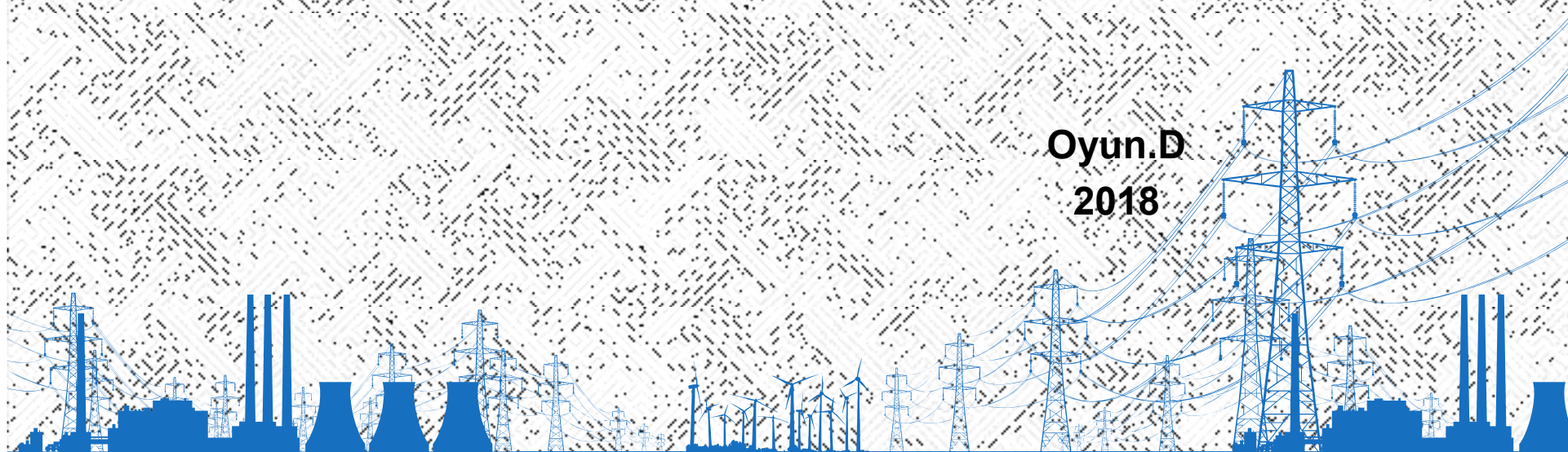




GOVERNMENT OF MONGOLIA
MINISTRY OF ENERGY

ENERGY SECTOR OF MONGOLIA, INTERNATIONAL COOPERATION POSSIBILITIES

**Oyun.D
2018**





GOVERNMENT OF MONGOLIA
MINISTRY OF ENERGY

CONTENT

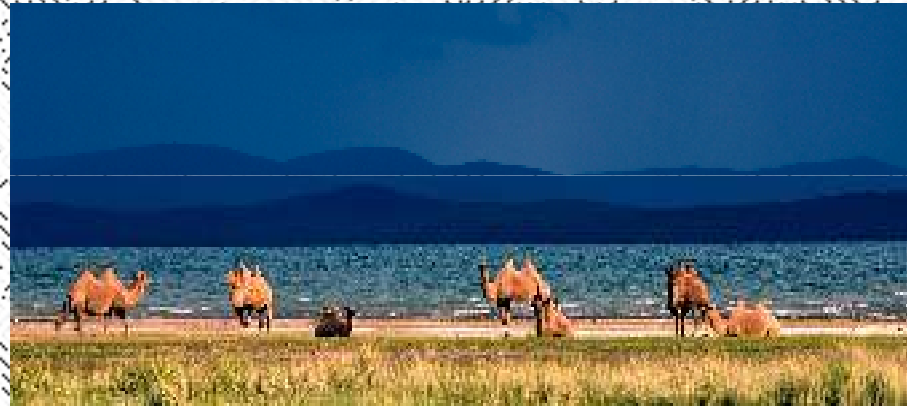
- Country profile
- Energy sector of Mongolia
- Cooperation possibilities in energy sector
- Heating system improvement project in 10 Mongolian province centers /by EDCF loan/





- Area: 1.564 million km²
- Population: 3.1 million
- Capital city: Ulaanbaatar (1.3 million)
- ≈ 40% of the population lives in the countryside
- Official language: Mongolian
- Ethnic groups:
 - Mongols 96%,
 - Khazakhs 4%
- Religions:
 - Buddhism 56%,
 - Shamanism 4%,
 - Islam 3%,
 - non 37%

Mongolia has 4 seasons and there is an extreme continental climate with long, cold winters and short summers. The geography of Mongolia is varied, with the Gobi Desert to the cold and mountainous regions.



- Highest point: “Huiten Peak ” (4,653 m.a.s.l)
- Lowest point: “Khukh Nuur” depressions (532 m.a.s.l)
- Lowest annual average temperature: -33°C (-50°C)
- Highest annual average temperature: $+23^{\circ}\text{C}$ ($+35.8^{\circ}\text{C}$)

Mongolia Economy Data (www.focus-economics.com May 22, 2018)

	2014	2015	2016	2017
<u>GDP per capita (USD)</u>	4,165	3,996	4,075	3,903
<u>GDP (USD bn)</u>	12.2	11.9	12.3	11.9
<u>Economic Growth (GDP annual variation in %)</u>	8.1	2.5	1.4	5.1
<u>Curr Account (% of GDP)</u>	-15.9	-8.0	-5.7	-9.7
<u>Exports (annual variation in %)</u>	35.1	-19.1	5.4	-26.0
<u>Imports (annual variation in %)</u>	-17.5	-27.5	-11.6	-29.2
<u>International Reserves (USD)</u>	1.7	1.3	1.3	3.0
<u>External Debt (% of GDP)</u>	179	192	200	230

ENERGY SECTOR OF MONGOLIA

Electricity usage /2017/ 7611.6 mln.kW.h.

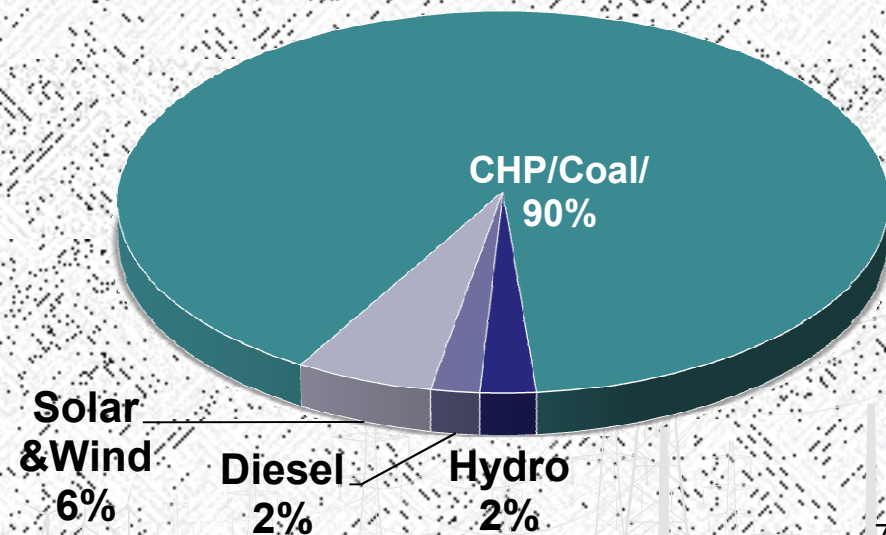
- Generation 6089.1 mln.kW.h - 80 %
- Import 1522.5 mln.kW.h - 20 %

Peak load /2017.12.26/ 1016 MW

Heat Generation /2017/ 8933.3 thousand Gcal, here of:

- by water 8325.8 thousand Gcal - 93.2%
- by steam 607.5 thousand Gcal - 6.8%

**The total installed capacity of
generation plants - 1273 MW,
by type**



Mongolian power system consists 4 systems:

- Central Energy System (CES),
- Western Energy System (WES),
- Altai- Uliastai Energy System (AUES),
- Eastern Energy System (EES),

There are:

- 7 CHP /age 30-60 years, efficiency 19-44%/,
- 2 hydropower plants,
- 2 wind park,
- off-grid renewable energy systems,
- regional small capacity diesel generators

THE POWER SYSTEM OF MONGOLIA

Western Power System

Eastern Power System

Ulaanbaatar

Altai-Uliastai Power System



There are 330 sum /province center/ in Mongolia, 329 from them connected to the electricity networks by transmission lines.

The total length of transmission lines **44 862** km,
number of total substations **5830**.

Transmission and distribution losses /2017/ 4.1-25.94 %

Total number of electricity consumers /2017/ **653 954**

- apartment 40.9%,
- entity & industry 7.5%,
- ger district 51.7%

Total number of heat consumers /2017/ **228 168**



Electricity tariff

No	Classification	Unit	Tariff
I.Residential			
1	Simple meter		
a	Monthly consumption under 150 kWh	USA \$/ kWh	0.041
b	Monthly consumption over 150 kWh	USA \$/ kWh	0.049
2	Time use of meter /2 parts/		
a	Daytime /06am~21pm/	USA \$/ kWh	0.043
b	Evening and nighttime /21pm~ 06am/	USA \$/ kWh	0.032
3	Monthly base tariff	USA \$/ kWh	0.828
II.Mining industries			
1	Simple meter	USA \$/ kWh	0.065
2	Time use of meter /3 parts/		
a	Daytime (06 am ~17 pm)	USA \$/ kWh	0.065
b	Evining (17 pm ~ 22 pm)	USA \$/ kWh	0.011
c	Nighttime (22 pm~06 am)	USA \$/ kWh	0.032

III. Lighting of public streets and squares in cities and center of province

1 Heating season /Oct, Nov, Dec, Jan, Feb, Mar, Apr /

a Daytime (06.00 am~ 19.00 pm)	USA \$/ kWh	0.053
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b Evening and Nighttime (22.00 pm~06.00 am)	USA \$/ kWh	0.032
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2 Non heating season /Apr ~Sep /

a Daytime (06.00 am~ 19.00 pm)	USA \$/ kWh	0.053
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b Evening and Nighttime (22.00 pm~06.00 am)	USA \$/ kWh	0.032
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IV. Other sectors

1 Simple meter	USA \$/ kWh	0.053
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2 Time use of meters /3 parts/

a Daytime /06:00 am ~17:00 pm/	USA \$/ kWh	0.053
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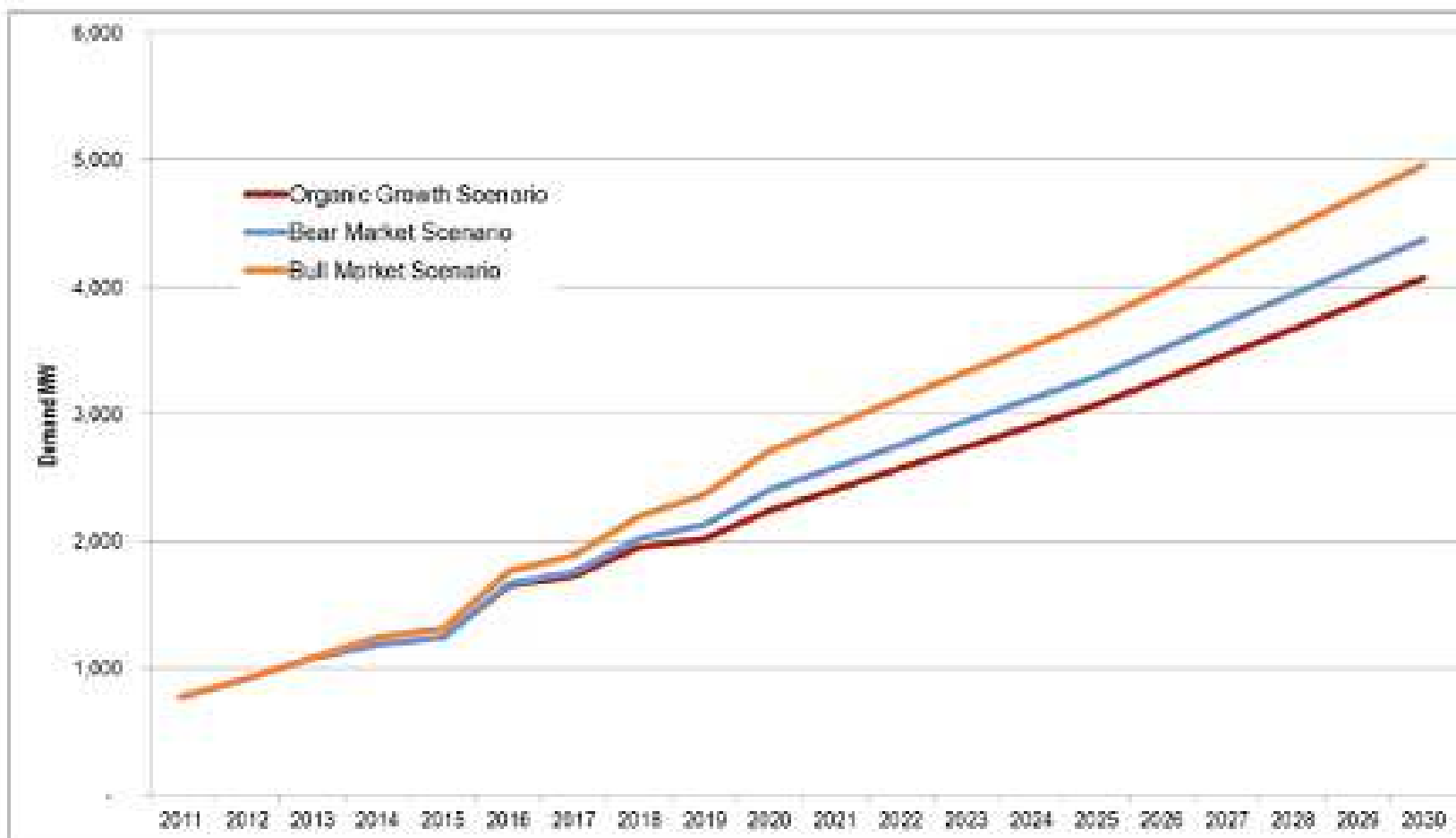
b Evening /17:00 pm ~ 22:00 pm /	USA \$/ kWh	0.087
----------------------------------	-------------	-------

c Nighttime /22:00 pm ~ 06:00 am /	USA \$/ kWh	0.032
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3 "Electrical Transport" company /Trolley company/	USA \$/ kWh	0.032
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Electricity Demand Forecast (MW)



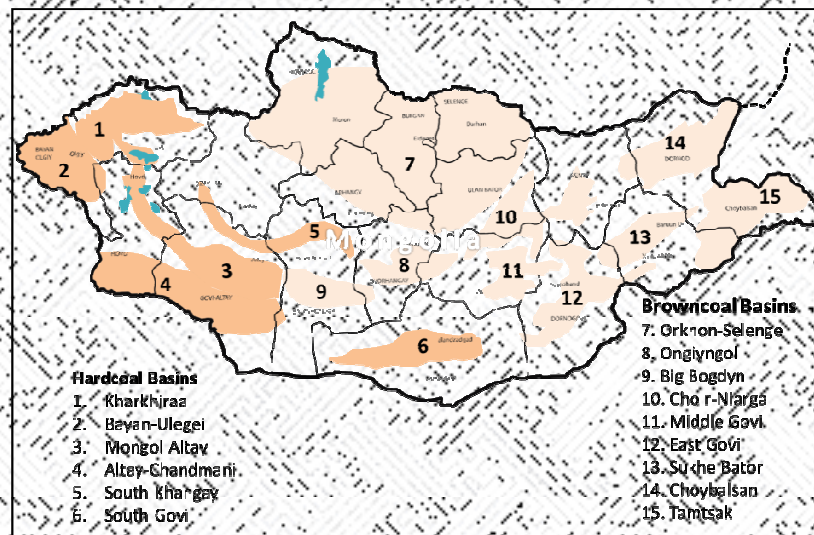
Source: Master Plan by ADB



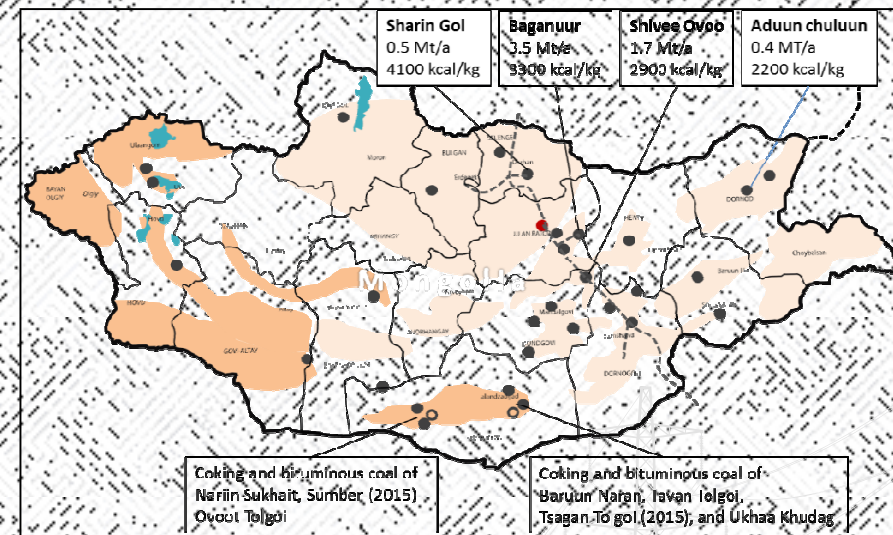
Mongolia is a rich country for its primary energy resources, there are abundant proven reserves of coal, oil, uranium, renewable energy, ample resources of shale oil and natural gas/coal bed methane/

COAL

Coal Basins



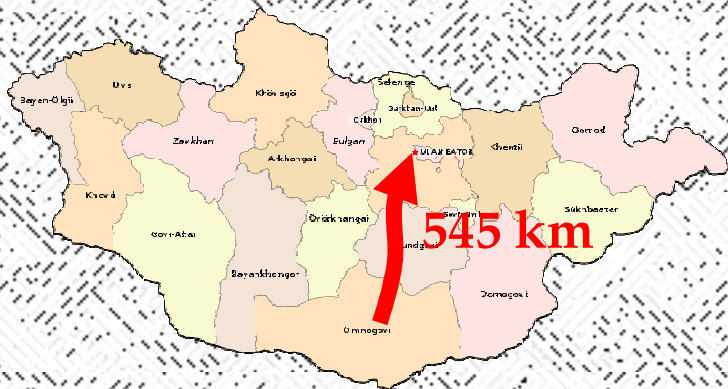
Key Mines



- Estimated total resources ~ 173 billion ton in 15 coal basins
- Over 370 identified occurrence in 85 deposits
- Proven Reserves 12 billion ton, of which 2 billion is coking coal
- Around 1/3 in Gobi Region
- Around 1/3 in Eastern Region

- Mines in Gobi area are for export /18 million in 2013/
 - Nariin Sukhait
 - Tavan tolgoi
- Mines in other region are for power production and household heating /12 million in 2013/
 - Baganuur, Shivee-Ovoo, Shariin Gol etc.,

UNCONVENTIONAL NATURAL GAS



6,400 MM ton of coal in Tavan Tolgoi
(6,150 MM ton, at the depth 300~1000 m)

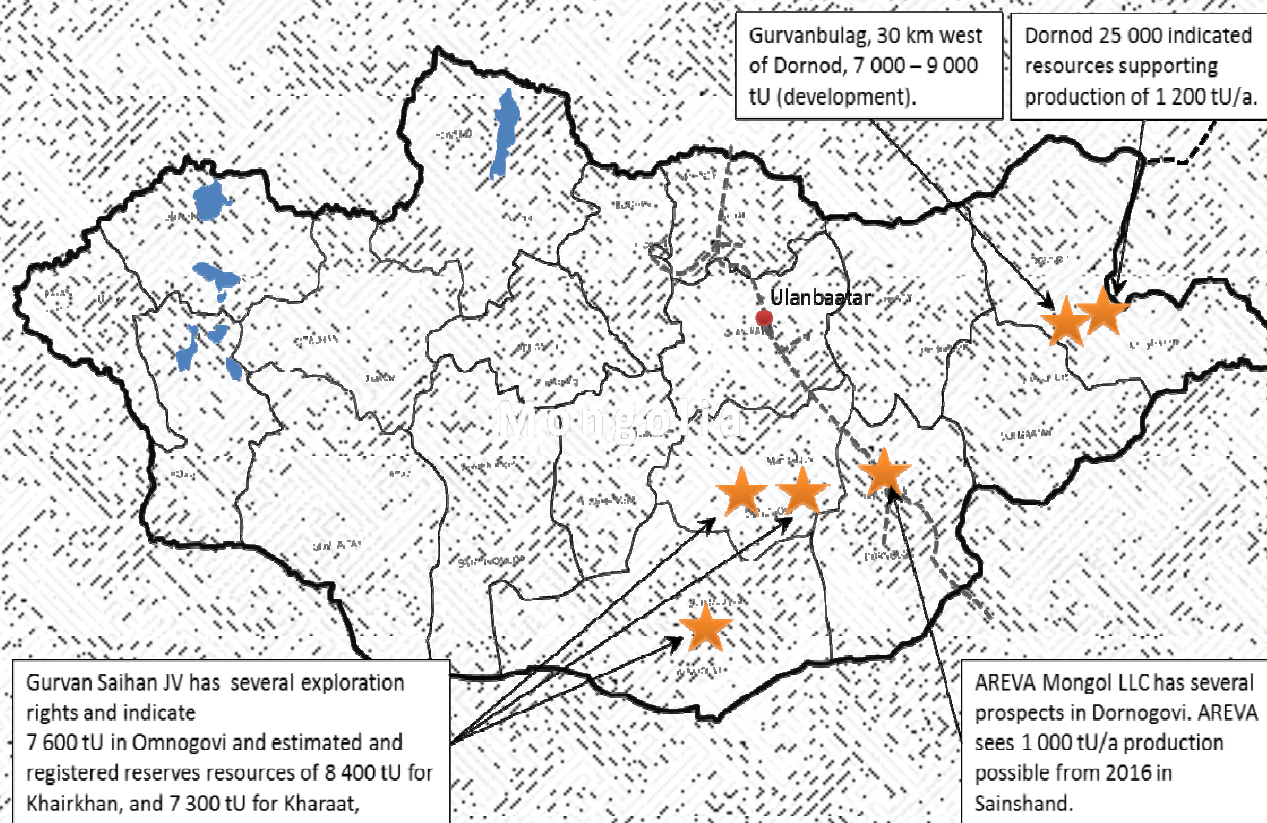
OIL EXPLORATION MAP



- Total 31 exploration blocks
- Current Proven reserve is 332 million ton



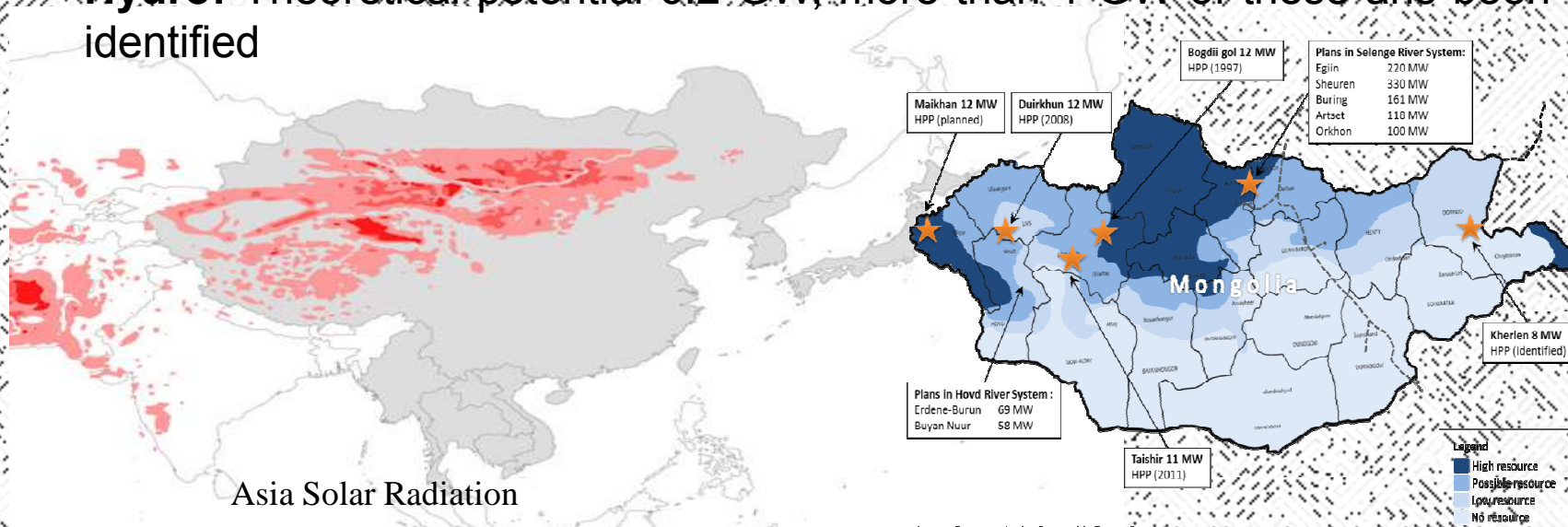
URANIUM



- Mongolia contains 6 uranium strata and more than 100 uranium deposits.
- Mongolian geologists now believe that Mongolia has 60,000 metric tons of uranium reserves, while Russian experts have much higher estimates, ranging from 120,000 to 150,000 metric tons.

RENEWABLES

- Rich resources of solar, wind and hydro in Mongolia:
 - Solar:** 270-300 sunny days in a year, 4.3-4.7 kWh/meter or higher per day
 - Wind:** 10 % of the total land area can be classified as excellent for utility scale applications, Power density 400-600 W/m², the resource could potentially supply over 1100 GW of installed capacity.
 - Hydro:** Theoretical potential 6.2 GW, more than 1 GW of these has been identified





LEGAL ENVIRONMENT

Key Documents

No	Document	Approved/ Last Update	Contents
Legal Framework			
1	Energy Law of Mongolia	2001/2015	Regulate matters relating to energy generation, transmission, distribution, dispatching and supply activities, construction of energy facilities and energy consumption that involve utilization of energy resources & Tariff, License
2	Renewable Energy Law of Mongolia	2007/2015	Regulate generation and supply of energy utilizing renewable energy sources & Tariff, License
3	Concession Law	2010	Establish the framework for granting concessions to private investors to use existing infrastructure facilities owned by the state, and to construct new infrastructure facilities for the purpose of providing services to the general public
4	Investment Law	2013	Protect the legal rights and interests of investors in the territory of Mongolia, to establish a common legislative guarantee for investment, to stabilize the tax environment.
Policy Documents			
5	Infrastructure Development Program of Southern Gobi	2010	Plans and actions to develop infrastructure for strategic mineral deposits in Gobi area
6	State Policy on Energy	2015	Government Policy for energy sector development for 2015-2030

“State Policy on Energy” 2015-2030**Expected Results**

In the 1st stage 2015-2023: The stage to develop energy safety resources and backup capacity, establish a foundation for the development of renewable, enhance normal documents and improve legal environment.

The installed power capacity will be doubled, and start using critical technology with high parameters. Hydro will be taken place at least 10% of the total installed power capacity and it will increase packup capacity to 10%, and create fundament for renewable sector to development intensively, enhance tariff system.

In the 2nd stage 2024-2030: The stage to export secondary energy and develop sustainably the renewable sector.

The backup capacity of power system will be reach at 20% and share of renewables will be reach at 30%. Integrated smart energy system will be created by connecting regions with high capacity transmission lines. State owned Power companies will be become a public company. Distribution and supply service will be privatized and energy sector will be worked as a competitive marked with regulation. Secondary energy will be exported by connecting with North east Asian countries with high capacity DC lines.

“State Policy on Energy” 2015-2030

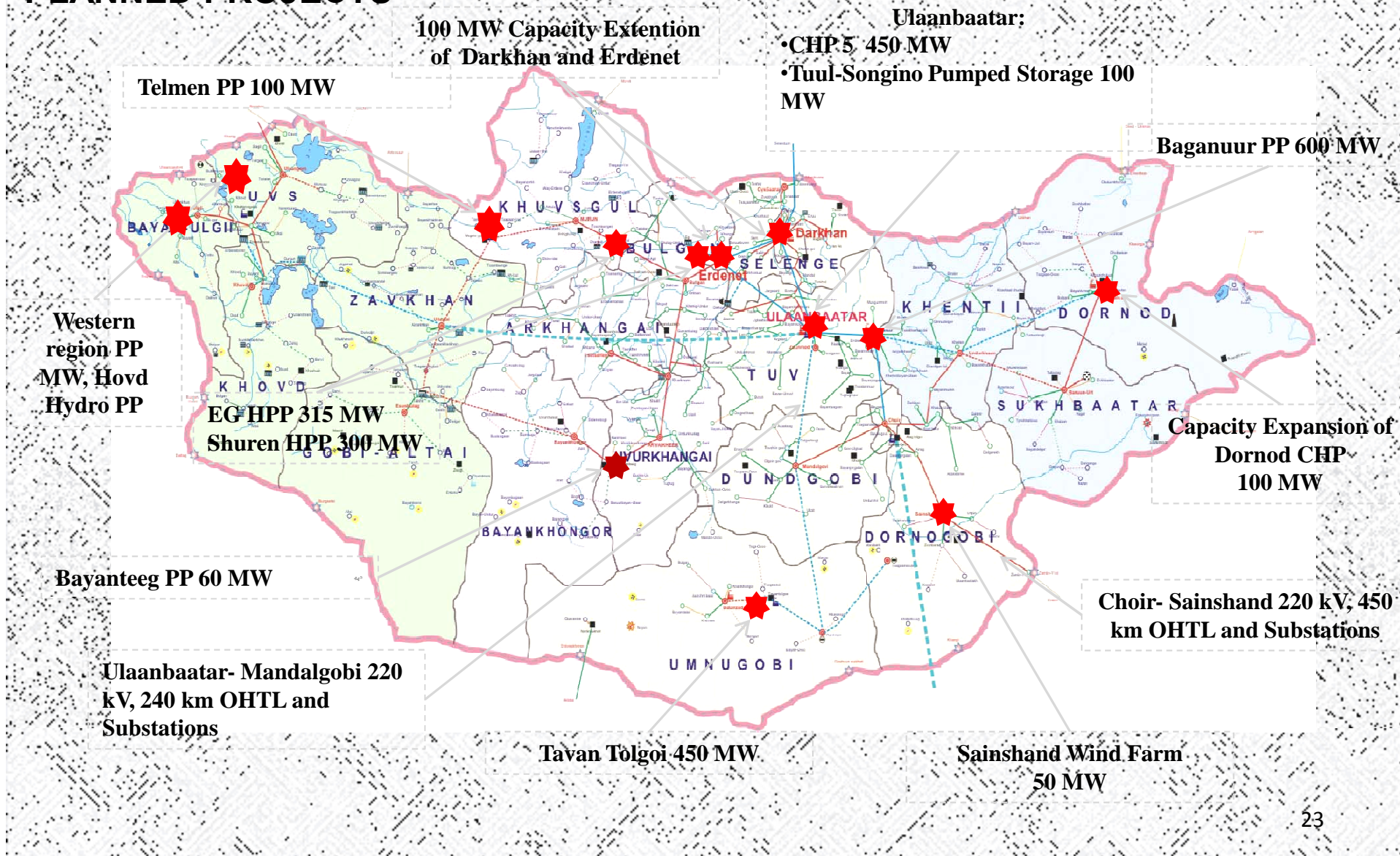
Expected Results - Criteria

Indicators	2014 on /Base year/	1 st stage /by 2023 /	2 nd stage /by 2030/
Reserve Capacity for Electricity Generation	-10%	10 % ≤	20% ≤
Reserve Capacity for Heat Generation in Cities	3%	10 % ≤	15 % ≤
Profit Share on Tariff Structure in Central Region	-16.22 %	0%	5%
Own Use of CHP's	14.4 %	11.2%	9.14 %
Transmission & Distribution Loss /excluding Oyutolgoi/	13.7%	10.8%	7.8%
Share of Renewables on total Installed Capacity for Domestic Supply	7.62%	20%	30%
Greenhouse Gas Emission per 1 Gcal Power Generation	0.52 ton CO ₂ equivalent	0.49 ton CO ₂ equivalent	0.47 ton CO ₂ equivalent
Reduction of Building Heat Loss	0%	20%	40%
Technological Achievements that have to be utilized in Energy Sector	CFB	Sub Critical Coal Bed Methane, Battery Energy Storage, Pumped Storage	Super Critical, Ultra S/Critical, Hydrogen, Concentrated Solar Plant

IN ENERGY SECTOR



PLANNED PROJECTS



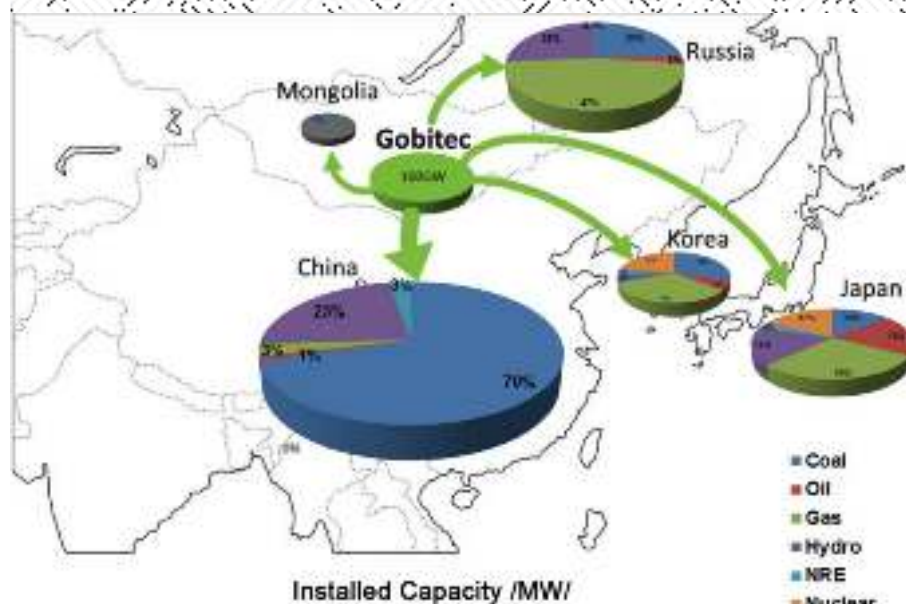
Cooperation possibilities:

- For planned and potential projects of power plant and transmission lines:
 - As a financier, contractor, equipment supplier, consulting service
 - concession agreement: built-operate-transfer, built-transfer,
 - independent power producer
 - PPP
- For existing power projects:
 - In the projects of operational enhancement and restructuring:
 - Operator company
 - Consultant
 - In the Projects of rehabilitation and capacity extension:
 - Investor, contractor, equipment supplier, consulting service
- General:
 - energy safety and efficiency technology, techniques /battery storage, heat pump ... etc/

Rich solar and wind resources in southern part of Mongolia and northern part of inner Mongolia /China/

Energy resources: from Russia, Mongolia and China

GOBI TEC AND ASIA SUPER GRID INITIATIVE



Resource: "GOBITEC AND ASIAN SUPER GRID FOR RENEWABLE ENERGIES IN NORTHEAST ASIA" Report 2014



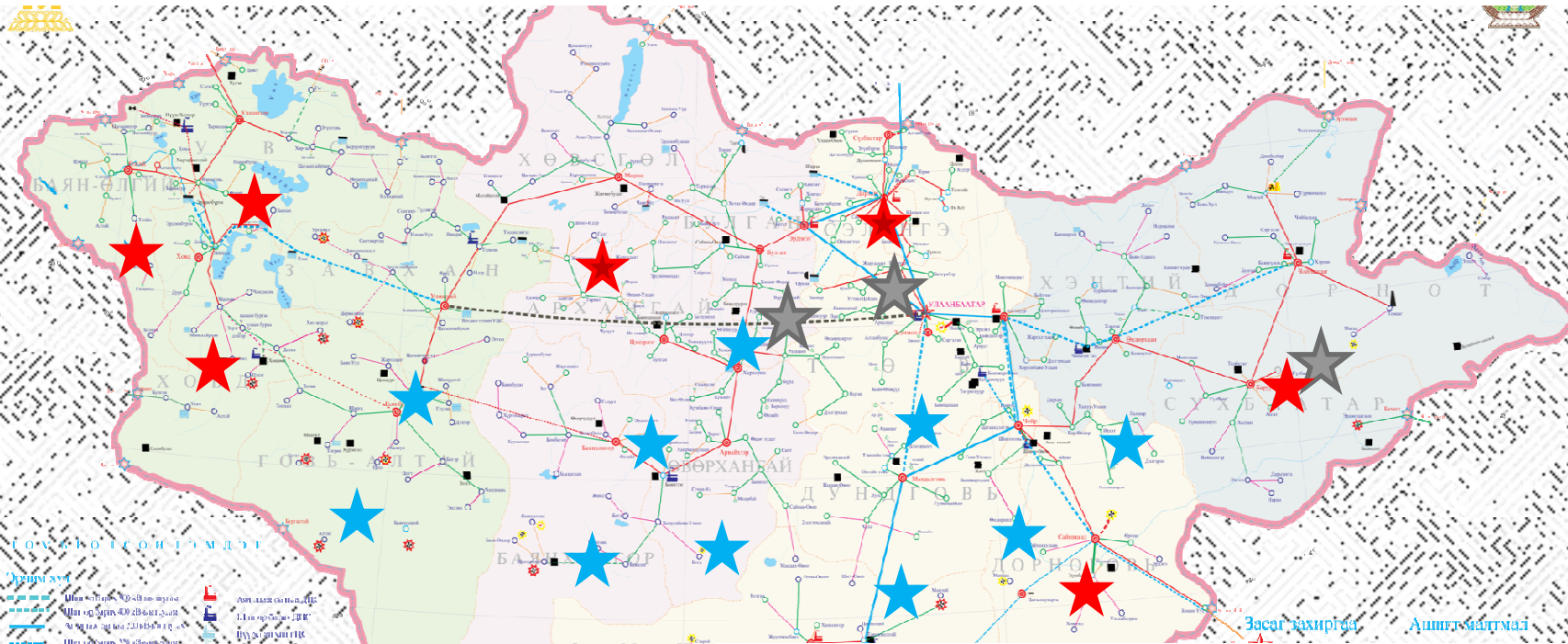
HEATING SYSTEM IMPROVEMENT PROJECT IN 10 MONGOLIAN PROVINCE CENTERS

Project cost: 50 mln.USD
 Loan by : KEXIM bank, EDCF
 FS by: “KDHEC” / developed in June 2018/

❖ Project Overall Schedule

Description	2017		2018												2019												2020												2021					
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
Major Milestones																																												
Feasibility Study																																												
Loan Agreement																																												
Contract for Consultancy Service																																												
Basic Design																																												
Bid for Construction Contract																																												
Implementation Design																																												
Authority Permits for Construction																																												
Construction Supervision (S/V)																																												
Procurement & Construction																																												
Commissioning																																												
Authority Permits for Use																																												
Normal Operation for DH Service																																												
Plant Stabilization (1 Full Year)																																												

Heating system improvement project in 10 province centers



Centralized heat system and CHP -4

Centralized heat system and Heat Plant - 7

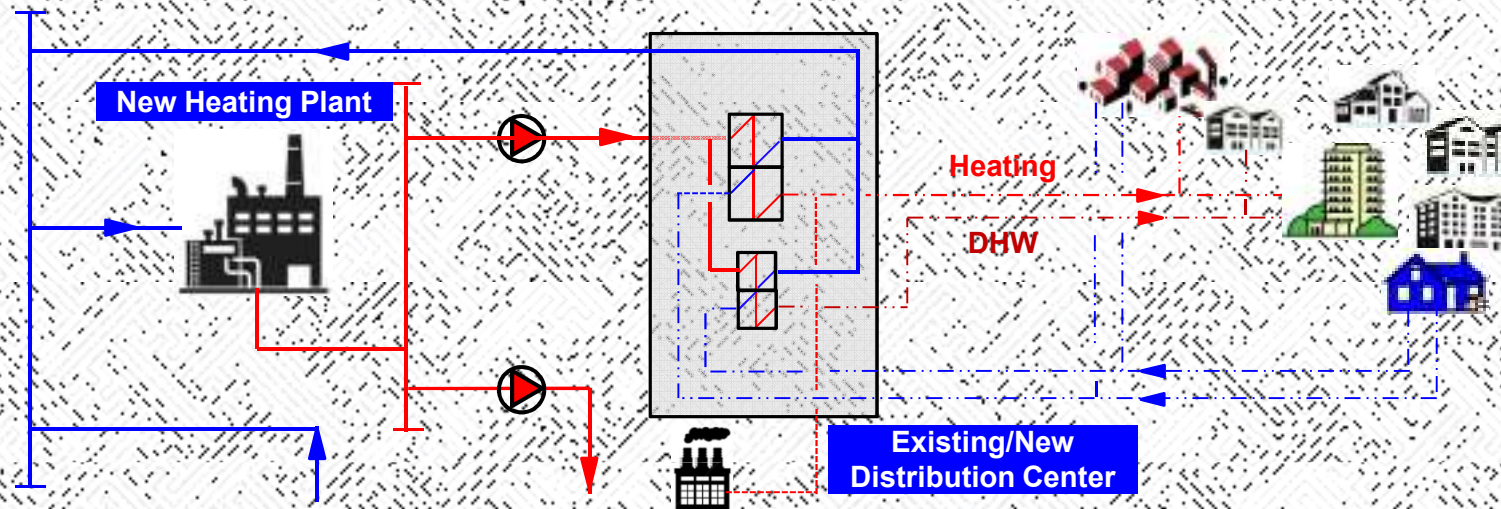
Heat only boiler and separated heat supply system- 9

The reason to implement the project:

- Long and cold heating season - 8 months;
- Low pressure boiler with low efficiency;
- Aged heat lines with higher heat insulation;
- No hot water supply system in household
- Higher emission ... etc

1-1. Project Definitions (1)

❖ **Scope : Heating Plant + Distribution Centers + 1st Circuit DH Network**



❖ **Project Objectives**

- Building a Centralized DH system
 - Efficiency Improvement of DH Heating Boilers
 - Plant Expansion for Increased DH Load
 - Year-Round Supply of Domestic Hot Water
 - DH Network Configuration
 - Power Supply System
 - Emergency Power Supply Capacity
- Indirect by Plate Heat Exchangers
 - One Transformer+ Emergency Generator
 - Power Supply to One Boiler System





GOVERNMENT OF MONGOLIA
MINISTRY OF ENERGY

**THANK YOU
FOR YOUR ATTENTION**

Website: <http://www.energy.gov.mn/>

