



**Asia-Pacific  
Economic Cooperation**

# Energy Development in China

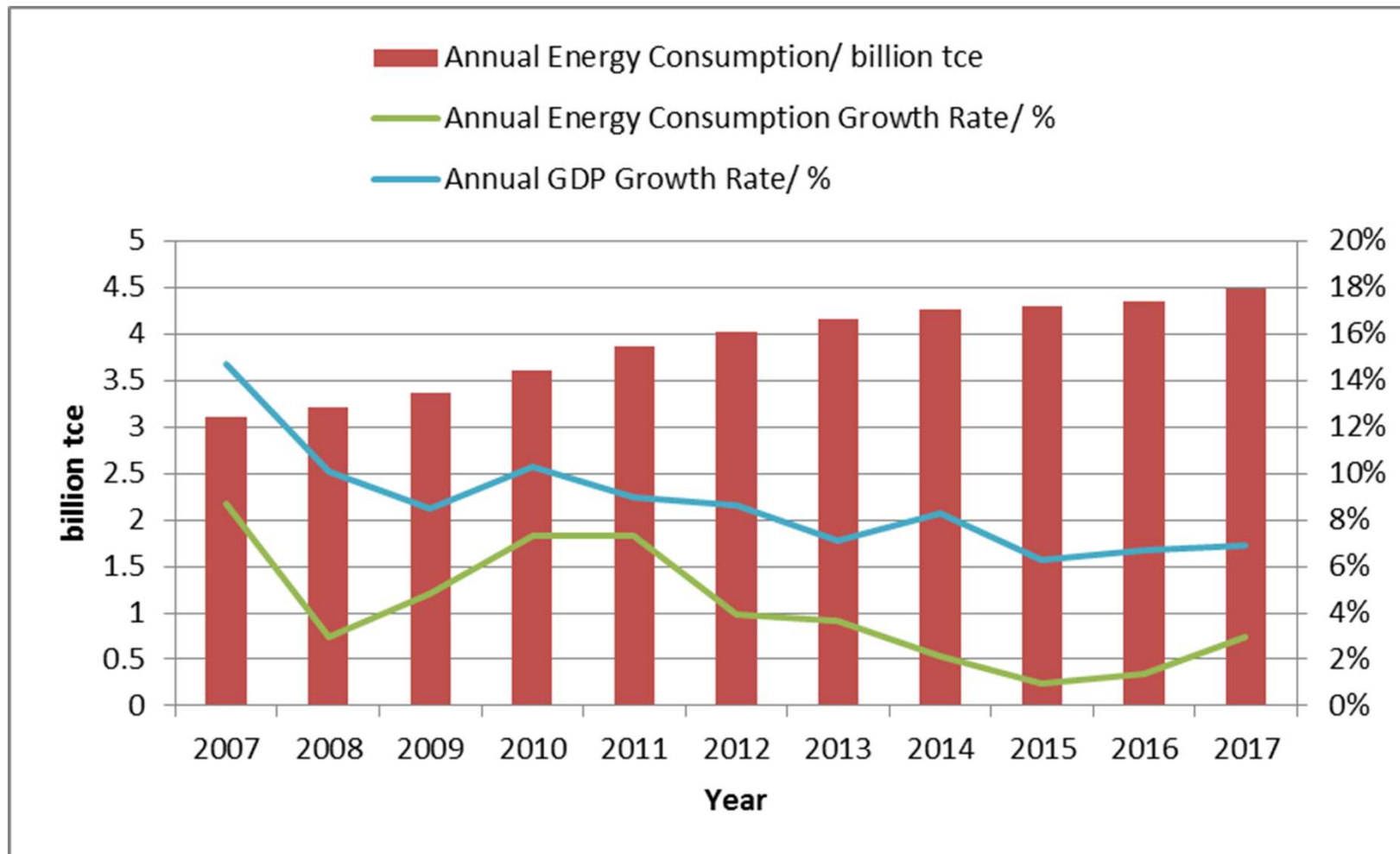


**Dr. LIU Meng, China**  
**April 30, 2022 – virtual meeting**

# Energy consumption in China



- ◆ China is the largest economy in energy consumption.
- ◆ The energy intensity of China has reduced around 34% during 2007-2017.



# Key Challenges



## Limited energy resources

- Oil and gas reserves is only 6% of average level of the world

## Limited environmental capacity

- Serious air pollution, water pollution and soil pollution

## Low energy efficiency

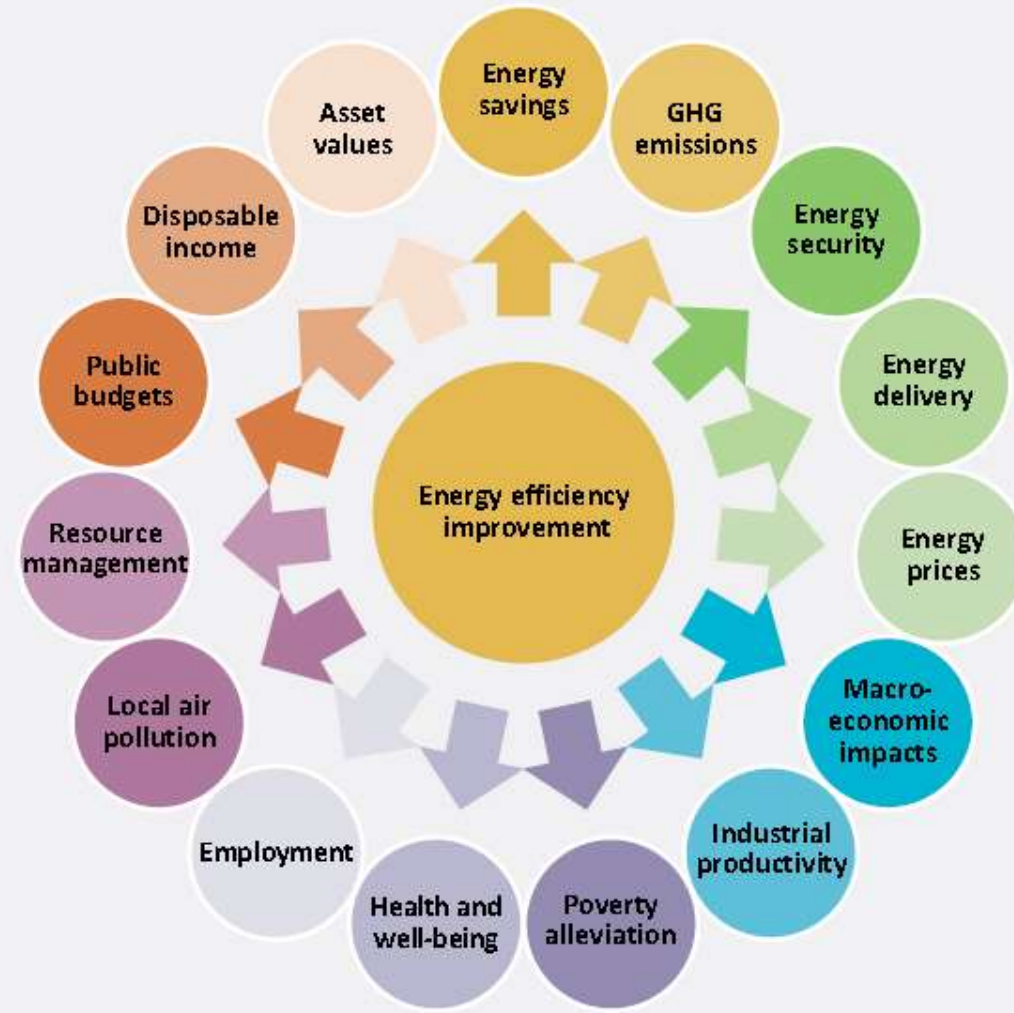
- Energy consumption per GDP is the twice of the average level of the world

## Assurance of energy security

- Around 70% of crude oil is imported



# Multiple benefits of energy conservation



Source: International Energy Agency

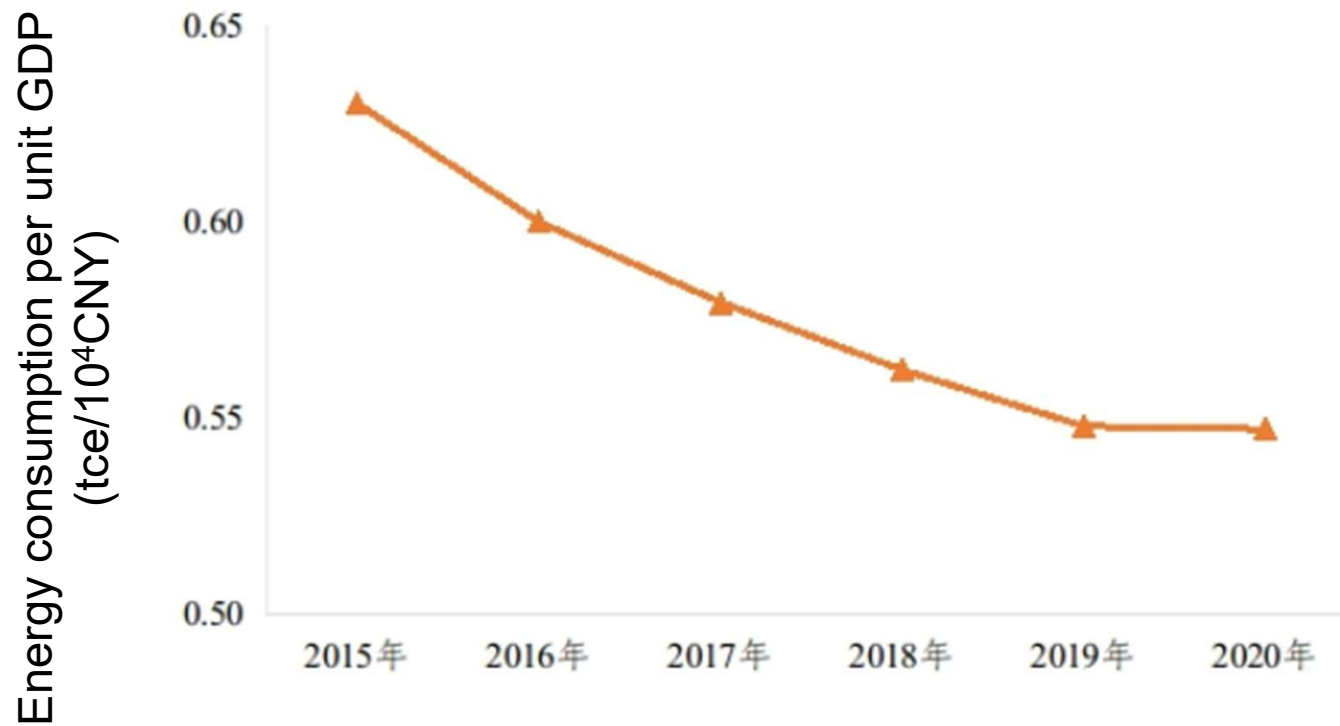
# Achievements in energy conservation



- ◆ Since 1980s, improvement of energy efficiency has been set as the primary policy in China's energy strategy
- ◆ Turning point of energy efficiency in China occurs in the 11th FYP period (2006-2010)
  - ◆ A mandatory target for energy intensity reduction of 20% was brought forward
  - ◆ Total energy savings: 630 million tce
  - ◆ Improvement of energy efficiency in key sectors
    - ◆ Thermal power: 10.0 %
    - ◆ Steel: 12.1 %
    - ◆ Cement: 28.6 %

# Achievements in energy conservation

- ◆ During the 13th FYP(2016-2020), China achieved a 5.7% of the average annual economic increase rate along with a 2.8% average annual increase in energy consumption, and resulted to the energy savings of over 650 million tce, 18.8% reduction in CO2 emission intensity



Energy intensity change during the 13rd FYP

# Strategy for energy conservation within the context of 3060 targets



30-60 targets were set for peaking CO<sub>2</sub> emission by 2030 and achieving carbon neutrality by 2060 in China. Important policies released recently containing the mid&long term strategy of energy conservation within the context of 3060 targets

- ◆ *Outline of the 14th Five-Year Plan (2021-2025) for National Economic and Social Development and Vision 2035 of the People's Republic of China* (released in 2021)
- ◆ *Guidance on effectively achieving peaking CO<sub>2</sub> emissions and carbon neutrality through following new development concept* (released in 2021)
- ◆ *Action plan for peaking CO<sub>2</sub> emissions by 2030* (released in 2021)
- ◆ *National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction* (released in 2021)
- ◆ *Guidance on improving the mechanism and policies for green-oriented transition of energy* (released in 2022)

# 3060 targets for energy conservation and carbon reduction in China



Metrics	Targets for the 14 <sup>th</sup> five-year plan(2021-2025)	Targets for 2030 (peak the CO <sub>2</sub> emission)	Targets for 2060 (carbon neutrality)
Reduction of energy intensity (tce/GDP)	[13.5%]	Energy efficiency of the major heavy industrial sectors with huge energy consumption reached international advanced level	Energy efficiency reached international advanced level
Reduction of CO <sub>2</sub> emission intensity (ton CO <sub>2</sub> /GDP)	[18%]	Peak the CO <sub>2</sub> emission	Carbon neutrality
Share of non-fossil energy consumption	~ 20%	~ 25%	Over 80%



# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

- ◆ *Industry restructure*
- ◆ *Green transition of energy system*
- ◆ *Green transportation*
- ◆ *Green building*
- ◆ *Technology innovation and demonstration*
- ◆ *Regulations and standards*
- ◆ *Supporting policies*

# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

◆ *Industry restructure:*

- Make plans for carbon neutrality in sectors of energy production, iron&steel, oil&chemical engineering, building material, transportation and building.
- Stringent control (such as stricter mandatory energy intensity standards for the project approval and market access) on the redundant expansion of industrial sectors of iron&steel, oil&chemical engineering, coal chemical engineering, coal fired power, etc., which are featured with high energy consumption and emissions.
- Upgrade the industry by integrating with the emerging tech such as internet, IoT, AI, 5G communication

# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

- ◆ *Green transition of energy system :*
  - Double control on energy intensity and energy consumption
  - Energy efficiency improvement in the major sectors of industry, building, transportation, communication infrastructure such as data centres through measures of EnMS, EE accountabilities, tech upgrade, programme of EE forerunner, etc.
  - Stringent control on fossil energy consumption. Accelerate the reduction of fossil energy consumption by conducting strict control on coal consumption increment during the 14<sup>th</sup> FYP(2021-2025), and realizing gradual reduction of coal consumption and peaking the oil consumption during the 15<sup>th</sup> FYP(2026-2030)
  - Utilization of non-fossil energy such as solar, wind, biomass, hydrogen, hydroelectricity, geothermal, nuclear power, etc, increasing the share of non-fossil energy in the total energy consumption.
  - Renovation in energy market mechanism

# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

## ◆ *Green transportation :*

- Widely deployment of green transportation vehicles. More clean and new energy driven vehicles, hydrogen refilling stations. Accelerate the development of electric railways, charging and swap battery networks. Improve the energy efficiency standards of fuel vehicles

## ➤ *Green buildings:*

- Improve the building energy conservation standards. Accelerate the construction of ultra-low, near-zero energy consumption and low carbon buildings. Promote the energy-saving retrofitting for the existing buildings. Promote the use of green building materials. Conduct the evaluation of green building.
- Optimize the energy supply in building. Renewable energy such as solar energy, biomass, heat pump, geothermal energy. District energy(heating and cooling). Improve building electrification.

# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

- ◆ *Technology innovation and demonstration:*
  - R&D of energy saving and low carbon and new energy technology, materials and equipment.
  - Demonstration: smart grid, energy storage, hydrogen energy.
- *Regulations and standards:*
  - Laws and regulations. Revisions to the Energy Conservation Law, Electric Power Law, Law on the Coal Industry, Renewable Energy Law, Circular Economy Law, etc.
  - Standards. Improve the energy intensity standards for industrial process and energy efficiency standard for end-use equipment, and the supporting standards of energy MV, audit, test, accreditation, evaluation, etc.
  - Statistics and monitoring capacity. Improve the energy consumption monitoring and metrology system in the major industrial sectors and the construction of energy consumption online monitoring system for the key energy consumers in the industrial sectors.

# Strategy for energy conservation in the context of 3060 targets.



Main tasks of energy conservation in the key sectors and areas

◆ *Supporting policies:*

- Policies of finance, tax and pricing. Implement tax refund for purchasing energy efficient products, green vehicles. Improve the policies for ladder type electricity price, peak-valley electricity price, pricing mechanism for renewable energy based electricity, punitive electricity price.
- Market mechanism. Improve the energy consumption allowance trading mechanism. Promote EMC and the energy saving services.

# Policy framework for energy efficiency in the National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction



- ◆ Key energy efficiency programs
  - Energy efficiency in key areas
  - Key energy efficiency programs
  - Clean and efficient utilization of coal
- ◆ Energy efficiency mechanism
  - Target accountability system
  - Phase out the high energy consumption facilities
  - Regulations and standards
  - Supporting financing policy
  - Energy efficiency market
  - Monitoring and inspection system
  - Capacity building

# Policy framework for energy efficiency in the National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction



	Sectors	Targets/activities
Key EE programs	Heavy industries	<ul style="list-style-type: none"> <li>• 13.5% Reduction in energy intensity (tce/GDP) by 2025</li> <li>• Over 30% production capacity in the industrial sectors of iron&amp;steel, electrolytic aluminium,cement,flat glass, oil refining, ethylene, synthetic ammonia, calcium carbide and over 30% of the data centres are supposed to reach the leading levels of energy efficiency benchmark by 2025.</li> </ul>
	Industrial parks	<ul style="list-style-type: none"> <li>• To implement energy system optimization in the industrial parks and encourage the plants and industrial parks to prioritize using renewable energy</li> <li>• To build up a batch of energy saving and environment friendly industrial parks by 2025</li> </ul>
	Buildings	<ul style="list-style-type: none"> <li>• To upgrade building EE standards, promote ultra-low energy consumption buildings, accelerate retrofitting to existing buildings and BIPV</li> <li>• To implement the green cooling action plan, greatly improve the EE of cooling system in central AC,data centres, commercial parks and cold chains, etc.</li> <li>• By 2025, all the new buildings are supposed to be constructed by following green building standards and great increase achieved in the market share of clean heating and green cooling products</li> </ul>



# Policy framework for energy efficiency in the National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction



	Sectors	Targets/activities
Key EE programs	Transportation	<ul style="list-style-type: none"> <li>To accelerate the green transportation infrastructure construction</li> <li>To improve the share of the green vehicles in the public transportation, promote the clean energy driven vessels</li> <li>Green cars accounts for 20% of the total car sales volume by 2025</li> </ul>
	Agriculture	<ul style="list-style-type: none"> <li>To accelerate the use of renewable energy (Solar, wind, biomass, etc)</li> <li>The utilization of the main biomass such as crop straw reached over 86% by 2025</li> </ul>
	Public institutions	<ul style="list-style-type: none"> <li>Existing building retrofitting,</li> <li>Green cars and charging points, etc</li> <li>2000 efficient public institutions and 200 EE forerunners will be identified for the purpose of demonstration by 2025</li> </ul>
	Clean and efficient use of coal	<ul style="list-style-type: none"> <li>Tech retrofitting to coal-fired power plant,</li> <li>Energy restructure, more clean energy, less coal</li> <li>Non-fossil energy accounts for ~ 20% of the total energy consumption by 2025.</li> </ul>

# Policy framework for energy efficiency in the National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction



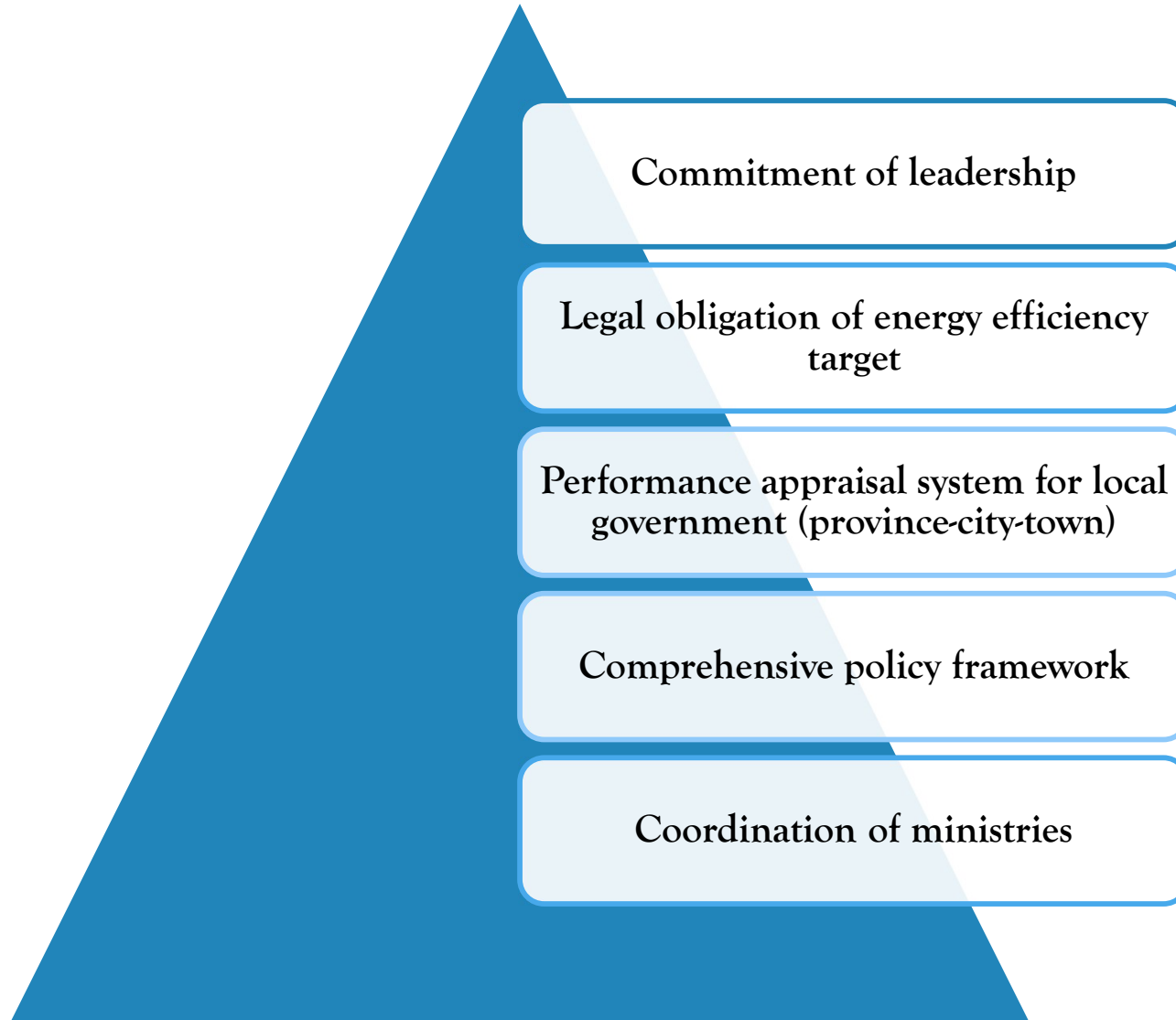
	Sectors	Targets/activities
EE mechanism	Target accountability system	<ul style="list-style-type: none"> <li>• Energy intensity</li> <li>• Energy consumption</li> <li>• Target accountability system includes all the main stakeholders of local government, industrial sectors, main enterprises with substantial energy consumption</li> </ul>
	Phase out low efficient industrial capacity	<ul style="list-style-type: none"> <li>• To impose stringent control on redundant expansion of industrial capacity</li> </ul>
	Regulations and standards	<ul style="list-style-type: none"> <li>• To accelerate revisions to the Energy Conservation Law, Circular Economy Law, Civil building energy saving regulation, Public institution energy saving regulation, Measures of energy assessment for fixed asset investment, Measures for DSM, etc.</li> <li>• To update the energy conservation standards and continue on carrying out the EE forerunner program.</li> </ul>
	Supporting economic policy	<ul style="list-style-type: none"> <li>• To improve the green electricity price mechanism such as the ladder type price for high consumption industry.</li> <li>• To implement green tax refund policy</li> </ul>

# Policy framework for energy efficiency in the National Comprehensive Plan (2021-2025) for Energy Conservation and Emission Reduction



	Sectors	Targets/activities
EE mechanism	Energy efficiency market	<ul style="list-style-type: none"><li>• To promote the green electricity trading, DSM, EMC, etc</li><li>• To improve the energy labelling system and expand the product coverage</li></ul>
	Monitoring and inspection system	<ul style="list-style-type: none"><li>• To build up the Energy consumption statistics system and Energy consumption online monitoring system</li></ul>
	Capacity building	<ul style="list-style-type: none"><li>• Training, experience and info exchange, etc</li></ul>

# Key to success



# Lessons



- ◆ Weakness of data
  - ◆ Quantified management
  - ◆ Market schemes
- ◆ Lack of professionals
  - ◆ The practitioners
  - ◆ The third party
- ◆ Few policy evaluation
  - ◆ Cost effectiveness
  - ◆ Duplication of policy/program



**Thank you for your attention!**