

T@W Good Practice Form: Thailand

Dan Chang Bio-Energy Cogeneration project

Setting:

Title: Dan Chang Bio-Energy Cogeneration project (DCBC)
Country: Thailand
Location: Nong Macha Mong Sub-district, Dan Chang District, Suphanburi Province
Start date: 2005
End date: 2029
Technology keyword(s): Agricultural Waste
Host sector: Sectoral scope 1: Energy industry (renewable sources)

General description:

Summary: The project is Biomass Cogeneration plant using agricultural residue, e.g., bagasse (biomass residue from sugar cane production) as primary fuel. Other biomass residue such as cane leaves or rice husk may be used to compensate for any shortfall in sugarcane throughput. Dan Chang Bio-Energy (DCB) Cogeneration project comprises the capacity expansion of the existing biomass cogeneration system located next to the sugar mill of Mitr Phol Sugar Corporation (MPSC) in Dan Chang, Suphan Buri province, Thailand. The proposed project will enable DCB to increase its electricity export to the grid from 6 MW on a non-firm year-on-year contract to 27 MW on a 21-year firm contract. DCB expects to export net electricity to grid approximately 195,129 MWh per year which results in GHG emission reduction approximately 92,177 tonnes CO₂equivalent/year.

Aims: To reduce greenhouse gases due to displacement of CO₂ emissions from electricity generation by other sources (displacement of grid electricity); and avoidance of CH₄ emissions from uncontrolled burning or decay of biomass.

Summary of Results: DCB shall export net electricity to EGAT approximately 195,129 MWh per year. Total net electricity sold to EGAT is calculated based on operation of 100% capacity during peak hours and 80% capacity during off-peak hours, 330 days per year. However, the emission reduction of the

displacement of grid electricity produced from fossil fuel shall be calculated only the additional Renewable energy electricity of the project activity from the baseline. The baseline of this project is the existing cogeneration plant of sugar mill which exports excess electricity to the grid under the non-firm 6 MW SPP contract. The average baseline for electricity export to grid during the most recent 3 years is 29,365 MWh per year. So the additional Electricity from baseline is 165,764 MWh per year, causes GHG emission reduction from this additional electricity generation of 92,177 tonnes CO₂equivalent/year.

Planning Time: The starting date of the project activity (date on starting construction work) is July 2002. The Project will finish all construction and related works, and aims to start the credit period by 1st January 2005.

Operation Time: DCB Cogeneration plant has minimum plant's life time of 25 years.

Feasibility Study: The project IRR without CER revenue is approximately 9.2 % at base case. The key factor that will influence the return of the project is the biomass price. The result of varying prices of biomass on IRR is shown as follows:

	Bagasse price (\$US/tonne)				
	10	15	20	25	30
Project IRR excluding CER revenue (%)	12.6	9.2	5.6	1.6	-2.9

Technical details:

Technical details: The project is a thermal-steam cycle power plant, which consists of two new high-pressure boilers (70 bar), one 41 MW double casing turbine generator, one cooling tower and the construction of 115 kV substation. The installation of a condensing turbine unit will allow DCB to generate electricity all year round, independent of the demand for steam from the sugar mill.

Energy data:

Energy data: DCB shall export additional RE Electricity from baseline activity approximately 165,764 MWh per year.

Energy saved/generated: Electricity export to grid, addition to the project's baseline is 596,750.4 GJ/year.

Monitoring: The approved consolidated monitoring methodology ACM0006, Version 01, Sectoral Scope: 01, 30 September 2005 is applied to the project. DCB will assign a manager to coordinate data collection from various sources and ensure consistency of the method used in collecting the data. The proof of records such as purchase receipts or invoices will also be collect systematically. He will also perform a timely check of the latest update of IPCC data used in the calculation. Data and Parameters that shall be monitored are:

Quantity of biomasses (each type) combusted in the project plant during the year, This data is used for calculating CH₄ emission from biomass combustion and calculate CO₂ emission from transportation of biomass;

Net calorific value of each biomass type;

Average return trip distance between biomass fuel supply sites and the project site;

Average truck load of the trucks used for transportation of biomass;

Average CO₂ emission factor for transportation of biomass with trucks;

Net quantity of electricity exported to the grid by the project during the year;

Total quantity of electricity generated at the project site (for consistency check only);

CO₂ emission factor of the most carbon intensive fuel in the calculation of the combined margin with methodology ACM0002;

Environmental data:

Environmental data: The construction of the DCB power plant is subject to an Environmental Impact Assessment (EIA) being approved by the Office of Natural Resources and Environmental Policy and Planning (ONEP) under the Environmental Quality Act. The EIA report was approved in August 2003. DCB power plant is well equipped with wet scrubbers that are capable of effectively reducing emission from biomass combustion. Air dispersion models show that the ground level concentration of gaseous emission is much lower than the maximum level allowed by law and by international air quality standards. In addition, a 25-meter net has been erected around

the bagasse storage area to prevent bagasse dust dispersion, with rows of pine trees surrounding the area to reduce wind speed and to create better aesthetics. Moreover, water will be regularly sprayed over the bagasse stockpile to help reduce bagasse fugitive dust. With regards to impacts on water quality, DCB power plant requires large amount of water for the cooling process. Cooling water will be reused in the cooling process, while any wastewater from the power plant will be treated by the sugar mill wastewater treatment system.

Project GHG-emissions:	Project GHG emission, which is come from CO ₂ emissions from combustion of fossil fuels for biomass transportation, CO ₂ emissions from on-site consumption of fossil fuels (co-fired of fossil fuel, etc.), and CH ₄ emissions from combustion of biomass is approximately 1,965 tonnes CO ₂ equivalent/year.
GHG-emission reductions:	GHG emission reduction from the project is approximately 92,177 tonnes CO ₂ equivalent/year
“EAU, CER, ERU, AAU”:	CER
Methodology:	Approved consolidated monitoring methodology ACM0006, Version 01, Sectoral Scope: 01, 30 September 2005.
Baseline	The baseline of project activity is the existing cogeneration plant of sugar mill which exports excess electricity to the grid under the non-firm 6 MW SPP contract. The average amount of net electricity export to the grid during the most recent 3 years before the implementation of the project is 29,365 MWh per year. The baseline emission of this project is CO ₂ emission of Thailand’s Grid Electricity Generation including CH ₄ emission due to natural decay or uncontrolled burning of biomass (cane leaves, rice husk, and excess bagasse).
Monitoring:	The approved consolidated monitoring methodology ACM0006, Version 01, Sectoral Scope: 01, 30 September 2005 is applied to the project. DCB will assign a manager to coordinate data collection from various sources and ensure consistency of the method used in collecting the data. The proof of records such as purchase receipts or invoices will also be collect systematically. He will also perform a timely check of the latest update of IPCC data

used in the calculation. Required Data and Parameters that shall be monitored are as above.

Contribution to Sustainable Development:

The project activity will contribute to the sustainable development of Thailand in the following ways:

Enhance Thailand economic sustainability by reducing the country's dependence on the use fossil fuel in power generation;

Support the government policy in promoting the use of renewable energy;

Enhance Thailand economic efficiency through more efficient use of abundant agricultural residues such as bagasse and cane leaves;

Increase local employment;

Increase income to local farmers through the collection and sales of cane leaves;

Avoid harmful air pollution due to the burning of cane leaves on the field and reduce the degradation of soil quality resulted from such burning;

Promote new "best practices" in sustainable sugar cane plantation management and operation;

Reduce dependence on import of chemical fertilizer as bottom ashes from the boilers will be distributed to local farmers for improving soil quality;

Develop local know-how in designing an efficient heat balance of the cogeneration, which can be replicated elsewhere in Thailand

Enhance social cohesion through public participation programme

Enhance capacity building of local stakeholders through training of power plant operation and through research and development to increase sugar cane yield; and

Improve stability of electricity supply in the local area.

Economic data:

Economic data:

The project IRR (at base case, bagasse price of 15 \$US/tonne) without CER revenue is approximately 9.2 %.

Financing:

N.A.

Additional Information:

Printed or electronic reports or other literature available:

Title	Dan Chang Bio-Energy Cogeneration project (DCBC), Document Version 01, Date 30 November 2005 (ver. 3, rev. 4)
Methodology	ACMOO2 ver.6 and ACMOO6 ver.4 Address for download of electronic document: http://cdm.unfccc.int/methodologies/DB/AS1DOF3L010BY57ZT2UZNO8Y9K83CN/view.html , and http://cdm.unfccc.int/methodologies/DB/AEXF9VXI2FOS2AXNKG3371B8QROLJF/view.html
Project Document	Address for download of electronic document: http://www.dnv.com/certification/climatechange/Upload/DanChangPDD_Ver03_rev03.pdf

Project Web site: www.mitrphol.com

Photo Library:



Figure 1 During Construction & Erection
 (Source: COGEN 3 Information Sheet)

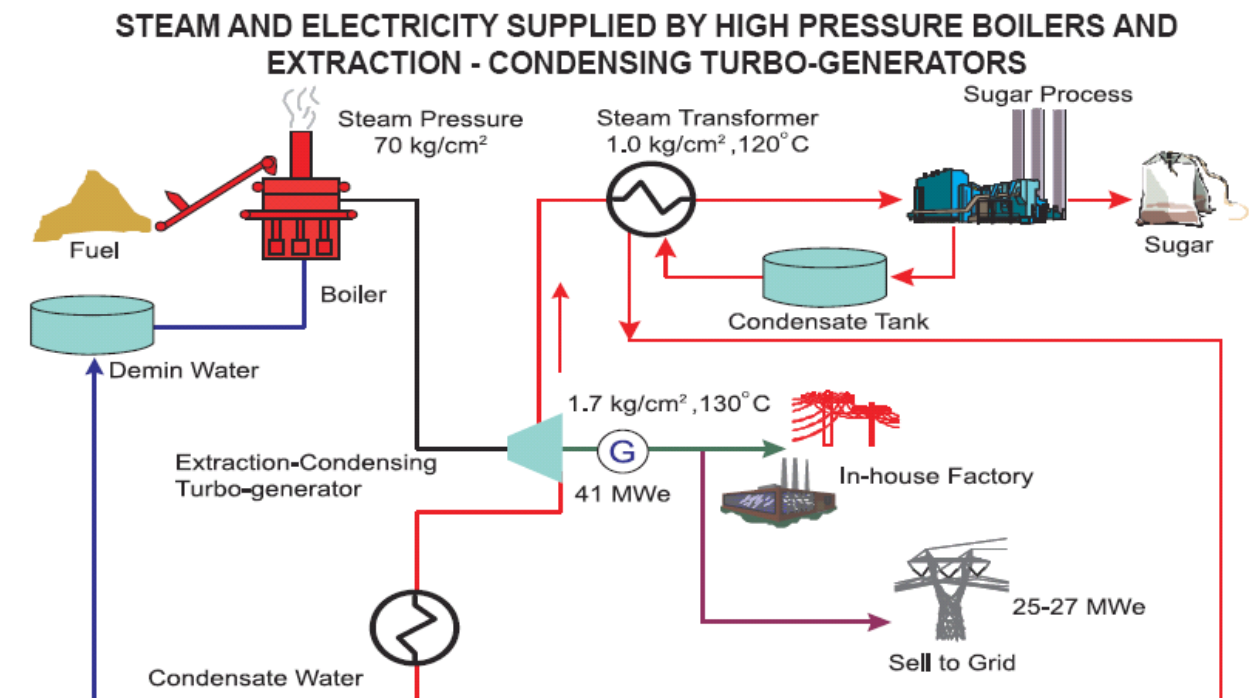


Figure 2 Process Flow Diagram
 (Source: COGEN 3 Information Sheet)

Contact information:

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 Description of the Organisation for inclusion in the database of Technology and Service
 Providers: The project is owned and operated by Dan Chang Bio-Energy Company Limited (DCB), a subsidiary of Mitr Phol Sugar Corporation (MPSC)

Type of Organisation: Project Participant
 Organisation / Agency: Royal Danish Embassy, Ministry of Foreign Affairs
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 Description of the Organisation for inclusion in the database of Technology and Service
 Providers: