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REQUEST FOR REVIEW

Dalmia Sugars Limited Nigohi project
Project 0977

The request for review highlighted 6 points that required further information, namely:

1. In accordance with the guidelines for completing the PDD, section B.5 of the PDD must contain evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity, such evidence shall be validated by the DOE.
2. Further explanation is required to demonstrate that the identified barriers *"Do not prevent the implementation of at least one of the alternatives"*.
3. As the project activity is taking place at a greenfield site, the common practice analysis should focus on recently completed sites rather than all sugar factories in the country/region.
4. Calculation of EG project plant should be submitted and the efficiency of new plant with regard to electricity production should be clearly shown in the PDD and validated by the DOE.
5. With respect to the efficiency of the project and reference plants ACM0006 requires the participant to "document relevant source of information and justify a choice". Further data and evidence is required regarding the documentation of the relevant source of input values used in the calculations in the PDD.
6. The methodology requires measurement of NCV of biomass residues combusted, while the monitoring plan indicates that "local record" may be used. Please clarify this.

The following responses are provided to the points raised.

1. In accordance with the guidelines for completing the PDD, section B.5 of the PDD must contain evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity, such evidence shall be validated by the DOE.

Evidence of the incentive from the CDM was provided to the DOE, this was in the form of a project report prepared by Dalmia prior to the starting date detailing the project set-up and the potential for the project to qualify as a CDM. Furthermore evidence of correspondence relating to the contractual arrangements for the provision of CDM consultancy prior to the starting date was also provided to the DOE.

The process of discussions on CDM consultancy started in July/August 2005 itself for all three projects being undertaken by Dalmia – Nigohi/Jawaharpur and Ramgarh. Evidence of discussions relating to CDM development for Jawaharpur and Nigohi is provided which is dated October 2005, this was for services to the company Ramnagar Chini Mills Limited, which then

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became Dalmia Sugars Limited and which subsequently became Dalmia Cement (B) Ltd[1], this company is the owner of the Nigohi project.

The PDD has now been amended to include evidence that the incentive was seriously considered prior to the decision to proceed with the project activity.

Documents provided: *Internal project report, correspondence on CDM consultancy discussions*.

2. Further explanation is required to demonstrate that the identified barriers *"Do not prevent the implementation of at least one of the alternatives".*

The alternatives to the project are the implementation of a low pressure system without export to the grid and the project activity not undertaken as a CDM. Through sub-step 3a of the additionality tool we have demonstrated the barriers and risks to undertaking the project activity but we have now added the following paragraph in sub step 3b which highlights how the barriers faced by the project activity do not prevent the implementation of the alternatives.

"The barriers highlighted above are broadly categorised as those affecting the sales price of electricity and the fuel supply to the project activity. In the case of a low pressure system the barrier on the sales price of electricity does not have an impact as there would not be any export of electricity to the grid – a low pressure system would be designed purely to satisfy the captive power requirements of the adjacent sugar factory. In terms of the fuel supply risk this would also not be a factor as the power plant would only generate enough power (steam and electricity) for the use of the adjacent sugar factory and therefore be only required to operate when the adjacent sugar factory is crushing cane. As the crushing of cane in the sugar factory generates enough biomass (bagasse) to generate captive power (steam and electricity) there is no risk on fuel supply for such project types."

3. As the project activity is taking place at a greenfield site, the common practice analysis should focus on recently completed sites rather than all sugar factories in the country/region.

The following table lists out the recently completed new sugar plants and whether these export to the grid. This demonstrates that all plants that plan to export to the grid have been submitted as potential CDMs (and which are therefore excluded from the common practice analysis) are following this route, all other new plants are not installing grid export at the point in time when the sugar factory was commissioned.

The common practise in the PDD focussed more generally on all plants as it was felt that these plants face less risk in establishing grid based cogeneration and that the limited uptake of such projects acts

[1] The evidence of the name change from Dalmia Sugars Limited to Dalmia Cement (B) Limited was provided during the completeness check, the name change from Ramnagar Chini Mills Ltd to Dalmia Sugars Limited is attached.

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as a proxy for the demonstration of barriers. The analysis in the table below is restricted to the state of Uttar Pradesh as policies across states are somewhat different.

Plant	Year	Power export	CDM project
Mankapur (BCML)	2006-07	Yes	Yes, UN validation website 2 Feb – 3 Mar 2007
Barkhera (Bajaj)	2006-07	Yes	Yes, UN validation website 23 Sep – 22 Oct 2006
Khambakhera (Bajaj)	2006-07	Yes	Yes, UN validation website 23 Sep – 22 Oct 2006
Gagnoli (Bajaj)	2006-07	Yes	Yes, UN validation website 23 Sep – 22 Oct 2006
Dalmia Jawaharpur	2006-07	Yes	Yes, UN validation website (3 Aug – 1 Sep 2006)
M/s Dwarikesh Sugar Distt., Bareilly	2006-07 (Delayed)	Yes but expected in second year of operation	Yes, UN validation website (29 Sep – 28 Oct 2006)
Chandanpur (Triveni)	2006-07	No	
Milak Narainpur (Triveni)	2006-07	No	
Rani Nangal (Triveni)	2006-07	No	
Loni (DSCL)	2006-07	Yes but expected in second year of operation	Will be proposed as CDM[2]
Hariyawan (DSCL)	2006-07	Yes but expected in second year of operation	Will be proposed as CDM
Rajpura (DSM)	2006-07	No	
Khai Kheri (Uttam)	2006-07	No	
Nakhaur (Uttam)	2006-07	No	
Belwara (Rana)	2006-07	No	
Amirkhan Ka Majara (Rana)	2006-07	No	

This table and data has now been incorporated into the PDD.

This table has been sourced from the list of projects for which UPPCL has signed PPAs from the Uttar Pradesh Ganna Vikas Vibhag website[3] and evidence of existing plants provided from the List of

[2] Loni and Hariyawan are being developed by Agrinergy and DSCL jointly, copies of draft PDDs have been provided to demonstrate this.

[3] http://upcane.org/Status%20of%20co-genration%20of%20Power.pdf

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Cane Sugar Factories and Distilleries (Season 2004-05)[4], cross referencing these two documents has generated the list of new factories which have plans to export to the grid. Added to this list we have provided a list of other new sugar factories that we know of from market sources. Combining these two lists then permits us to arrive at the data in the table above. UPPCL has signed PPAs with 47 sugar plants, 9 of these are new sugar factories (including the project activity). Of these 9 plants, 3 have signed PPAs from the second year of operation when the sugar plant will have stabilised (but these are proposed CDM projects), of the remaining 5 all are proposed as CDMs and are currently under validation.

4. Calculation of EG project plant should be submitted and the efficiency of new plant with regard to electricity production should be clearly shown in the PDD and validated by the DOE.

The calculation of EG project plant was detailed in spreadsheets provided to the DOE. This calculation was based on the following assumptions – a turbine generator with nominal capacity of 27MW and an operational capacity of 25.4MW, season days of 160 days, off-season days of 90, auxiliary consumption equal to 8% and a PLF of 90%.

Therefore
Season generation = 25.4 x 160 x 24 x 90% = 87,782 MWh
Season auxiliary consumption = 8% x 25.4 x 160 x 24 x 90% = 7,023 MWh
Off-season generation = 25.4 x 90 x 24 x 90% = 49,378 MWh
Season auxiliary consumption = 8% x 25.4 x 90 x 24 x 90% = 3,950 MWh

Therefore
EG project plant = 87,782 + 49,378 – 7,023 – 3,950 = 126,187 MWh

There is no requirement in the methodology to show the efficiency of the new plant (the efficiency of the reference plant is required and this is detailed in Annex 3 of the PDD). However the efficiency of the new plant, in terms of $MWh_{el}/MWh_{biomass}$, is detailed below:

MWh_{el} = 250 days x 24 hours x 23.37 MW = 140,208 MWh
In the baseline calculation net electricity was used and for the sake of a true comparison we have also adopted net electricity here, i.e. generation from 23.37 MW which assumes an auxiliary consumption of 8%.

$MWh_{biomass}$ is calculated from the amount of biomass used and the energy contained within this biomass, in units of MWh. The amount of biomass used is 177,000 tonnes of bagasse (dry weight) and 30,000 tonnes of rice husk (dry weight). The bagasse has a calorific value of 17.73 GJ/t or 4,238 kCal/kg and given that 1kWh is equal to 860 kCal the bagasse has energy of 4.928 MWh/t. The rice

[4] The list of plants from this source has been provided to the validator.

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husk has a calorific value of 13.392 GJ/t or 3,200 kCal/kg, therefore the rice husk has energy of 3.722 MWh/t.

Therefore $\varepsilon_{projectplant}$ = 140,208 / (4.928 x 177,000 + 3.722 x 30,000) = 0.143

5. With respect to the efficiency of the project and reference plants ACM0006 requires the participant to "document relevant source of information and justify a choice". Further data and evidence is required regarding the documentation of the relevant source of input values used in the calculations in the PDD.

As highlighted under point 4 there is no requirement in the methodology to show the efficiency of the project plant. The efficiency of the reference plant is detailed in Annex 3 of the PDD. The table has been reproduced below with references and notes to the calculations inherent in the table which were discussed at the time of validation with the DOE.

Baseline plant set-up

Capacity	Tcd	7,500		Capacity of plant
Crush rate	Tph	312.5	=7,500/24	24 hours in a day
Crush	Mt	1,200,000	=7,500 x 160	The adjacent sugar factory expects to operate for 160 days
Net Bagasse (dry weight)	Assume 29.5% on cane	177,000	=1,200,000 x 29.5% x 0.5	The percentage of bagasse on cane is sourced from Hugot, Handbook of Cane Sugar Engineering which states that bagasse is 24 to 30% by weight of cane, page 915. This was confirmed through CAR 3 raised in the validation report. The moisture content of the bagasse was taken from testing done at another Dalmia sugar factory and also confirmed through CAR 3 of the validation report.
Steam consumption	% on cane	48%		Hugot states that steam on cane is between 45 to 50%, page 1026. This has also been confirmed by the Sugar Technologist Mission, a government of India body. The Mission Director, Mr J J Bhagat, is available to discuss this further, tel 011 26964656.
Steam consumption	Tph	150	= 48% x 312.5	
Condensed steam	Tph	--		
Steam generation	Tph	150		The steam generation is taken from the amount of bagasse generated per hour, 312.5 x 29.5% = 92.2 tph (total weight). If the steam per tonne of

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				bagasse conversion factor highlighted in page 12 of the PDD, 1.604 tonnes steam per tonne bagasse, is used we arrive at 148 tph steam generation. In actual fact the sizing is likely to be slightly larger to accommodate any problems in operation and we have therefore taken 150 tph.
Steam pressure	kg/cm2	46		
Power generation	MW	8.75	= 28 kWh/t of cane x 312.5/1000	We have assumed 28 kWh/t cane. This is supported by the actual operation of Ramgarh, another sugar factory owned and operated by Dalmia. The Ramgarh sugar factory used the following electricity for sugar operations over the last 3 years 2003/04: 16,491 MWh 2004/05: 18,711 MWh 2005/06: 22,054 MWh This data was validated by a DOE and is presented in the Ramgarh PDD which is at the request for registration stage. The cane crushed at the Ramgarh sugar factory has been provided from Excise reports submitted to the state government and copies have been provided to the DOE. The crushing data is provided below: 2003/04: 63,343 t 2004/05: 70,220 t 2005/06: 84,191 t From this data we arrive at the following kWh/t cane for the three years. 2003/04: 26 kWh 2004/05: 27 kWh 2005/06: 26 kWh The assumption of 28 kWh is therefore supported by existing operations and has also been confirmed by the Sugar Technologist Mission, a government of India body. The Mission Director, Mr J J Bhagat, is available to discuss this further, tel 011 26964656. Furthermore our assumption is conservative as the higher figure results in a higher baseline and hence lower qualifying electricity under the equation for EGy. Generally these numbers are supported by Hugot, Handbook of Sugar Cane Sugar Engineering which suggests for India a figure of 32 i.h.p/t.c.h with 26 kW = 35 i.h.p, page 1028.

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Steam to generate power	Tph	70	= 8.75 x 8	In order to generate 8.75MW of electrical power we assume that 8 kg of steam are required per kWh of electrical power. This has been taken from a performance guarantee from a turbine supplier, Triveni, on a recent order of a turbine by Dalmia where the supplier guaranteed 7.8 kg steam/kWh. The operating conditions of this turbine are the same as the baseline, 45 bar and 450°C maximum. The copy of the order and the relevant sections detailing the performance guarantee have been attached. Our assumption of 8 kg steam/kWh is therefore conservative as this increases the baseline and reduces EGy.
Steam to fibrizer	Tph	25		This is calculated from the following assumptions: 40 kW/tonnes fibre, 16.5% fibre on cane giving power consumption of 20625 kWh. At 12kg/kWh of steam this yields an equivalent steam requirement of 25 tph. This data is taken from Hugot, page 1014 and 1015.
Steam to PRDS	Tph	55	=150 – 70 – 25	This is the difference between steam consumption and steam to power and the fibrizer
Hours	Hr	3840	=160 x 24	
Efficiency		0.0385	=(160 x 24 x 8.75)/ (177,000 x (4,238/860))	Calculated as shown under point 4 of the response to the request for review.
Calorific value of bagasse	kcal/kg (dry)	4,238		Taken from Hugot, see page 12 of PDD and footnote 13 for complete reference.
Calorific value of bagasse	GJ/t	17.73		Converted from kcal/kg using a conversion factor of 4.184 J/Cal
Baseline, MWh		**33,600**	**=0.0385 x 177,000 x (4,238/860)**	**= ε xNCV x BF** Where NCV is converted from kcal/kg to MWh/t)

Documents: *RT8(C) for 2005/06 season and 2004/05 season, Hugot pages 1014-1015, 1026 and 1028,Turbine order 3MW and operating guarantees.*

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6. The methodology requires measurement of NCV of biomass residues combusted, while the monitoring plan indicates that "local record" may be used. Please clarify this.

The variable for NCV of biomass residues combusted is included twice in the monitoring plan and the first mention of this variable says that it will be measured and there is no reference to local records. The reason for the confusion is that the project was initially submitted under version 3 of the methodology which did not include detail under leakage of NCV and we therefore followed the guidance for NCV detailed under the project emissions section. This permits local values to be used and hence added to the confusion.

The PDD has now been amended so that there is now only one reference to the NCV for biomass in the monitoring and this has been clarified for bagasse and rice husk and the use of laboratory measurements, there is no mention of using local values except as a QA/QC.

(B.B. MEHTA)

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