4 June 2007

Initial Response by the Project Proponent
to the Request for Review of Project 1020
Dan Chang Bio-Energy Cogeneration Project (DCBC)

Reference is made to the request for review by members of the Executive Board regarding Dan Chang Bio-Energy Cogeneration Project. The project proponent, Dan Chang Bio-Energy Co., Ltd. would like to submit the following responses.

1. **Further evidence should be provided regarding how a benchmark rate of 12% has been validated. In doing so it should be noted that the additionaility tool requires that, *"project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark".***

The benchmark rate of 12% was based on the weighted average cost of capital (WACC) for the Mitr Phol Group calculated at the beginning of 2002 before the decision about the Dan Chang project was made. The following values as shown in *Table 1* were used in the calculation of WACC.

Table 1 Key Assumptions for Calculating WACC

Parameter	Value	Source
Risk free rate	5.97%	Coupon rate of long-term government bond as of 28 December 2001
Market Risk Premium	8.46%	US Market Risk Premium (MRP) plus Country Risk Premium
Business Risk Index (BRI) or Beta	0.68	Average Beta from other companies with similar size and industry
Leverage	1.5	Approximate D/E ratio of the Mitr Phol Group in 2001
Tax	30%	Corporate Tax Rate in Thailand
Debt Risk Premium	4.71%	Spread between the company cost of debt and risk free rate

The evidence supporting each of the key parameters is exhibited as follows:

Risk Free Rate

The government bond yield as of 28 December 2001 was used to represent the risk free rate (K_{Rf}). To reflect the company's intention to operate in this business in the long term, the longest maturity was selected, which was 19 year to maturity according to the Thai Bond Market Association (TBMA). *Table 2* presents government bond yield at different time to maturity (TTM), in which the 19-year bond yield to maturity was 5.97%.

Table 2 Government Bond Yield to Maturity, as of 28 December 2001

TTM (Yrs.)	Yield (%)	TTM (Yrs.)	Yield (%)
0.08	2.02	10	4.84
0.25	2.19	11	4.98
1	2.49	12	5.12
2	2.68	13	5.25
3	2.79	14	5.37
4	3.03	15	5.49
5	3.37	16	5.61
6	3.79	17	5.73
7	3.97	18	5.85
8	4.34	19	5.97
9	4.52		

Source: www.thaibma.or.th as of 28 December 2001

Market Risk Premium

Market Risk Premium (MRP) was calculated from the US MRP plus country risk premium for Thailand. The US MRP of 6.21% was derived from the spread between the average return on the US stock market and the average return on the US Treasury Bill during 1928 – 2001 as shown in *Table 3*.

Table 3 Average Return on US Stock Market and on US Treasury Bill

	Annual Returns on Investments in		Compounded Value of $ 100	
Year	*Stocks*	*T.Bills*	*Stocks*	*T.Bills*
1928	43.81%	3.08%	$ 143.81	$ 103.08
1929	-8.30%	3.16%	$ 131.88	$ 106.34
1930	-25.12%	4.55%	$ 98.75	$ 111.18
1931	-43.84%	2.31%	$ 55.46	$ 113.74
1932	-8.64%	1.07%	$ 50.66	$ 114.96
1933	49.98%	0.96%	$ 75.99	$ 116.06
1934	-1.19%	0.30%	$ 75.09	$ 116.41
1935	46.74%	0.23%	$ 110.18	$ 116.68
1936	31.94%	0.15%	$ 145.38	$ 116.86
1937	-35.34%	0.12%	$ 94.00	$ 117.00
1938	29.28%	0.11%	$ 121.53	$ 117.12
1939	-1.10%	0.03%	$ 120.20	$ 117.16
1940	-10.67%	0.04%	$ 107.37	$ 117.21
1941	-12.77%	0.02%	$ 93.66	$ 117.23
1942	19.17%	0.33%	$ 111.61	$ 117.62
1943	25.06%	0.38%	$ 139.59	$ 118.06
1944	19.03%	0.38%	$ 166.15	$ 118.51
1945	35.82%	0.38%	$ 225.67	$ 118.96
1946	-8.43%	0.38%	$ 206.65	$ 119.41
1947	5.20%	0.38%	$ 217.39	$ 119.87
1948	5.70%	0.95%	$ 229.79	$ 121.01
1949	18.30%	1.16%	$ 271.85	$ 122.41
1950	30.81%	1.10%	$ 355.60	$ 123.76
1951	23.68%	1.34%	$ 439.80	$ 125.42
1952	18.15%	1.73%	$ 519.62	$ 127.59
1953	-1.21%	2.09%	$ 513.35	$ 130.25
1954	52.56%	1.60%	$ 783.18	$ 132.34
1955	32.60%	1.15%	$ 1,038.47	$ 133.86
1956	7.44%	2.54%	$ 1,115.73	$ 137.26
1957	-10.46%	3.21%	$ 999.05	$ 141.66
1958	43.72%	3.04%	$ 1,435.84	$ 145.97
1959	12.06%	2.77%	$ 1,608.95	$ 150.01
1960	0.34%	4.49%	$ 1,614.37	$ 156.75
1961	26.64%	2.25%	$ 2,044.40	$ 160.28
1962	-8.81%	2.60%	$ 1,864.26	$ 164.44
1963	22.61%	2.87%	$ 2,285.80	$ 169.16
1964	16.42%	3.52%	$ 2,661.02	$ 175.12
1965	12.40%	3.84%	$ 2,990.97	$ 181.84
1966	-9.97%	4.38%	$ 2,692.74	$ 189.81
1967	23.80%	4.96%	$ 3,333.69	$ 199.22
1968	10.81%	4.97%	$ 3,694.23	$ 209.12
1969	-8.24%	5.96%	$ 3,389.77	$ 221.59
1970	3.56%	7.82%	$ 3,510.49	$ 238.91
1971	14.22%	4.87%	$ 4,009.72	$ 250.55
1972	18.76%	4.01%	$ 4,761.76	$ 260.60
1973	-14.31%	5.07%	$ 4,080.44	$ 273.81
1974	-25.90%	7.45%	$ 3,023.54	$ 294.21
1975	37.00%	7.15%	$ 4,142.10	$ 315.24
1976	23.83%	5.44%	$ 5,129.20	$ 332.39
1977	-6.98%	4.35%	$ 4,771.20	$ 346.85
1978	6.51%	6.07%	$ 5,081.77	$ 367.91
1979	18.52%	9.08%	$ 6,022.89	$ 401.31
1980	31.74%	12.04%	$ 7,934.26	$ 449.63
1981	-4.70%	15.49%	$ 7,561.16	$ 519.28
1982	20.42%	10.85%	$ 9,105.08	$ 575.62
1983	22.34%	7.94%	$ 11,138.90	$ 621.32
1984	6.15%	9.00%	$ 11,823.51	$ 677.24
1985	31.24%	8.06%	$ 15,516.60	$ 731.83
1986	18.49%	7.10%	$ 18,386.33	$ 783.79
1987	5.81%	5.53%	$ 19,455.08	$ 827.13
1988	16.54%	5.77%	$ 22,672.40	$ 874.86
1989	31.48%	8.07%	$ 29,808.58	$ 945.46
1990	-3.06%	7.63%	$ 28,895.11	$ 1,017.59
1991	30.23%	6.74%	$ 37,631.51	$ 1,086.18
1992	7.49%	4.07%	$ 40,451.51	$ 1,130.39
1993	9.97%	3.22%	$ 44,483.33	$ 1,166.79
1994	1.33%	3.06%	$ 45,073.14	$ 1,202.49
1995	37.20%	5.60%	$ 61,838.19	$ 1,269.83
1996	23.82%	5.14%	$ 76,566.48	$ 1,335.10
1997	31.86%	4.91%	$ 100,958.71	$ 1,400.65
1998	28.34%	5.16%	$ 129,568.35	$ 1,472.93
1999	20.89%	4.39%	$ 156,629.15	$ 1,537.59
2000	-9.03%	5.37%	$ 142,482.69	$ 1,620.16
2001	-11.85%	5.73%	$ 125,598.83	$ 1,712.99
Average			***Risk Premium***	
1928-2001	10.12%	3.91%	6.21%	

Source : www.ustreas.gov

The country risk premium was taken from a study at Stern Business School which was updated in January 2002. This study found that the country risk premium for Thailand was 2.25%, as shown in *Table 4*.

Table 4 Country Risk Premium for Thailand, updated January 2002

Country	Bond Rating	Default Spread	Country Risk Premium
Thailand	Baa1	150	2.25%

source : http://pages.stern.nyu.edu/~adamodar

Hence, the market risk premium for Thailand was 6.21% + 2.25% = 8.46%

Business Risk Index (BRI) or Beta

BRI was calculated as the average Beta of other companies that were in the same business and were about the same size as Mitr Phol Group. The average beta was 0.68 for the year 2001 as shown in *Table 5*.

Table 5 Average Beta for Sugar Companies, 2001

Name	Industry Sub-group	Beta
BALRAMPUR CHINI MILLS	Sugar	0.77
ILLOVO SUGAR LTD	Sugar	0.53
TONGAAT-HULETT GROUP LTD	Diversified Operations	0.72
	Average	**0.68**

Source: http://pages.stern.nyu.edu/~adamodar

Debt Risk Premium

Debt Risk Premium (K_d) was calculated from the spread between the interest rate at which the company's debt was financed and the risk free rate. The average MLR of 5 big commercial banks in Thailand as of 28 December 2001 was 7.20% as shown in *Table 6*.

Table 6 MLR for Big Commercial Banks in Thailand, as of 28 December 2001

Bank	MLR (%)
BBL	7.00
KTB	7.25
SCB	7.25
KBANK	7.00

Bank	**MLR (%)**
BAY	7.50
average	**7.20**

Source: www.bot.or.th as of 28 December 2001

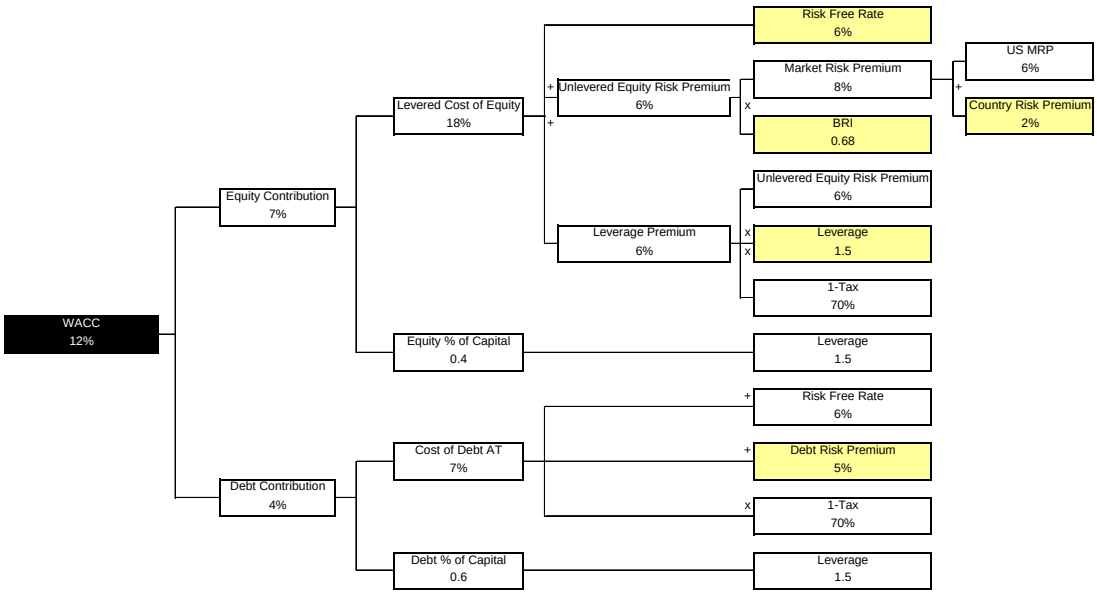
Thus the debt risk premium compared to the 1-year government bond, which was 2.49% (see *Table 2*) became 4.71% as shown below:

K_d = 7.20% - 2.49%
= 4.71%

WACC

When all the information was plugged into the capital tree model, it gave the WACC of approximately 12%, as shown in *Figure 1*.

Figure 1 Capital Tree for Calculating WACC



During the validation, the non-final version was mistakenly provided to DNV, although the benchmark rate of 12% was still the correct value used when the decision about Dan Chang Project was made. The final version of the spreadsheet for calculation of WACC, as also shown in *Figure 1*, is presented in *Attachment 1 – WACC_MitrPhol2002.xls*.

Dan Chang was the first project undertaken by the Mitr Phol Group since the end of the financial crisis in Thailand which lasted for several years prior to 2002. Project investment decisions undertaken during this time were also subject to a significantly different financial environment compared to that before the financial crisis. As such, Dan Chang was the first project that applies the revised benchmark rate of 12% based on the company's WACC. However, this approach for applying the benchmark rate based on WACC was consistently applied for other subsequent projects within Mitr Phol Group such as Petrogreen ethanol project, as demonstrated in the attached documentary proof *Attachment2 – PetrogreenFeas.pdf*. Petrogreen project was approved in 2005 based on the calculated project IRR of 13.16% compared to the discount rate of 13%, which was based on an updated WACC for Mitr Phol Group at that time. This project has now started its ethanol production.

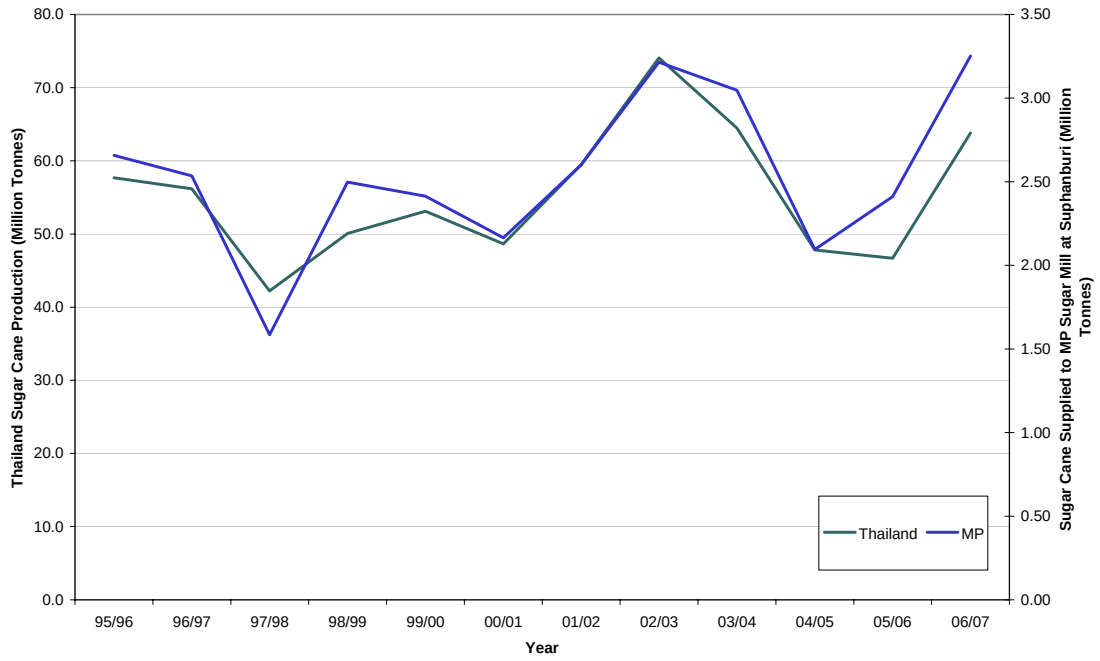
With reference to the tool for the demonstration of additionality, an alternative benchmark rate could have been used, which was *government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert*. In the project financial plan (72% debt financing), Dan Chang expected to pay off its debt in 11 years. When the 11-year bond yield of 4.98% as shown in *Table 2* was added to debt risk premium of 4.71% as calculated above, we could arrive at the benchmark rate of 9.69%, which was still higher than the project IRR of 8.93%. Note that this benchmark rate is particularly conservative because in reality it is unlikely that this project will be able to secure 100% debt financing, in which case the debt servicing years would be longer and government bond yield would be higher accordingly.

In addition, it should be noted that another proposed CDM project – 1036 Khon Kaen Sugar Power Plant Project – which operates in the same sugar industry in Thailand also used a weighted average cost of capital of 11.7%, which is similar to the value used by this project.

2. In particular it should be confirmed how any risk premiums applied in the calculation of the WACC have been validated in the context of a project activity with a 21 year firm contract.

The same risk premium as Mitr Phol Group's was applied to this project because although Dan Chang was able to enter into a long term Power Purchase Agreement (PPA) with EGAT, Dan Chang still shared the same risks as Mitr Phol sugar business, mainly due to the uncertainty of sugar cane supply. Most of sugar cane supplied to Mitr Phol Sugar Mill is still rain fed. *Figure 2* shows the fluctuation of sugar cane supplied to Mitr Phol Sugar Mill in Suphanburi province, where Dan Chang Project is located, which is highly correlated to Thailand sugar cane production during the past decade.

Figure 2 Cane Supply to Mitr Phol Sugar Mill in Suphanburi compared to Sugar Cane Production in Thailand, 1995 – 2007



Source: Thailand sugar cane production from Office of Agricultural Economics: www.oae.go.th and sugar cane supplied to Mitr Phol sugar mill from Mitr Phol Group.

In particular, with a firm contract, Dan Chang shall supply the contracted amount of electricity to EGAT, with penalty applied in case of failure to deliver. According to Clause 17.4.2 of The Power Purchase Agreement (PPA) that Dan Chang entered into with EGAT, '*if the actual electric power supplied to EGAT is less than the contracted amount, the electric power to be calculated for payment is the actual power delivered less 20% of the difference between the actual electric power delivered and the contracted amount*'. (See Attachment3 – PPA_PenaltyClause.pdf) This implies that if the power supply is less than 4.5 MW, a negative capacity payment will be made, ie a fine.

In the year when there is low sugar cane throughput, the plant will have to look for more supplementary fuel, which is far more costly than bagasse supplied from the Mitr Phol Sugar Mill, partly due to the cost of transport. By its engineering design, it is neither possible to co-fire any fossil fuel in this power plant. Therefore, the uncertainty of the sugar cane supply can impose a significant financial burden on Dan Chang project.

Being the pioneer of new high efficiency biomass technology in Thailand also exposes Dan Chang to the risk of unfamiliar technology. In fact, there was an incident in 2006 which led Dan Chang to shut down the power plant for approximately 2 months. Dan Chang received no revenues during the shutdown and was also penalized by EGAT for

1,099,224 Baht and 1,069,092 Baht in March and April 2006 respectively. (See *Attachment4 – EGAT_FineNotification.pdf*)

Given that Dan Chang shared similar risks with the sugar business as it had to rely on the amount of sugar cane supply by Mitr Phol Sugar Mill, Mitr Phol consider that the group WACC was appropriate to be applied to Dan Chang project.

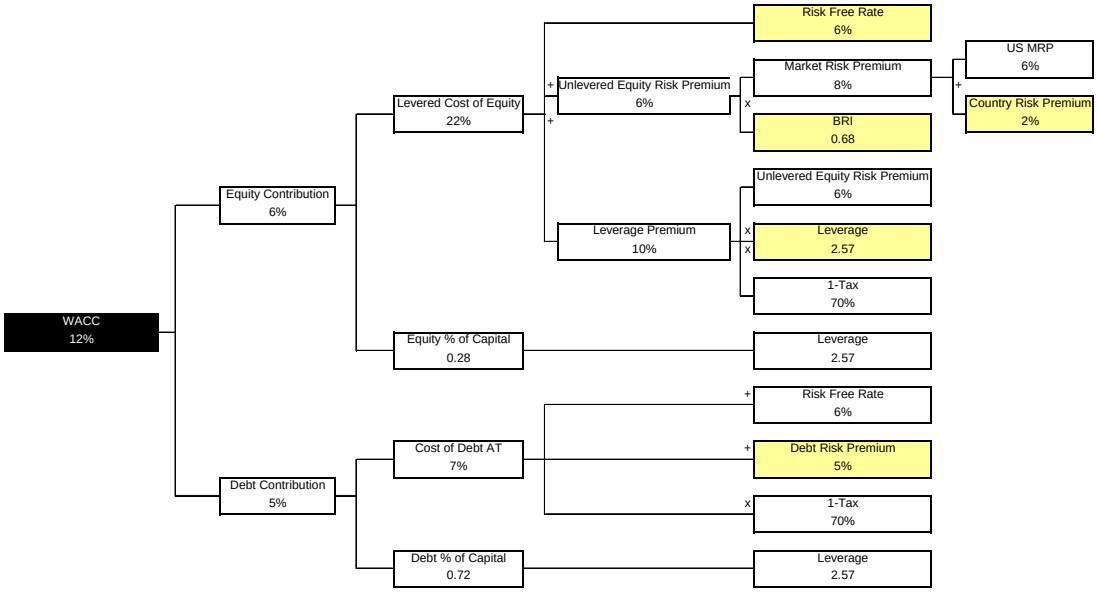
3. In addition the assumption that the project is 40% equity financed does not match with the IRR calculation which indicates 28% equity financing.

The 40% equity financed shown in the WACC calculation is based on Mitr Phol Group financing plan, while the equity financing for Dan Chang Bio-Energy Co., Ltd, as a separate company, is only 28%, as shown in the IRR calculation for this project. The decision to go ahead with Dan Chang Project was made by Mitr Phol Group.

Since this project is a new business line within the Mitr Phol Group, the existing shareholders were not willing to invest a large proportion of equity financing in this project. It also happened that in the early 2000's, banks in Thailand were more willing than before to lend to new renewable energy projects. Dan Chang project was then able to secure up to 72% debt financing, which was higher than the Group average.

It should also be noted that had the 28% equity been applied in the same capital tree model with the same risk premium as the Mitr Phol Group, the WACC for Dan Chang project would produce insignificant difference to the WACC value of around 12%, as shown in *Figure 3* below.

Figure 3 Alternative WACC that could have been used for Dan Chang



4. The IRR without CDM revenues is quoted as being 8.93% on page 14 of the PDD and 9.2% on page 15.

Both IRR calculations were shown to reflect the historical events of the CDM projects. However, the 9.2% IRR figure as calculated by the World Bank Prototype Carbon Fund (PCF) was based on approximate information gathered over a short timeframe, with no supporting explanation submitted to the Mitr Phol Group to justify the Project Concept Note at the time of writing. Mitr Phol Group at the same time commissioned the COGEN feasibility study, which calculated the IRR of 8.93%, using detailed information and with a strong set of explanatory assumptions. This IRR figure of 8.93% has been used as the basis for the financial analysis shown in the PDD before the CER revenues, while the World Bank PCN information was also provided as supplementary information since it provided further information on sensitivity analysis and on the expected CER revenues at that time.

5. The validation of the input values for the IRR calculation should be further explained, in particular the price paid for bagasse as the baseline assumes that excess bagasse is left to decay.

Dan Chang is a separate legal entity to Mitr Phol Group, and is a subsidiary with separate operations. Dan Chang has entered into a commercial contract to buy bagasse from Mitr Phol, and also to sell electricity and steam to Mitr Phol Sugar Mill, as shown in the supported document *Attachment5 – BagasseSupplyAgreement.pdf*. The agreed

price of 250 Baht/tonne of bagasse [1] paid by Dan Chang to Mitr Phol Group reflects the intrinsic value of the bagasse, as stated in the baseline scenario, where 93% of the bagasse would be used for onsite cogeneration, while only 8% would be left to decay due to insufficient power plant capacity (See also *Table 7*).

Table 7 Production and Utilisation of Bagasse, at Mitr Phol Sugar Mill, Suphanburi, 2001 – 2003

Dan Chang	Cane crushing	Bagasse produced	Bagasse used	Bagasse leftover
	tonnes	*tonnes*	*tonnes*	*tonnes*
2001	2,601,243	703,376	693,035	10,341
2002	3,214,776	894,672	774,443	120,229
2003	3,046,992	822,688	761,748	60,940
Annual Average	**2,954,337**	**806,912**	**743,075**	**63,837**

Source: baseline table on p.46 of the PDD (Annex 3 Baseline Information)

Proof of payment is provided in *Attachment6 – BagasseReceiptMitrPhol2006.pdf*, which shows the amount of bagasse that Mitr Phol Sugar Mill sold to Dan Chang Bio-Energy Co., Ltd. during Jan – Apr 2006 and Dec 2006 at unit price of 250 Baht/tonne bagasse. The total sum of 168,330,152.50 Baht of payment was made on 26 April 2007.

This 250 Baht/tonne was neither agreed at an exaggerated price. Dan Chang also bought additional bagasse from other suppliers. *Attachment7 – BagasseReceiptOthers2007.pdf* exhibits the proof of payment for 2,301.20 tonne of bagasse at 315 Baht/tonne (not including transportation), amounting to 724,878 Baht.

Therefore, the price assumed in the feasibility study reflected the reality and should be considered as conservative, because the project IRR would have been even lower, had the price of bagasse been assumed to be higher in the IRR calculation.

[1] Bagasse from Mitr Phol Sugar Mill is supplied to Dan Chang via conveyor belts because Dan Chang is right next to Mitr Phol Sugar Mill. Thus transportation is not included in this price. Quantity of bagasse supply is not committed in this agreement.