



Updating Energy Sector Development Plan

Presented by,

Mike Emmerton

May 17, 2012

Terms of Reference & Outputs

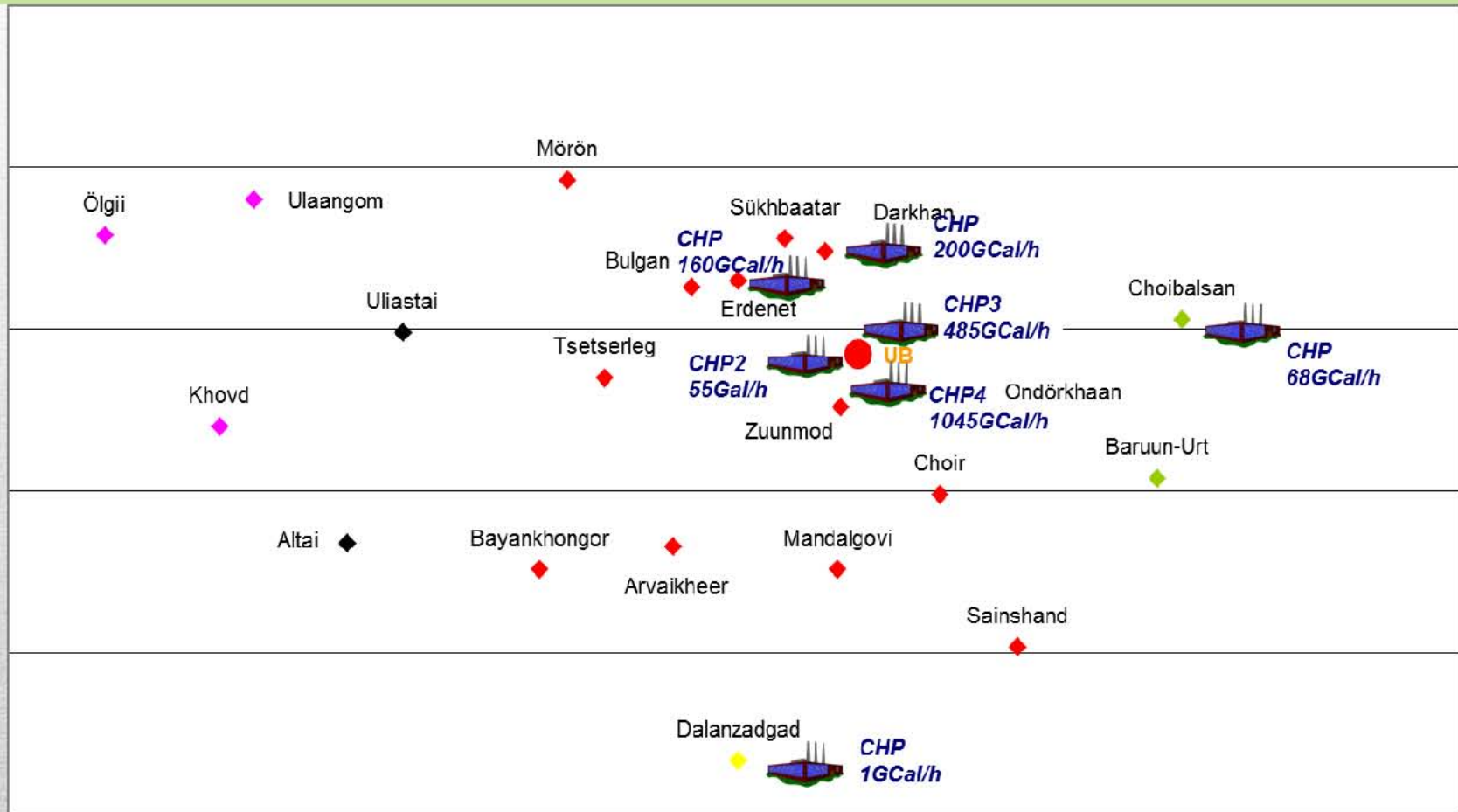
1. A policy note with recommended policies and reforms to overcome the sector's investment constraints
2. A comprehensive sector investment plan, 2010–2020 to identify priority investment projects.

The plan is to be based on (a) analysis of performance of electricity and heat generation, transmission, and distribution to identify an investment long list, and (b) a balanced set of indicators to identify a short list of potential investment to prepare a comprehensive sector investment plan

3. Capacity development training and seminars to strengthen capacity in sector assessment and investment needs analysis

Current Situation – Heat Supply to Major Centres

- Three UB CHP / District Heating plants with total capacity 1,585 Gcal/h
- 170 HOBs in UB Districts with capacity 140GCal/h
- Darkhan, Erdenet, Choibalsan, Dalanzadgad CHP total capacity 430 GCal/h



Current Situation – UB Heat Supply

UB CHP's

- Heat demand exceeds supply capacity in 2012

Source	Capacity	Demand	Reserve
	Gcal/h	Gcal/h	Gcal/h
CHP No.2	55	54	1
CHP No.3	485	485	0
CHP No.4	1,045	1,016	29
Total	1,585	1,555	30

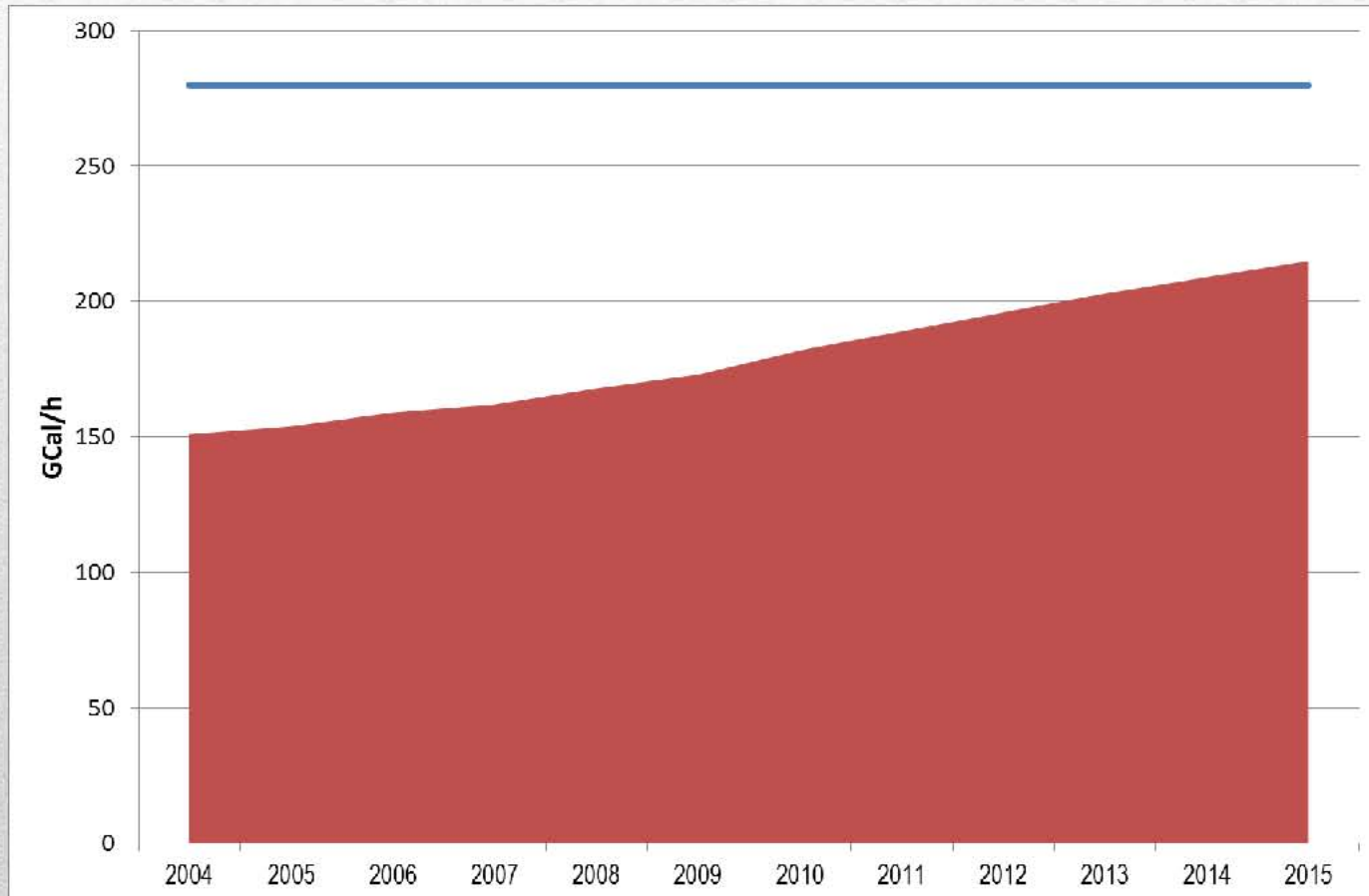
UB Districts

- HOBs
- 166 Boilers

UB Districts	Demand
	Gcal/h
Han-Uul	16.5
Bayanzurh	17.1
Songinohairhan	5.8
Suhbaatar	2.8
Chingeltei	4.9
Bayangol	0.35
Total:	47.35

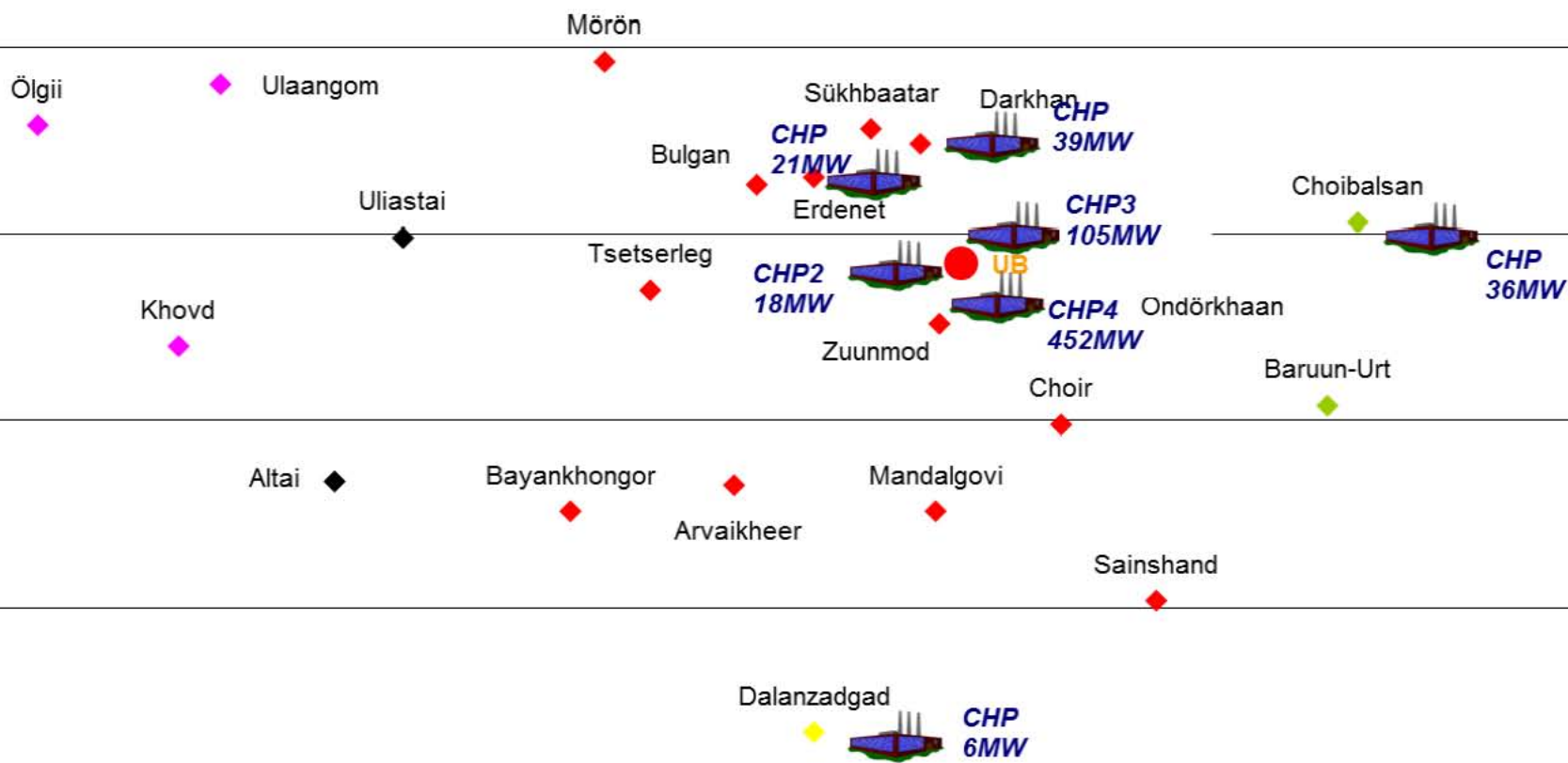
Current Situation – Rural Heat Supply

- HOBs size 2.5 to 7.5 GCal/h supply Aimag centres
- Total production capacity 280 Gcal/h in 2012
- Total heat losses 40% - 60%



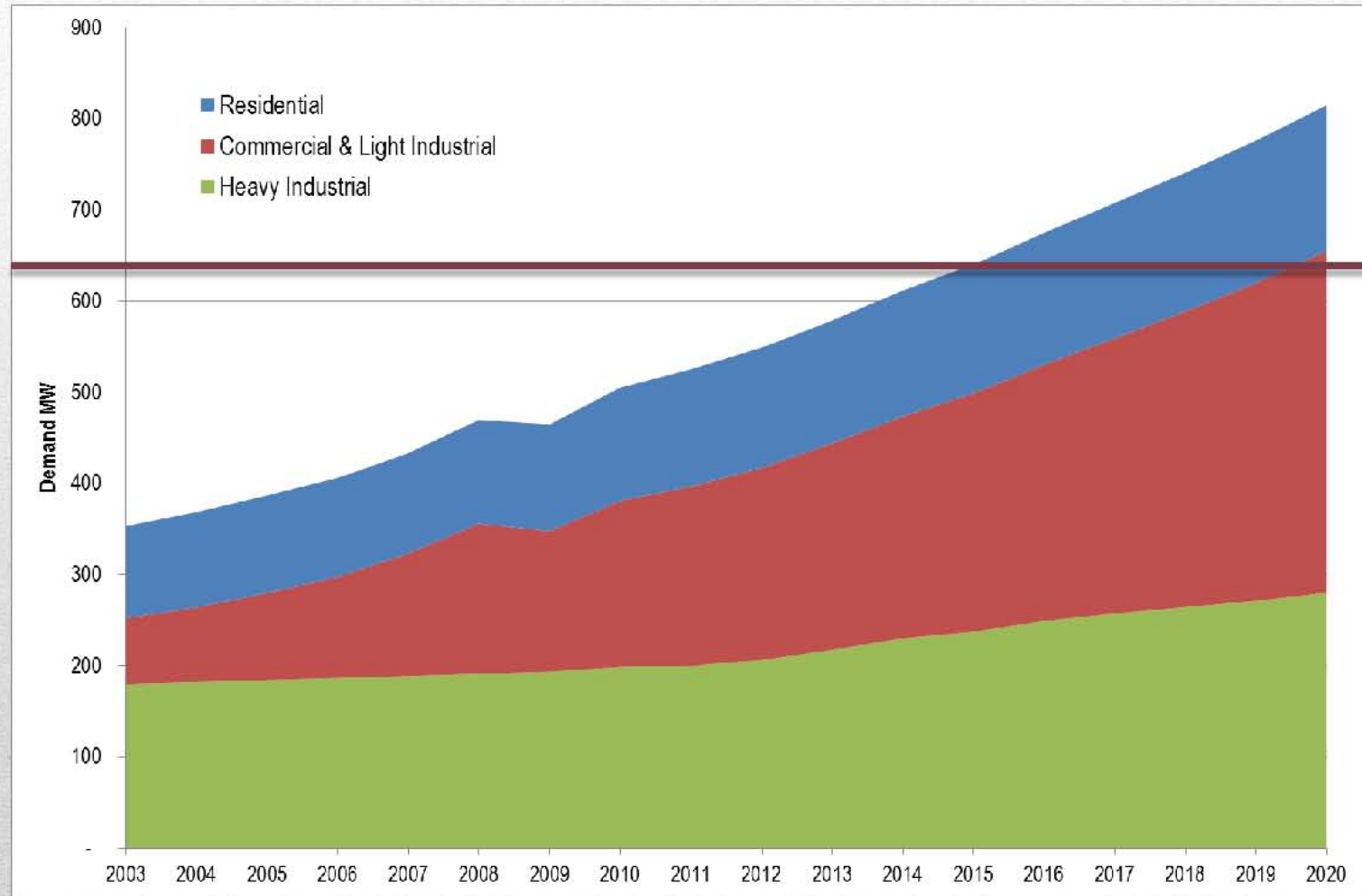
Current Situation – Electricity Supply

- Seven CHP plants producing electricity
- CES – total capacity 780 MW; available capacity 634 MW



Current Situation – Electricity Supply

- CES electricity demand exceeds supply capacity in 2015



Current Situation – Central Electricity Supply

- Reserve Margins Eroded
- CES Loss of Load Probability increasing
- Increasing dependence on Russia in recent years

	Loss of Load		EENS GWh	Reserve Margin		Available Capacity Mongolia CES MW	Peak Production Needs MW	Russian Capacity MW
	LOLP %	LOLE Days in a Year		%	MW			
2004	1.08	3.9	9.2	20.1	96	614.3	545.0	120
2005	1.05	3.8	8.7	21.4	127	614.3	565.7	160
2006	1.07	3.9	10.0	19.6	118	614.3	585.0	160
2007	1.42	5.2	12.9	15.9	96	614.3	612.4	160
2008	2.99	10.9	16.4	5.4	32	614.3	660.1	120
2009	1.94	7.1	10.9	7.9	50	614.3	660.1	160
2010	2.16	7.9	16.8	6.5	41	634.3	703.2	180

Energy Masterplan Objectives

- Maintain adequate heat supply
- Restore heat supply to Aimag towns

- Adequate electricity supply to support industrialization / mining
- Adequate electricity supply to support commercial / light industrial development

- Restore healthy reserve margins – around 20%
- Establish system balancing within Mongolian system (hydro)
- Minimal import of power
- Optimal use of renewables

- Universal Access
- Minimizing Particulates, CO2
- Least Cost (long run marginal cost)
- Affordable
- Moving to full cost recovery

Conventional Thermal

- Coal is abundant albeit quality is variable
- Mining produces large quantities of lignite 'middlings'
- Transportation distances up to 300km is costly
- No indigenous gas supplies
- Coal to liquids, coal gasification promising but costly with uncertain lead times

Renewables

- 500MW Hydropower opportunities in near to medium term
 - 600MW potential for Wind resources in CES and Gobi region alone
 - 250MW potential for Solar PV throughout the country
-
- Conventional Thermal power plant offers firm capacity for heat supply and to industry
 - Renewable power plant has low capacity factor and is not firm

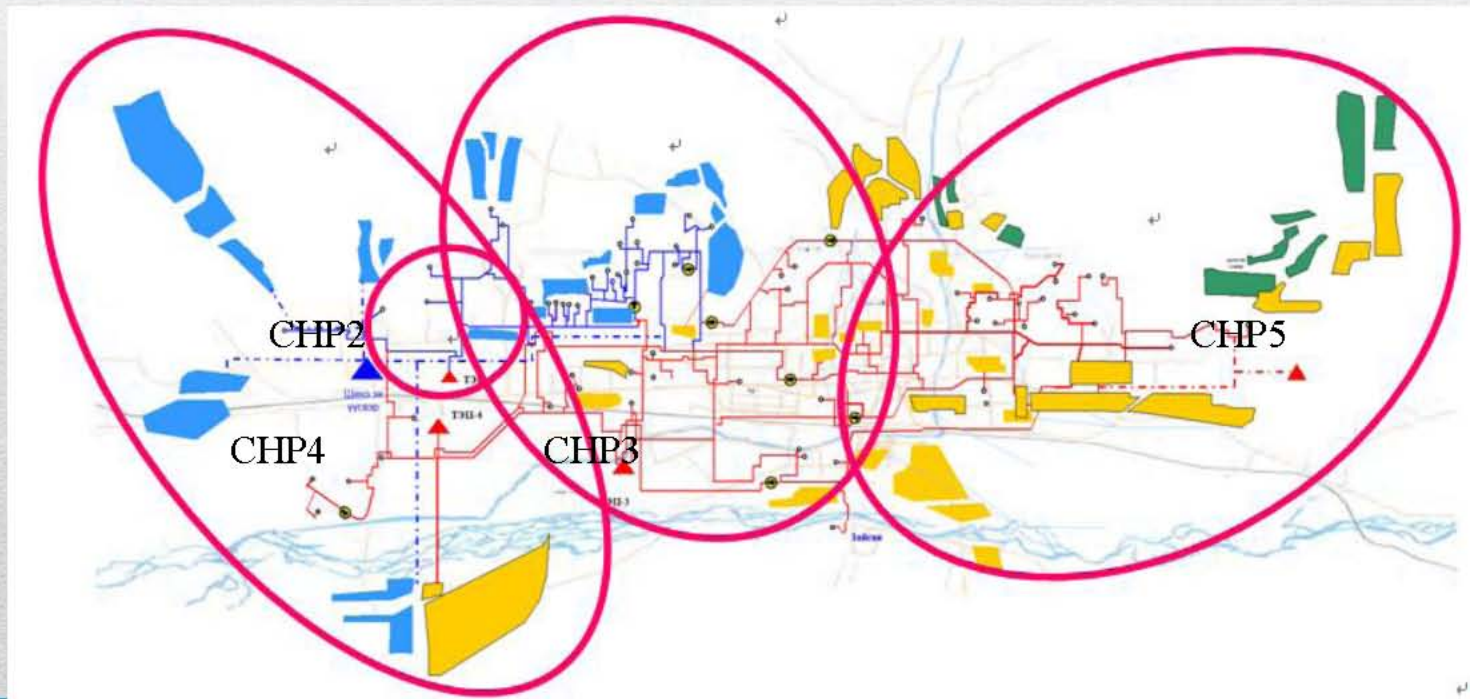
Future – Heat Supply

Ulaanbaatar / Peri-Urban

- CHP expansion where possible, e.g. CHP4 additional 240GCal/h by 2013/14
- UB CHP5 plant 450GCal/h by 2018
- Large HOB in UB, East side – 300 Gcal/h

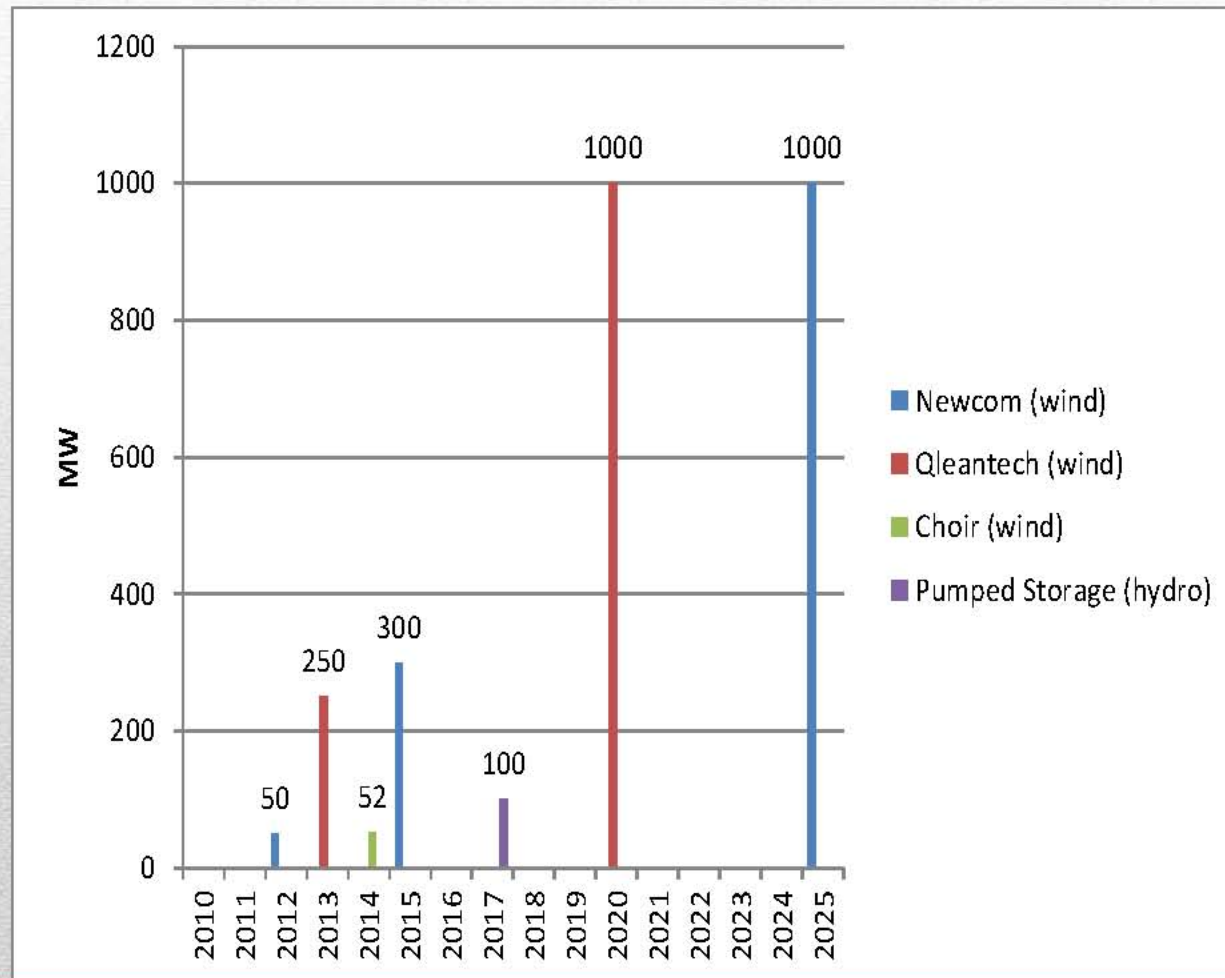
Aimag Centres

- Replacement programme Aimag HOBs - 300 Gcal/h within 5 years
- Replacement District Heating pipe networks – total 180km within 5 years



Future – Electricity Supply










- Renewables project proponents have obtained licenses or feasibility studies completed

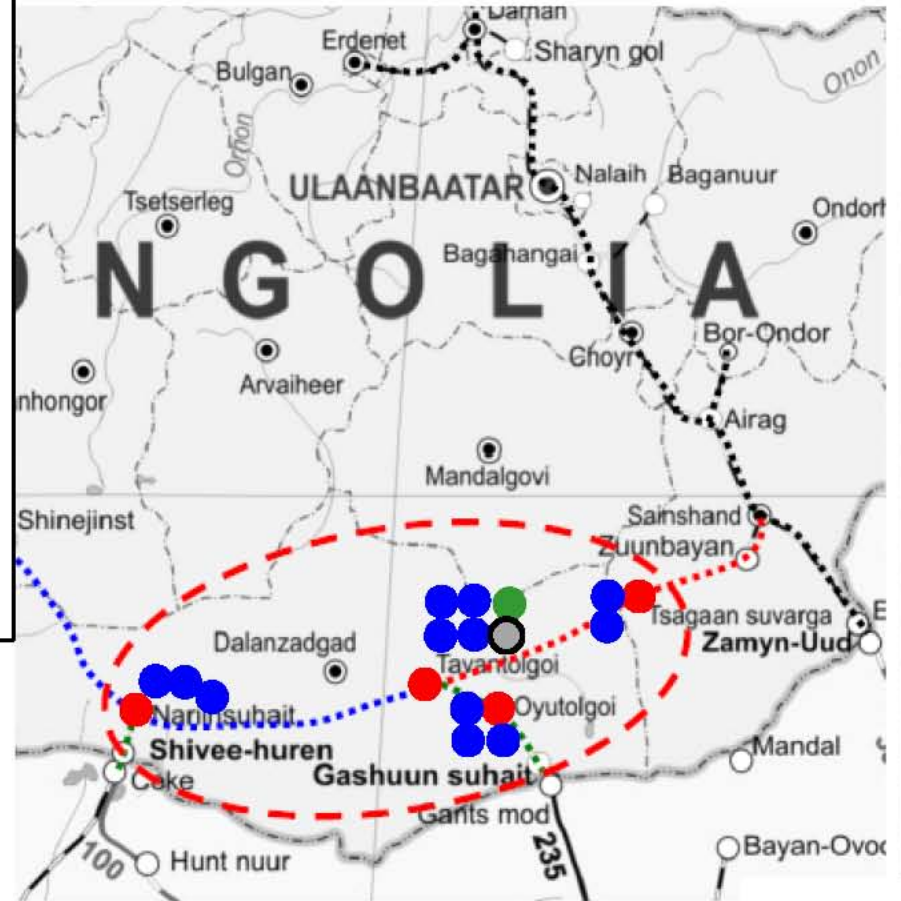


Future - Electricity

- Vision – moving from Extractive Industry to Industrialization
- Creation of Industrial Regions supported by firm electricity capacity

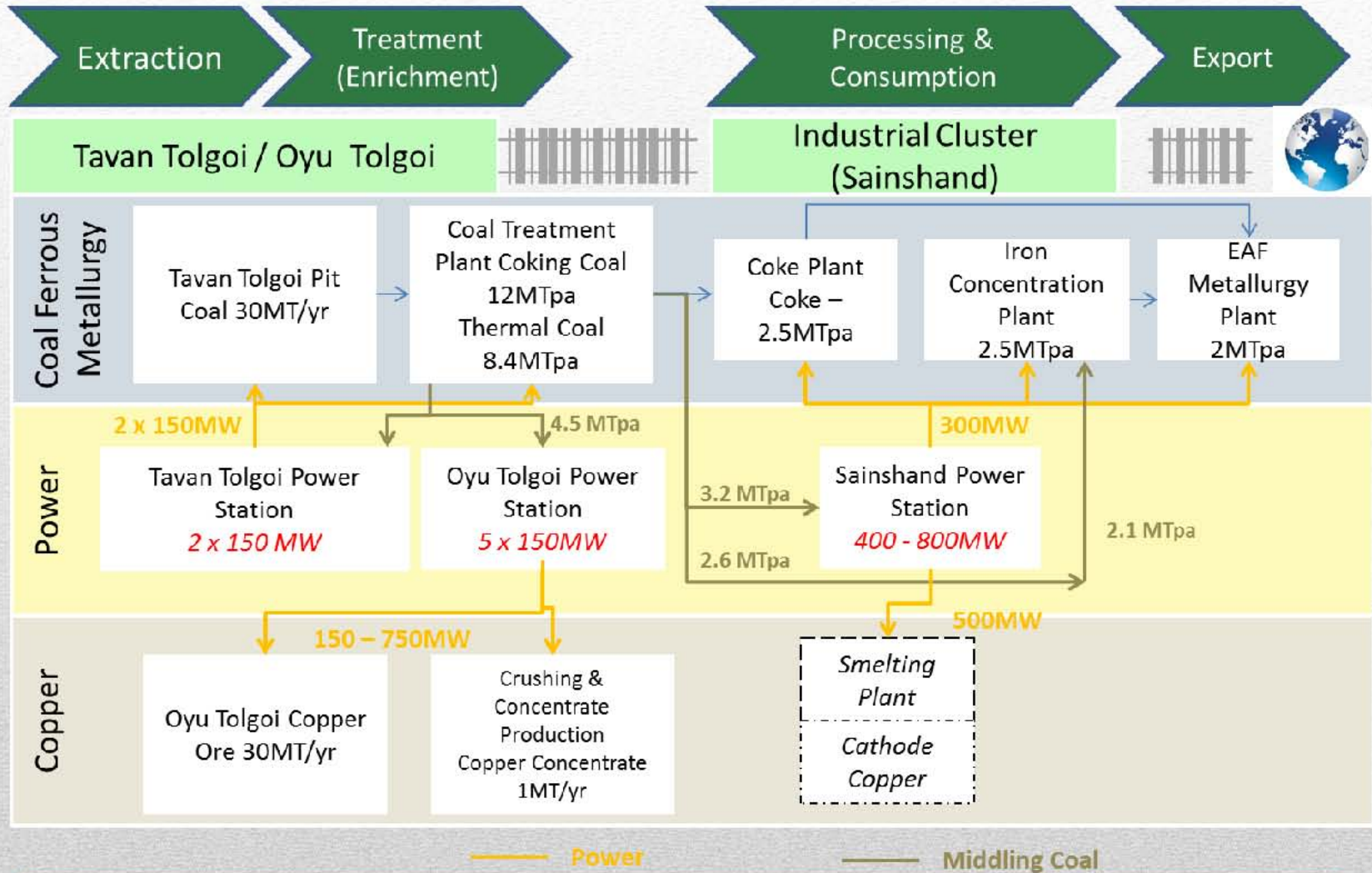
- 4 Strategic Mineral Deposits including coal
- Creation of an industrial region at Tavan Tolgoi including township of 100,000 people
- Development of 1 – 1.5 GW Power Plant
- Additional water requirements met by integrated water management
- 12 Processing plants for production of high value products for export or internal markets
- Greenhouse agricultural farming opportunity through use of heat generated by the power plant
- New railway lines from the mines to the existing railway and to Southern border

- | | | | |
|---|------------------------------|---|-----------------|
|  | South Gobi Industrial Region |  | Existing Rail |
|  | Mine |  | High Priority |
|  | Power Plant |  | Medium Priority |
|  | Processing |  | Low Priority |
|  | Agriculture | | |



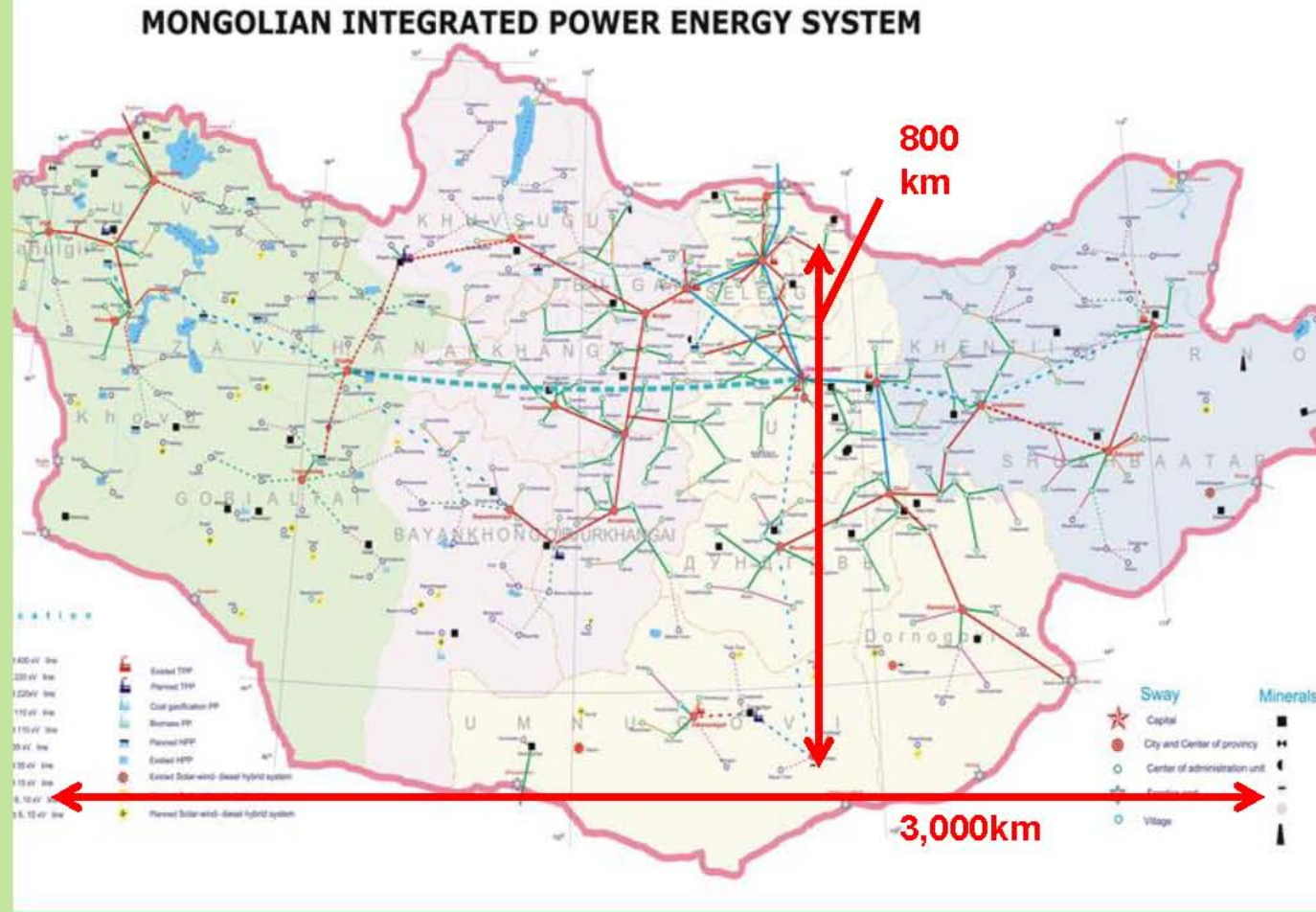
Future – Electricity Supply

- Gobi Electricity Supply Needs met by 'lignite' thermal coal



Future - Electricity Supply

- Long distances between population centres
- High electrical losses
- Voltage control issue under light load conditions
- Locating power plant remote from load centres can give rise to stability issues under fault conditions
- Selection of optimal supply mix must consider T&D issues



Status & Timeline to Completion

Status


- ✓ Inventory of heat and power assets and historical asset performance developed through survey data collection
- ✓ Heat and electricity load forecasts developed and validated
- ✓ Expansion plans identified based on best practice planning criteria

Completion

- Long list according to techno-financial analysis
- Capacity increments, timing and location – Statement of Opportunities
- Long run marginal costs and optimal tariff structures
- Investment needs
- Policy note covering investment strategy

Status & Timeline to Completion

WORK PROGRAMME																
TA No. 7619 MON - ENERGY MASTER PLAN																
ACTIVITIES	SEP 11	OCT 11	NOV 11	DEC 11	JAN 12	FEB 12	MAR 12	APR 12	MAY 12	JUN 12	JUL 12	AUG 12	SEP 12	OCT 12	NOV 12	DEC 12
Preliminary Tasks	█	█														
Data Collection / Analysis	█	█	█	█	█											
Inception Report			█													
Generation, Transmission and Dist'n Options					█	█	█	█	█	█						
Interim Report								█	█							
Review by ADB / MMRE									█	█						
EMP Development									█	█	█	█	█	█		
Draft Final Report										█	█	█	█	█		
Review by ADB / MMRE														█	█	
Final Report															█	█
TA Completion																▼



**Thank you for your kind attention
Q&A**
