



**MINISTRY OF ENVIRONMENT
AND GREEN DEVELOPMENT**

NATIONAL STANDARDS OF AIR POLLUTANTS IN COAL FIRED POWER PLANTS AND THERMAL PLANTS

Ministry of Environment and Green development
Clean technology and science division

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MNS 5919:2008**
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INTRODUCTION

- Coal is the major power source in the world. For example, about half of the United States electricity is generated from coal-fired power plants; China, India, Germany, Poland, South Africa and Australia have abundant coal reserves, where coal-fired power generation has a share of more than half of total electricity production
- In Mongolia, the proportion of coal-fired power generation reached 97% in the national power generation
- Coal-fired power plants in Mongolia are important pollutant sources to local air, due to the absence of necessary desulphurization devices and other adequate emission control measures. The total installed power generation capacity in Mongolia is 913 MW, where the available capacity is only 667 MW

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- The old emission standard for coal-fired power plants have been developed and issued in Mongolia. But compared with developed countries, such as Japan, South Korea the requirements for SO₂ and NO_x emission standards of Mongolia are very weak
- Based on the experience and lessons learned from North East Asian countries, and considering the current status of Mongolia regarding availability of coal, financial, environmental, and technology resources as well as people's understanding and acceptability, through careful comparison and analysis, we approved new emission standard on coal fired power and thermal plants with ADB supports

Power Plant in Mongolia

- In Mongolia, over 97% of electricity is generated by coal-fired power plants.
- Total available power capacity in Mongolia is 667 MW.
- 7 main coal-fired power plants with capacity of 836.3 MW.

No	Power Plants	Capacity (MW)	Available capacity (MW)	Installation year	Efficiency (in 2009)
1	TPP #2	21.5	18	1961	21.0
2	TPP #3	136	105	1968	38.6
3	TPP #4	560	452	1983	40.1
4	Erdenet Plant	28.8	39	1987	40.8
5	Darkhan Plant	48	21	1965	28.5
	CES Subtotal	794.3	615	--	
6	Dornod Plant	36	--	1969	19.4
7	Umnugobi Plant	6	--	2001	--
	Total	836.3			

Emission Standards for Power Plants in Mongolia

1. MNS 5919:2008

Maximum acceptable level and measuring method of air pollutants in exhaust gases from the steam and hot water boilers of TPP and thermal stations.

2. MNS 6298:2011

Maximum acceptable level and measuring method of air pollutants in flue gas of New thermal power plant and thermal plant”.

MNS 5919:2008

Maximum acceptable level and measuring method of air pollutants in exhaust gases from the steam and hot water boilers of TPP and thermal stations.

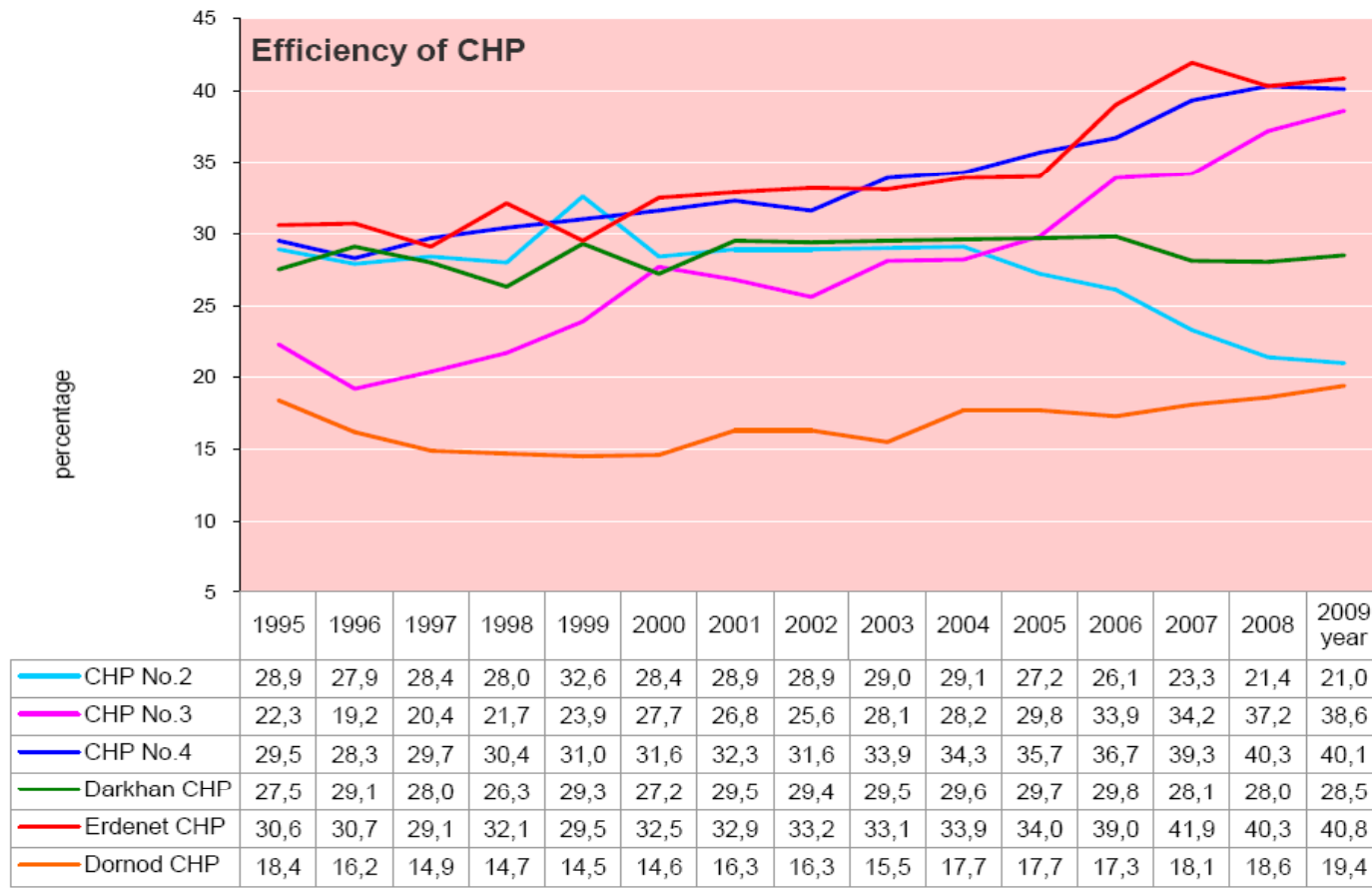
- The first emission standards for coal-fired boilers, including steam boiler for power plants in Mongolia, were established in 2008
- The emission standards are based on emission measurements from existing boilers so they are complex and without strong rationale to justify these standards.

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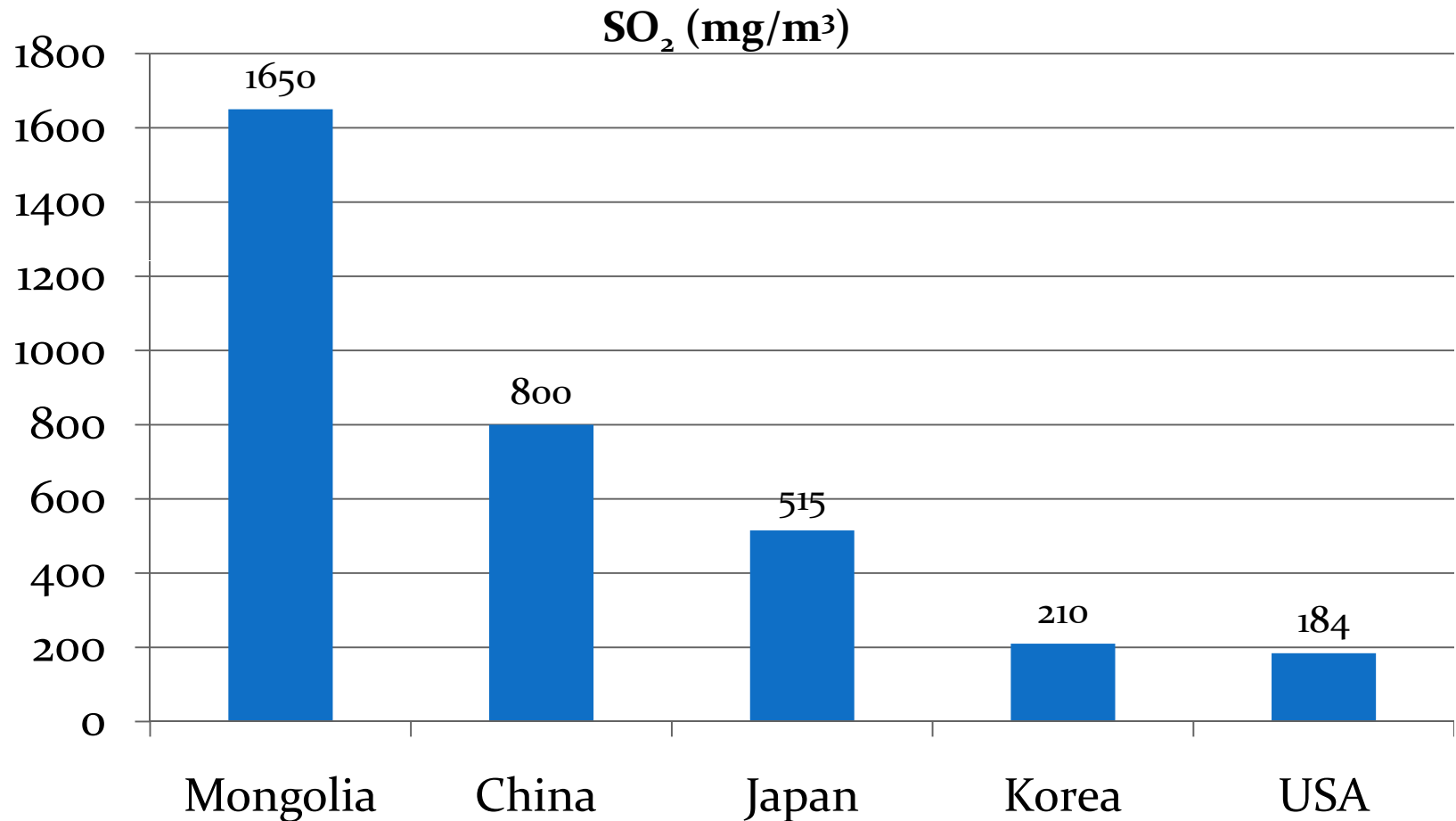
- It is the first emission standard for power plant boilers and HOBs in Mongolia. The standard regulated SO₂, NO_x, CO, and PM emission from coal-fired boilers for power plants and HOBs.
- There are 15 different emission limitation levels on each pollutant for different type of boilers and capacities, including steam boiler and hot water boilers.

Energy Efficiency in Mongolia

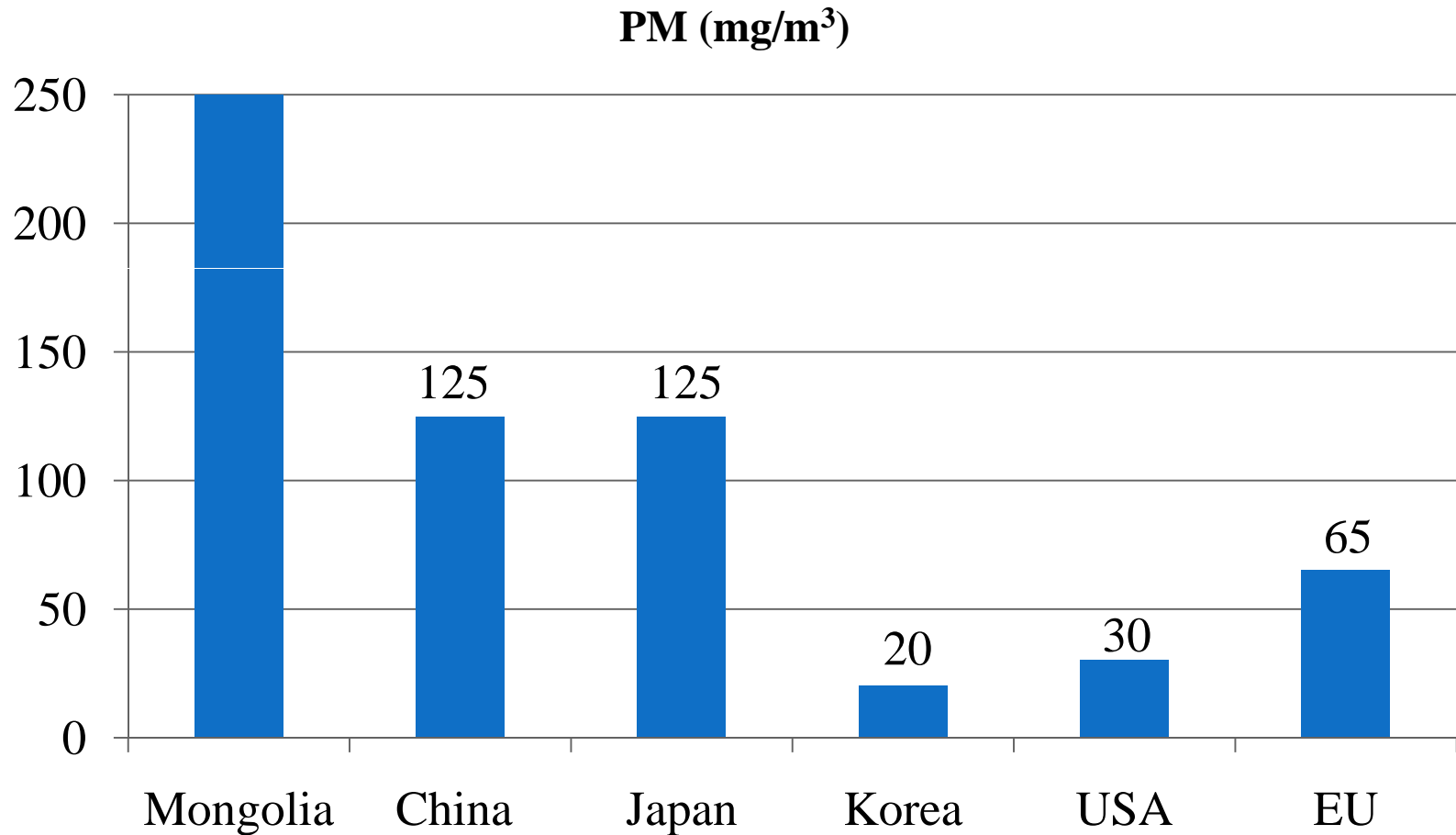
- The fuel utilization efficiency at CHPs: 20-40%
- Modern CHP plant efficiency: 50-80%.



Comparison of Average SO₂ Emission Standards

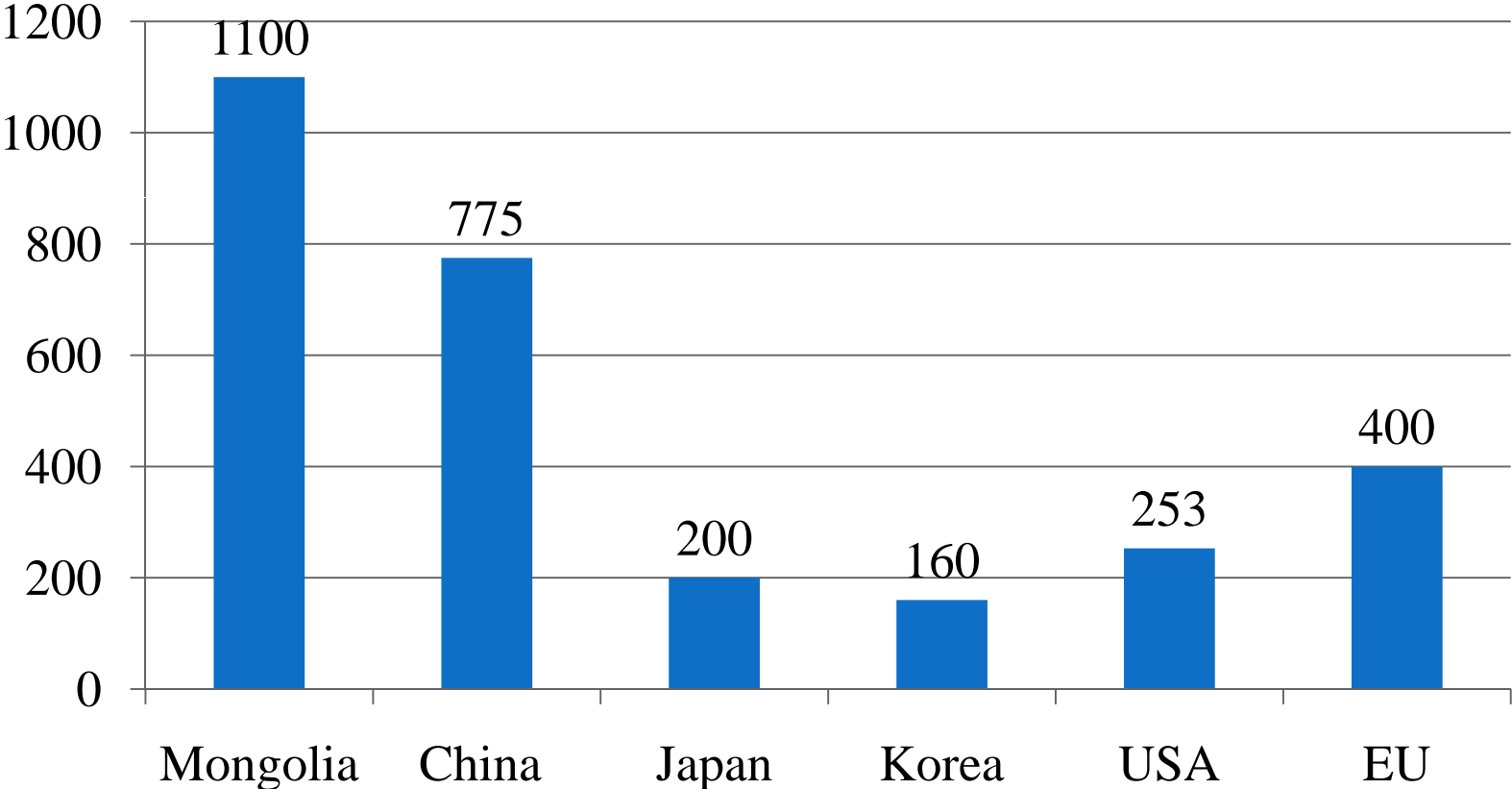


Comparison of PM Emission Standards



Comparison of NOx Emission Standards

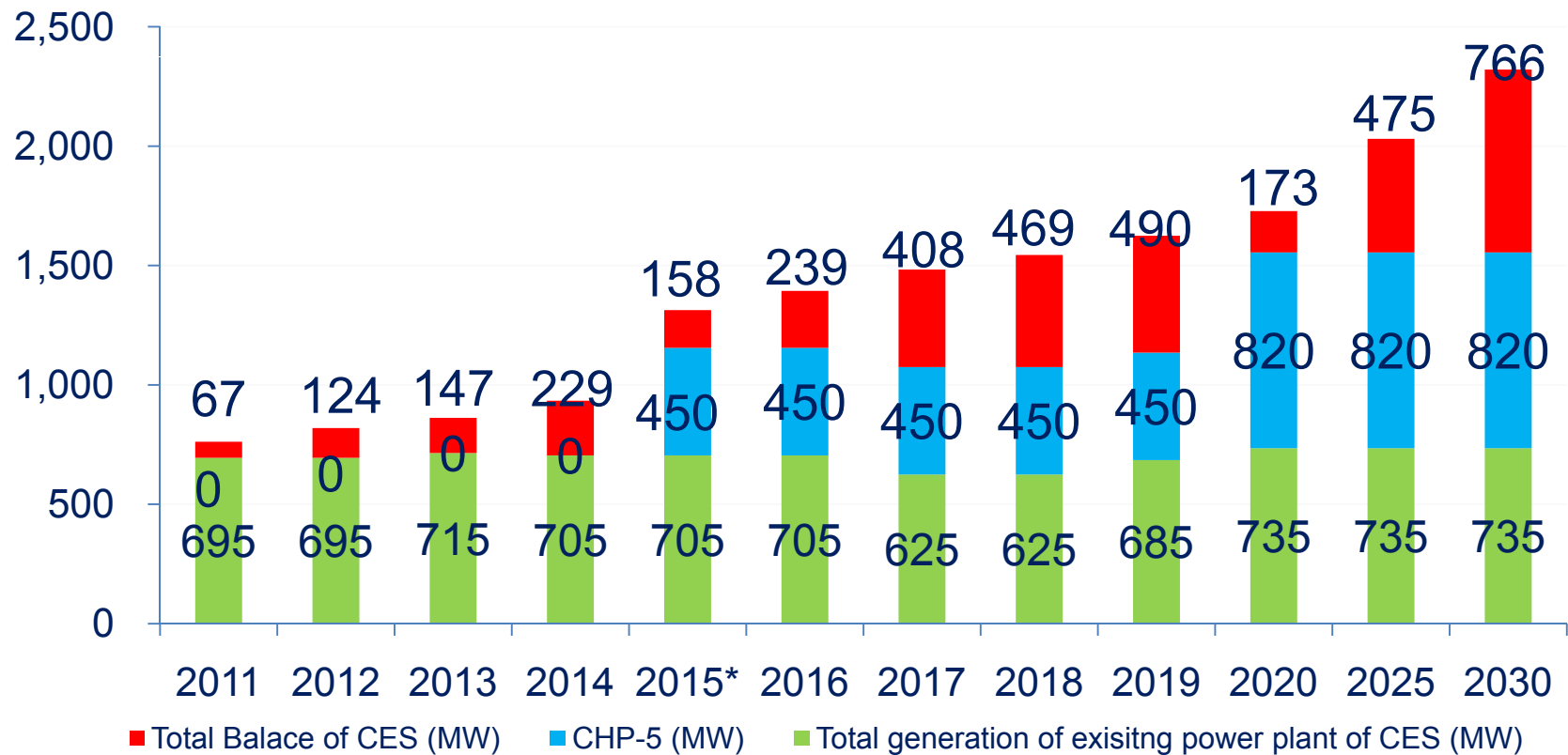
NOx (mg/m³)



Power Supply and Demand Assessment

Additional power demand forecast:

- 608 MW, by 2015
- 993 MW, by 2020
- 1568 MW, by 2030



MNS 6298:2011 Maximum acceptable level and measuring method of air pollutants in flue gas of New thermal power plant and thermal plant”.

- The air pollution in the Capital City of Mongolia is very serious, especially during winter time. In term of the smoke problem, UB is highly polluted city in the world.
- Pollutants such as PM and SO₂ are much higher than international standards.

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- The measured PM₁₀ levels in UB are 2-5 times higher than Mongolia's AQS of 50 µg/m³, 5-10 times higher than the World Health Organization (WHO) Guideline Value of 20 µg/m³, and 3-7 times higher than the European limit value of 40 µg/m³.
- It is well-documented that particles (primary PM₁₀, PM_{2.5}, and secondary PM due to SO₂ and NO_x emissions) cause negative health effects when inhaled by people. Inhaling PM can severely affect the lungs and the heart.

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- Therefore, more stringent emission standards on PM, SO₂, and NO_x are urgently needed to reduce current emissions to acceptable levels.
- The new emission standards covered CO, SO₂, NO_x emissions as controlled pollutants for existing and new power plants

Emission Control Equipment

- CHP #4 which is equipped with ESP for PM control.
- Other the coal-fired steam boilers for power plants is equipped with wet scrubbers.
- The Boilers for thermal stations equipped with cyclones.
- No emission control equipment is used on heat only boilers
- Uncontrolled pollutants emit from these boilers and power plants pollute the air in surrounding areas.

Comparisons of Emission Standards

Pollutant	Unit	Mongolia	China	Japan	ROK	U.S.	EU
SO ₂	mg/nm ³	615-193,1	400-1200	170-860	210	184	400-2000
PM	mg/nm ³	50-200	50-200	50-100	20	20-40	30-100
NO _x	mg/nm ³	450-1100	450-1100	200	160	135-370	200-600

- For PM emission standards, the ROK has the lowest emission standards for PM among the five countries.
- The U.S. also has very stringent PM standards.
- Again, Mongolia has the highest emission standards for PM.
- For NO_x emission standards, again ROK has the lowest standards at 160 mg/m³ while Mongolia has the highest at 715-1,100 mg/m³ for relative large boilers (>76 ton/hr). It has been reported that the actual NO_x emission limits both Japan and U.S. are much lower than the standards.

NEW Emission Standards

- There are 7 existing power plants and over 1500 of HOBs in Mongolia. Mongolia still relies on them to provide power and heating for the citizens. These boilers are equipped with old technologies and no control of air emission in most cases.
- It is not suitable and not financially favorable to retrofit them with new control technologies.
- New standard given existing facility some time to meet regional standards, and otherwise they will be phased out.

PM and SO₂ Emission Standards for Newly-Built Power Plants

Region	SO ₂ (mg/m ³)	CO (mg/m ³)
Area I	400	50
Area II	600	200

Note: **Area I** is defined as the urban areas where population density equals to or greater than 10 persons per square kilometer or the population is 1,000 or greater.

Area II is defined as the remote areas that have a population density smaller than 10 persons per square kilometer or the population is less than 1,000.

New NO_x Emission Standards

Volatile Content in Coal	NO _x (mg/m ³)
$V_{\text{daf}} < 10\%$	1,100
$10\% \leq V_{\text{daf}} \leq 20\%$	650
$V_{\text{daf}} > 20\%$	450

Since most coal deposits in Mongolia are low sulphur coal. The emission standards for SO₂ can be tighter than for high sulphur coal without increasing control cost.

Comparison of New Mongolian Standards with Other Countries' Standards

Pollutant	Mongolia	China	Japan	ROK	U.S.
SO ₂ (mg/m ³)	400-600	400-1200	170-860	210	184
NO _x (mg/m ³)	450-1,100	450-1,100	200	160	135-370
CO (mg/m ³)	50-200	50-200	50-100	20	20-40

COMMENTS AND RECOMMENDATIONS

- **To investigate best experiences and introduce environment friendly technologies for emission reduction of coal fired power plants**
- **To built bottom ash processing factory**
- **Technical assistance on coordination with related organizations**

Reference

- MNS 5919:2008 Maximum acceptable level and measuring method of air pollutants in exhaust gases from the steam and hot water boilers of TPP and thermal stations.
- MNS 6298:2011 Maximum acceptable level and measuring method of air pollutants in flue gas of New thermal power plant and thermal plant” .
- Mitigation of Trans-Boundary Air Pollution from Coal-Fired Power Plants in Northeast Asia. TA6371-REG

THANK YOU.

Web: www.mne.gov.mn

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