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Angkor

Bio

Cogen

Angkor Bio Cogen Rice Husk Power Project

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Project Details



2 MW. Power plant

Generate electricity using rice husk that produced from a rice mill and sell the power back to the mill.



CDM activity (1)



The Project will avoid methane emissions that would be produced from rice husk left to decay in the absence of the Project.

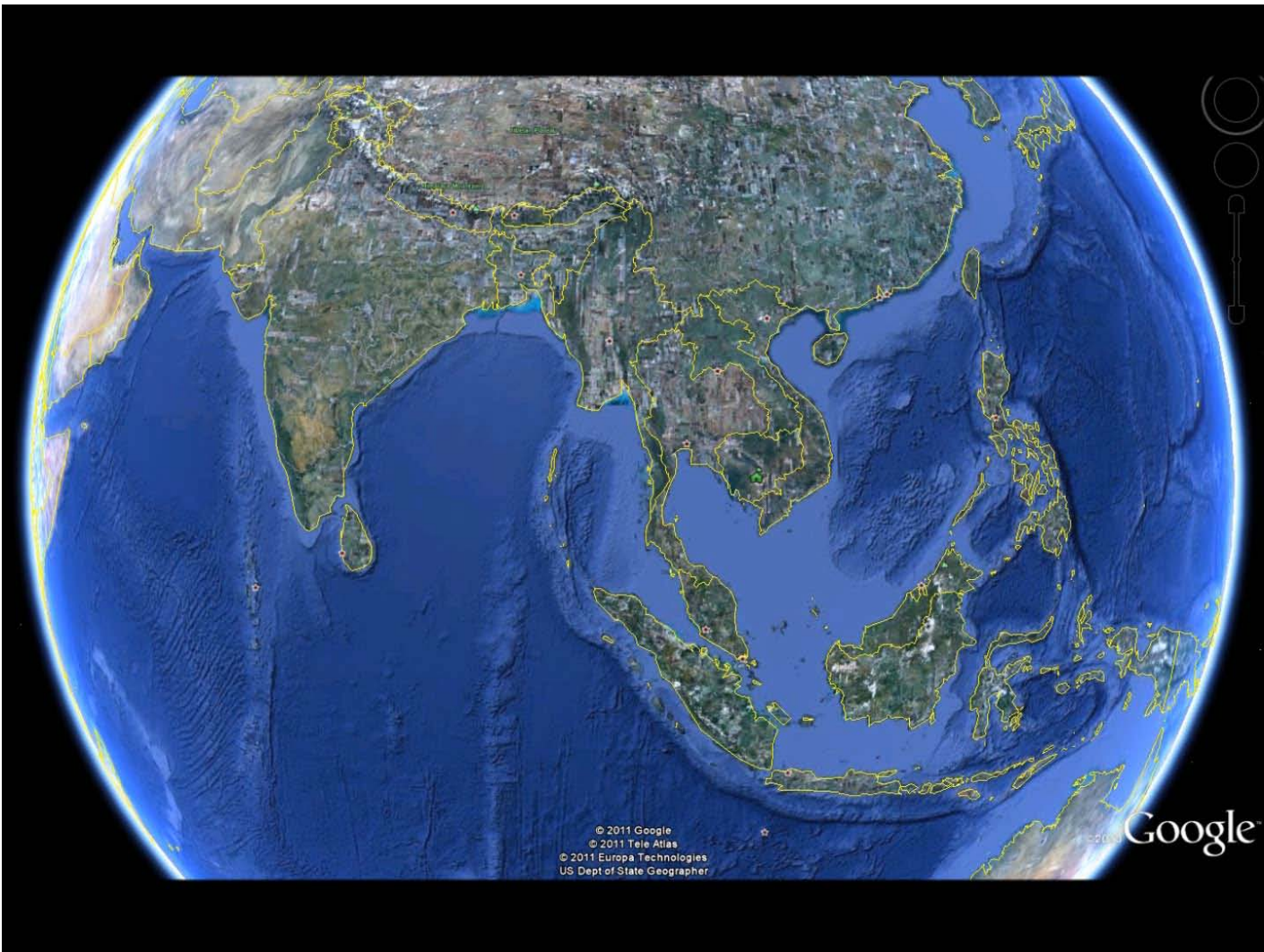


CDM activity (2)



The Project also displace the use of diesel oil for power generation at the rice mill.

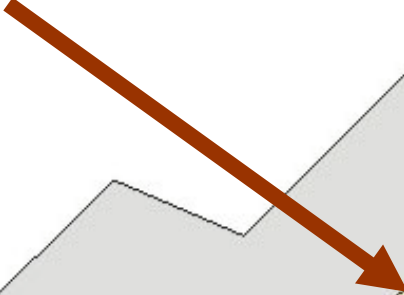




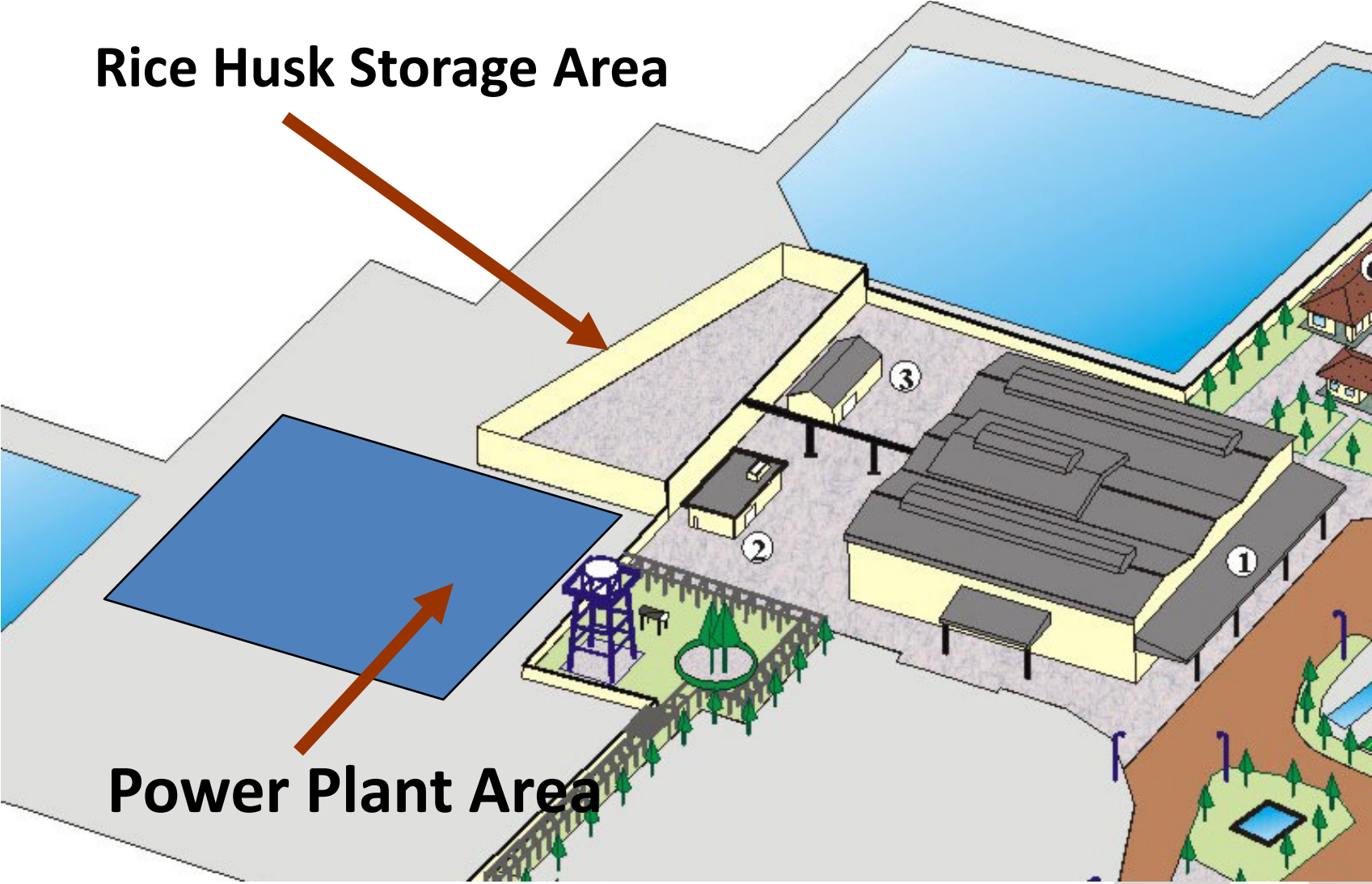
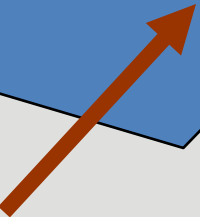
Location



Rice Husk Storage Area



Power Plant Area



CDM details

CDM – Executive Board CDM – Executive Board CDM – Executive Board CDM – Executive Board CDM-SSC-PDD (version 02) page 26

SECTION E.: Estimati

E.1. Formulae used:

E.1.1 Selected formulae:

Baseline emissions for electricity

The calculation of the baseline emissions for electricity shall be in accordance with the modalities and procedures for small-scale CDM project activities and shall be based on the Option 2 is selected for the project activity.

The formulae used to estimate the baseline emissions for electricity are:

$$E_{b,elec} = \sum_{i=1}^n (Q_{i,elec} \times E_{i,elec})$$

where:

- $E_{b,elec}$ = annual electricity baseline emissions (tCO₂e/year)
- $\sum_{i=1}^n$ = the sum of electricity generation from all sources
- $Q_{i,elec}$ = the electricity generation from source i (MWh/year)
- $E_{i,elec}$ = the electricity generation emission factor for source i (tCO₂e/MWh)

According to paragraph 7 of the modalities and procedures for small-scale CDM project activities, the electricity generation emission factor for diesel which is derived from diesel is:

$$E_{i,elec} = \frac{DOC}{F} \times \frac{BE_{i,elec}}{Q_{i,elec}}$$

where:

- $BE_{i,elec}$ = Baseline electricity generation emissions (tCO₂e/year)
- $Q_{i,elec}$ = Quantities of electricity generated (MWh/year)
- DOC = Degradation coefficient (fraction)
- F = Fraction of electricity generated from diesel

According to paragraph 7 of the modalities and procedures for small-scale CDM project activities, the electricity generation emission factor for natural gas is:

$$E_{i,elec} = \frac{CH_4_{IPCC} + CH_4_{IPCC} \times MCF + CH_4_{IPCC} \times \text{Fraction of } CH_4 \text{ in gas}}{Q_{i,elec}}$$

where:

- CH_4_{IPCC} = IPCC methane emission factor (tCO₂e/MWh)
- MCF = Methane correction factor (0.4)
- $\text{Fraction of } CH_4 \text{ in gas}$ = Fraction of methane in natural gas (0.5)

Calculation

$$CH_4_{IPCCdecay} = \frac{CH_4_{IPCC} \times MCF + CH_4_{IPCC} \times \text{Fraction of } CH_4 \text{ in gas}}{Q_{i,elec}}$$

Calculation

$$PE_{i,elec} = Q_{i,elec} \times E_{i,elec} \times \left(\frac{CH_4_{bio_comb}}{CH_4_GWP} + \frac{N_2O_{bio_comb}}{N_2O_GWP} \right) \times 1000$$

(CO₂ equivalent) (tons/year) (TJ/ton) (kg CH₄/TJ x ton CO₂/ton CH₄) (kg N₂O/TJ x ton CO₂/ton N₂O)

Leakage

As stated earlier, leakage calculation associated with the electricity generation component of the Project Activity is not required for small-scale CDM project activities. Leakage calculation is not required for the methane avoidance component of the Project Activity.

E.1.2 Description of formulae when not provided in appendix B:

>> All formulae used are provided in Appendix B.

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>> The formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary are provided in Appendix B and described in paragraph 5 of the modalities and procedures for small-scale CDM project activities.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>> According to the calculation conducted in Section E.1.1, project emissions amount to 3,729 tCO₂e per year.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

The annual amount of emission reductions

Baseline emission 55,349 tCO₂e

Project Emission 3,729 tCO₂e

Emission Reduction 51,620 tCO₂e

Total 51,620 tCO₂e

⁷ The basis for determining the emission reduction is the fluctuation between separate tests *ante* estimation.

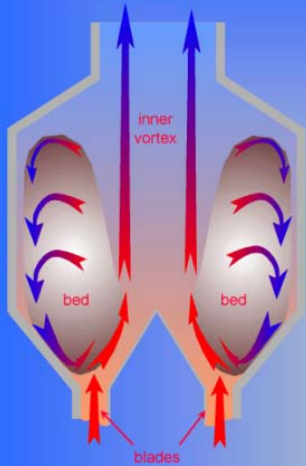


Status and Challenges – Video clip of the construction from the start to now.



Main features of the project

The first time in the world using the TORBED technology to burn the rice husk. As a result, a complete burning of the husk will turn them into amorphous silica.

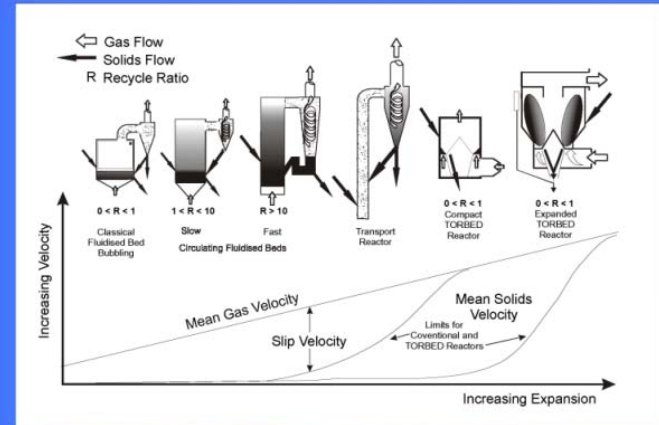


The TORBED Expanded Bed Reactor (EBR)

The process gas flow is increased until it entrains all the bed particles in a rapidly spinning inner vortex.

Particles separate by centrifugal force from the inner vortex to the outer wall before returning to the base of the reactor creating a diffuse toroidal bed.

The base layer of the bed is subjected to high impact gas velocities and thus high heat and mass transfer rates.

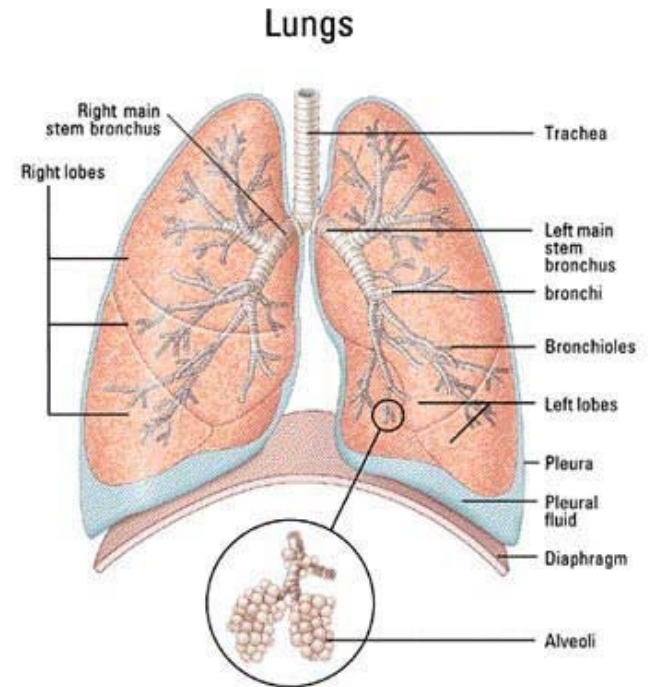
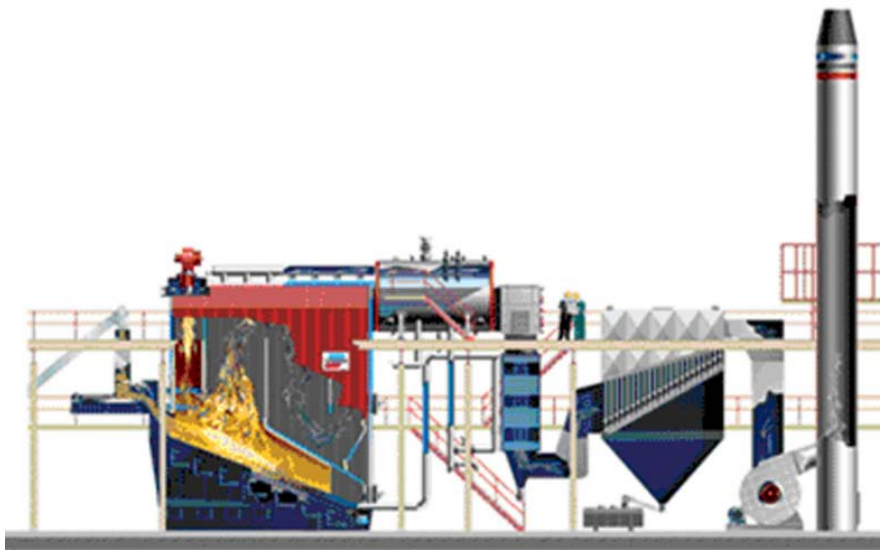


Comparison of various reactor technologies

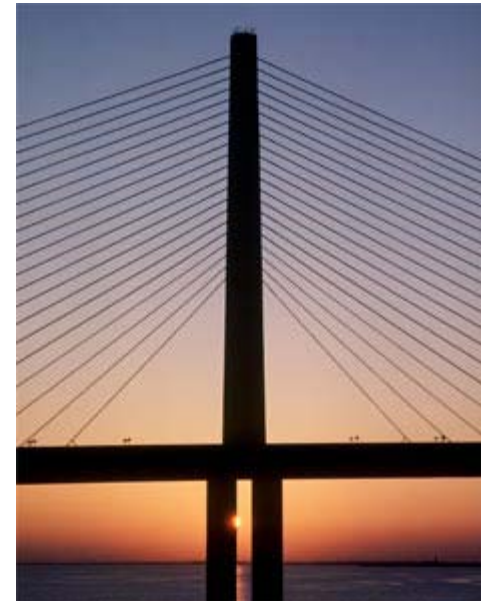


Note:

crystallite ash is usually produced by other typical rice husk reactors used in the region. Crystallite ash could cause lung problem among the workers.



Amorphous silica ash is also an important ingredient to produce high strength concrete.



Merits

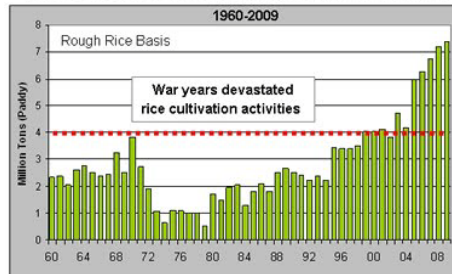
Technological breakthrough



Indirect benefits goes to the rice industry in Cambodia which at the moment has higher operating costs than other neighboring countries (e.g. Thailand, Vietnam)



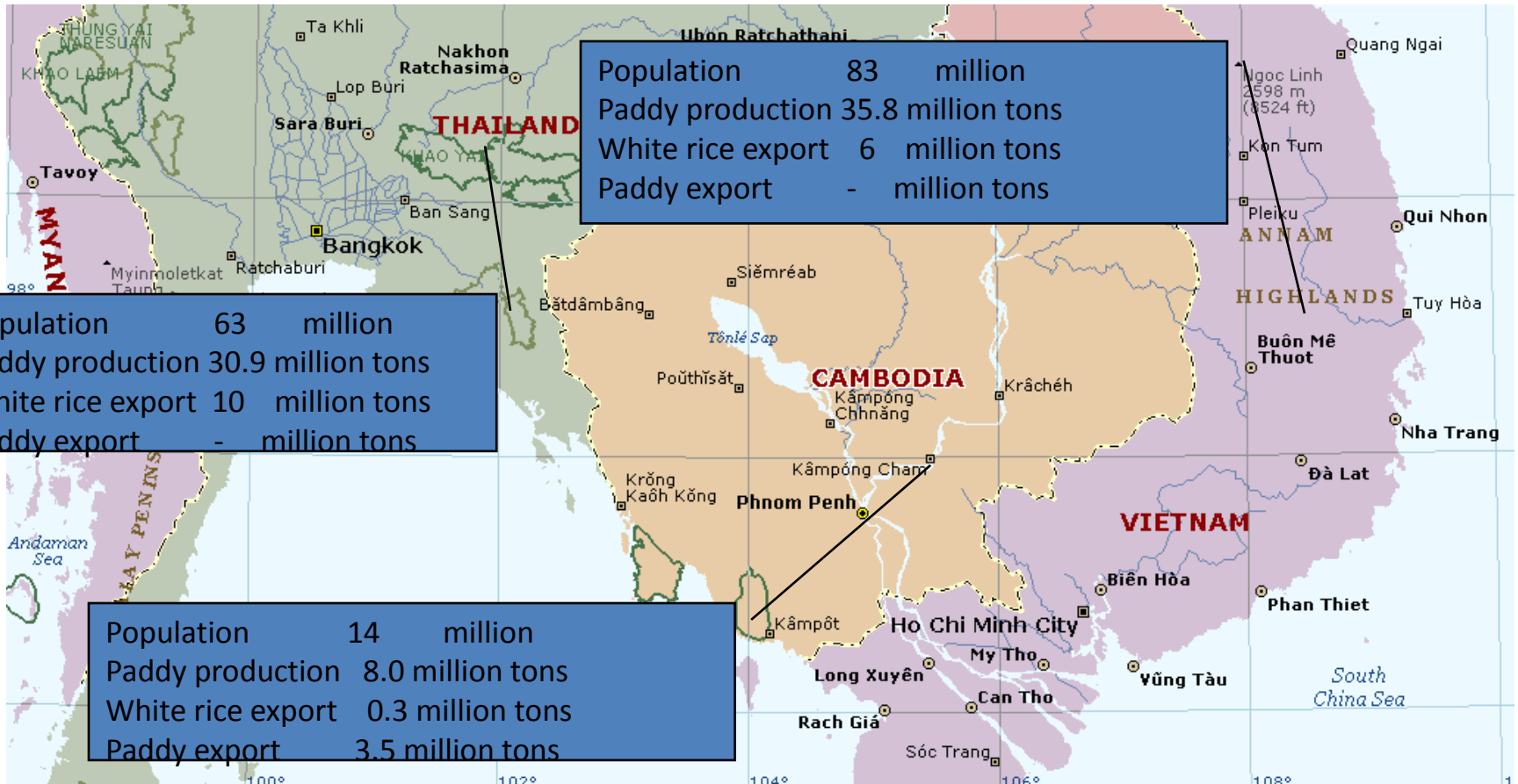
CAMBODIA: Historical Rice Paddy Production Statistics



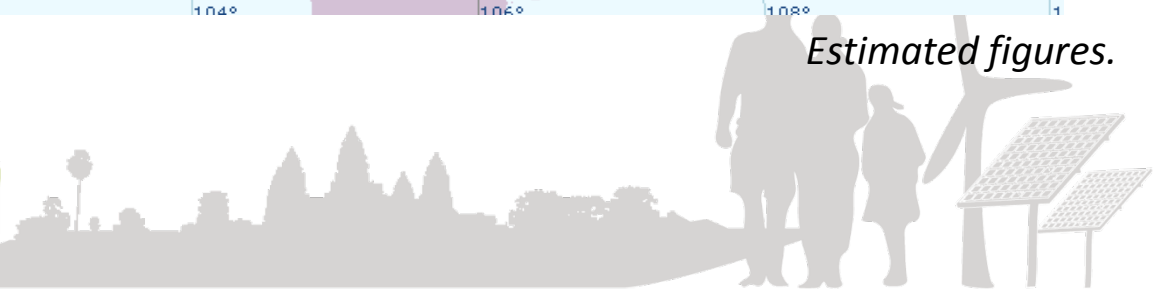
Source: U.S. Department of Agriculture (USDA)



Comparison among 3 countries



Estimated figures.



Recommendations on CDM rules

1. Flexibility of the verification

- since a plant might have some minor details different from its original PDD.

2. More flexibility on start of the crediting period (e.g. allowing to change the start of the crediting period more than one time)

- a project might face unforeseen difficulties from the delay of construction or commissioning.



THANK YOU !



For more information:

<http://www.angkorrice.com/abc.htm>

