# Case Study for Replacement of Inefficient Boilers: HOB Standardized Baseline in Mongolia

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## Step 1: Define Aggregation Level

**Host country**: Mongolia

✓ cold winter
✓coal is the most important energy source

**Sector**: Supply side energy efficiency improvement (district heating for larger sized building)

✓**Measure**: Replace old inefficient polluting coal-fire and heat-only-boilers(HOBs) with environment friendly highly energy-efficient boilers

Small scale projects

✓**Defined output level**: 0.3MW-5MW thermal

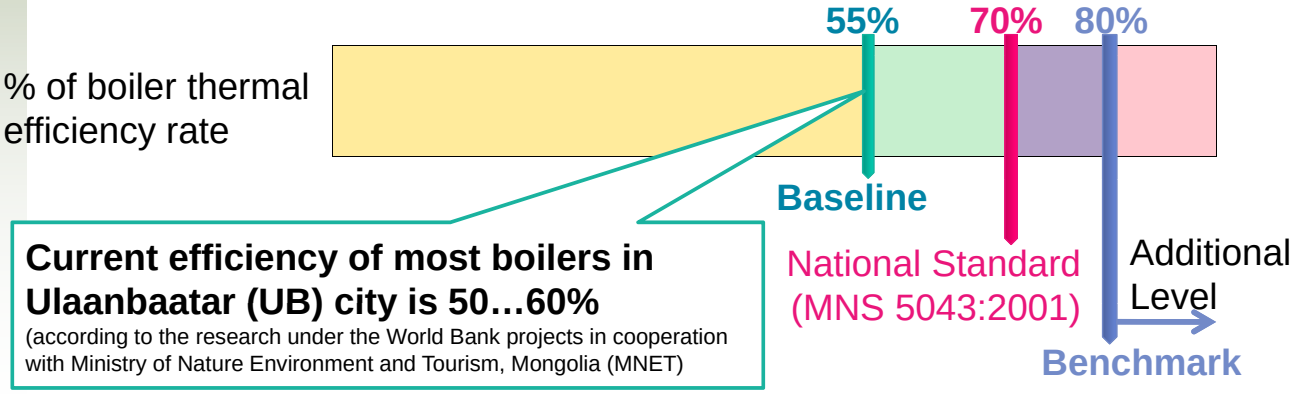
# Step 2: Define Additionality Criteria

Exemption from demonstrating additionality:

✓ The remaining lifetime* of boilers is over **10 years**

Refer to "Tool to determine the remaining lifetime of equipment (ver. 1)" [EB50, Anx15]

✓ The thermal efficiency of the boilers to be replaced is **lower than 55%**




Source: "Market Study of heat-only Boilers and Coal-fired Water Heaters" 2009, p.43



# Step 2: Define Additionality Criteria (cont.)

How to define the benchmark of additional level?

- The **average efficiency** of boilers manufactured and supplied in Mongolian market is **75%**.

| Efficient rate | X＜65% | 75%≦Y |
|---|---|---|
| Total # (2008) | 28 boilers | 81 boilers |

Estimation by IGES (raw data from "Market Study of heat-only Boilers and Coal-fired Water Heaters" 2009, p. 35)

- The current **most efficient boiler** supplied in Mongolia is **80%** efficiency.

**Thus, 80% efficiency seems to be the most possible project scenario.**

# Step 3: Identify Baseline Scenario

Baseline scenario:
Continuation of heat supply by the current HOBs

✓The energy baseline

The monitored performance of the existing generating unit

✓ Threshold

Due to the highly share of coal as fuel (almost 100%), the threshold is defined as energy efficient rate, not energy rate.



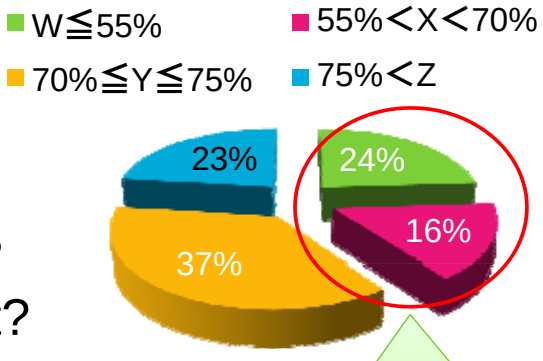
# Step 3: Identify Baseline Scenario (cont.)

Issue to be developed

How to calculate the average efficiency?

- ✓ average or median?
- ✓ Boiler efficiency test?
- ✓ Boiler registration system?

**The types and share of HOBs in UB city(2008-2009)**




66 boilers might be the target of CDM (PoA)

Estimation by IGES (raw data from "Market Study of heat-only Boilers and Coal-fired Water Heaters" 2009, pp. 6-7)

# Step 4: Baseline Emission Factor

$$BE = E_{BL.} \times CO_2\text{-}EF$$

Baseline emissions

Primary Energy consumed in the baseline

Emission factor of the coal = NCV coal (lignite) by the IPCC default value 0.101t-$CO_2$/GJ

In case of 1MW boiler replacement

$E_{BL.} = E_{ou}$ / $\square_{BL}$ = 14.40TJ / 0.55 =26.18TJ

- $E_{ou}$: useful energy output in year
  = capacity x operation hours/year
  = 1MW x 4,000hours
  = 4,000MWh
  = 4,000MWh x 3.6
  = 14.40TJ
- $\square_{BL}$: measured efficiency of the baseline boilers 55%

? the reliable national data instead of IPCC default values might be examined…

∴BE = 26.18TJ x 101t-$CO_2$/TJ
= 2,644t-$CO_2$



# Summary

- Positive list for boiler replacement CDM:
  - ✓ Mongolia (and other regions characterized by cold winter and importance of coal as fuel)
  - ✓ the remaining lifetime of replaced boiler is over 10 yrs
  - ✓ the benchmark of additional level is 80% efficiency
- More possibility as PoA than normal CDM
- Setting the baseline scenario, how to define the average efficient rate? 55% efficiency or…?
- As for baseline $CO_2$-EF, IPCC default value