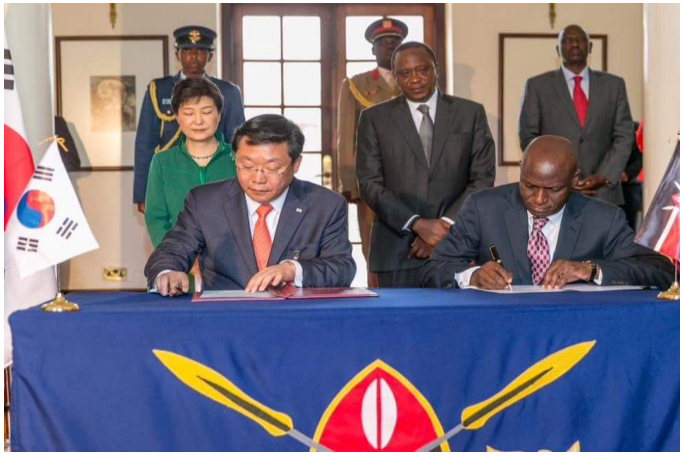
Conclusion



- Increasing economic growth, electricity consumption

- Need for secure and adequate energy reserves.

- Encourage continued operation of NPP



- Encourage NPP technology export