Appendix A[1] to the simplified modalities and procedures for small-scale CDM project activities

CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
Version 01 (21 January, 2003)

Introductory Note

1. This document contains the clean development mechanism project design document for small-scale project activities (SSC-PDD). It elaborates on the outline of information in appendix B "Project Design Document" to the CDM modalities and procedures (annex to decision 17/CP.7 contained in document FCCC/CP/2001/13/Add.2) and reflects the simplified modalities and procedures (herewith referred as simplified M&P) for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3).

2. The SSC-PDD can be obtained electronically through the UNFCCC CDM web site (http://unfccc.int/cdm/ssc.htm), by e-mail (cdm-info@unfccc.int) or in print from the UNFCCC secretariat (Fax: +49-228-8151999).

3. Explanations for project participants are in italicized font *(e.g. explanation).*

4. The Executive Board may revise the SSC-PDD if necessary. Revisions shall not affect small-scale CDM project activities validated prior to the date at which a revised version of the SSC-PDD enters into effect. Versions of the SSC-PDD shall be consecutively numbered and dated. The SSC-PDD will be available on the UNFCCC CDM web site in all six official languages of the United Nations.

5. In accordance with the CDM modalities and procedures, the working language of the Board is English. The completed SSC-PDD shall therefore be submitted to the Executive Board in English.

6. Small-scale activities submitted as a bundle, in accordance with paragraphs 9 (a) and 19 of the simplified M&P for small-scale CDM project activities, may complete a single SSC-PDD provided that information regarding A.3 (*Project participants*) and A.4.1 *(Location of the project activity)* is completed for each project activity and that an overall monitoring plan is provided in section D.

7. A small-scale project activity with different components eligible to be proposed[2] as a small-scale CDM project activity may submit one SSC-PDD, provided that information regarding subsections A.4.2 (*Type and category (ies) and technology of project activity*), and A.4.3 (*brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity)* and sections B *(Baseline methodology)*, D *(Monitoring methodology and plan)* and

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[1] This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix A to that document. For the full text of the annex II to decision 21/CP.8 please see http://unfccc.int/cdm/ssc.htm).

[2] In paragraph 7 of simplified M&P for small-scale CDM project activities, on clarifications by the Executive Board on small-scale CDM project activities, the Board agreed that in a project activity with more than one component that will benefit from simplified CDM modalities and procedures, each component shall meet the threshold criterion of each applicable type, e.g. for a project with both a renewable energy and an energy efficiency component, the renewable energy component shall meet the criterion for "renewable energy" and the energy efficiency component that for "energy efficiency".

E *(Calculation of GHG emission reductions by sources)* is provided separately for each of the components of the project activity.

8. If the project activity does not fit any of the project categories in appendix B of the simplified M&P for small-scale CDM project activities, project proponents may propose additional project categories for consideration by the Executive Board, in accordance to paragraphs 15 and 16 of the simplified M&P for small-scale CDM project activities. The project design document should, however, only be submitted to the Executive Board for consideration after it has amended appendix B as necessary.

9. A glossary of terms may be found on the UNFCCC CDM web site or from the UNFCCC secretariat by e-mail (cdm-info@unfccc.int) or in print (Fax: +49-228-8151999).

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A. General description of project activity

A.1 Title of the project activity:

Ajbapur Sugar Complex Cogeneration Project
07/03/2006

A.2 Description of the project activity:

The proposed CDM project activity is an expansion of electricity generation capacity and the installation of facilities to export electricity to the grid at the Ajbapur Sugar Complex in Uttar Pradesh, India. The efficiency of an existing boiler will be upgraded, with its capacity increased from 50 tph to 65 tph; a Kessels 7.5 MW condensing and extraction turbine will be installed (TG5); as will a 132kV step-up station and connection to the Uttar Pradesh grid to allow for the export of electricity to the grid. The turbine generator will be powered by the combustion of bagasse, a co-product of the sugar production process, and other biomass, and will therefore be a renewable carbon neutral source of electricity.

Currently the power generation set-up at the factory consists of three 3MW backpressure type turbines and one 1.5MW turbine generator and two bagasse based boilers of 45 kg/cm^2. These turbine generators will continue to operate after implementation of the project activity[3]. One of the boilers will be upgraded as outlined above and they are both connected to a common steam header. The plant also has two DG sets of 750kVA and 380kVA that are used in the off-season for maintenance work. These power generated from these DG sets in the off-season will be replaced by the new turbine generator but the emission reductions from the displacement of this fossil fuel based source is not included as part of the project activity. Currently no facility is available at site to synchronise these DG sets with grid power nor is it planned in future.

All modern sugar factories are energy independent, employing co-generation for their own steam and power requirements. However in the absence of financial incentives to sell surplus power, the technology chosen is low cost and inefficient. Typically this produces just enough energy for the plant's own consumption. However, given the right financial incentives investments may be made to improve the efficiency and capacity of power generation. This is the situation with the Ajbapur Sugar Complex, which currently has four existing turbines with a total capacity of 10.5MW that is sufficient to meet the factories internal power demand. However the factory neither has the facilities, nor the capacity to export electricity to the grid. The factory management have decided to utilise the CDM to justify an expansion of generating capacity and to allow for export of electricity to the grid. As detailed in section B3, the prospect of CDM revenue has allowed the project to overcome a number of barriers, particularly those relating to financial attractiveness, price uncertainty and PPA risk.

The factory was established in 1997, and has increased its crushing capacity to its current peak capacity of 7,000 tonnes of cane per day. The construction of the sugar factory has had a major impact on the surrounding rural economy and on the welfare of villagers. The revenue from growing sugar cane exceeds that of alternative crops, and by providing an outlet for increased cane production, the installation and growth of the factory has allowed farmers' incomes to increase sharply. This is illustrated by the increase in the cane area supplying the factory – up from 17,000 hectares in 1997/8 to 42,400 hectares in 2003/4.

In addition to the direct revenue impact for farmers, the sugar factory actively contributes to the development of the local economy. There is a long list of initiatives undertaken by the sugar factory, all

[3] These existing units have not in the past and will not in the future supply power to the grid.

of which transform the rural economy and the well being of the local population. These initiatives include:

- Construction of 52 km of roads
- Provision of free medical facilities at four nearby villages, including weekly visits from a qualified doctor and distribution of medicines free of charge
- Establishment of scheme, in collaboration with an NGO, to provide primary education, health, hygiene and self dependency in 10 villages
- Installation of 655 bore wells
- Provision of a chain of agricultural shops, providing quality inputs, services and advice under one roof
- Provision of over 100 extension and community development officers
- Establishment of Green Card system, to allow farmers to access low interest loans from banks, and hence to avoid the use of high interest charging money lenders

Moreover, the presence of the factory has provided sufficient income to allow for the conversion of over 50% of local dwellings to brick and concrete from mud.

Access to secure and reliable electricity supplies is fundamental to development, a factor highlighted by stakeholders' comments (see section G). The project activity will contribute to sustainable development through two key avenues. Firstly, by allowing for diversification of the revenue of the sugar factory through the sale of electricity and CERs, the project activity will assist in establishing the viability of the unit. This will contribute to the continuation and furthering of the benefits the factory's presence provides to the local economy. Secondly, by producing clean and renewable power, the project activity will contribute to electricity security and lead to the displacement of fossil fuel based generation.

A.3 Project participants:

Name of Party involved	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as a project participant
India (host)	Private entity: DCM Shriram Consolidated Ltd.[4] Public entity: Ministry of Environment and Forests	No
United Kingdom	Private entity: Agrinergy Ltd. Public entity: Department of Environment, Food and Rural Affairs	No

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host country Party (ies): India

[4] The Ajbapur Sugar Complex is a unit of DCM Shriram Consolidated Limited (DSCL). The factory was previously one of the units of Ghaghara Sugar Ltd (another unit is Rupapur Sugar Complex), which was a wholly owned subsidiary of DSCL. In May 2004, through a high court order, Ghaghara Sugar Ltd was considered to have merged with DCM Shriram Consolidated Ltd with effect from 1st April 2003. DCM Shriram Consolidated Ltd has many divisions and now Ajbapur and Rupapur Sugar Complexes are part of the Sugar Division, which is known as DSCL SUGAR

A.4.1.2 Region/State/Province etc.: Lakhimpur-Kheri District, Uttar Pradesh State

A.4.1.3 City/Town/Community etc: Ajbapur

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity *(max one page)*:

The address of the Ajbapur Sugar Complex is:

Ajbapur Sugar Complex
DSCL Sugar
Vill. Ajbapur, PO. Mullapur
Dist. Lakhimpur Kheri (UP)
Pin – 261 505

The complex is located in central Uttar Pradesh, 140 Kms from Lucknow and 372 Kms from Delhi. The nearest town is Shahjahanpur, which is 35 Kms from the complex. Shahjahanpur is situated at 27º54'N and 79º57' East.

A.4.2 Type and category (ies) and technology of project activity

Type I – Renewable Energy Projects
I D - Renewable electricity generation for a grid

The project produces renewable energy from the combustion of bagasse and recent biomass. The project activity falls within the small-scale rating as the total generation capacity of the new unit is 7.5MW, i.e. below the 15MW outlined in section ID of Appendix B to the simplified modalities and procedures for small-scale CDM project activities[5]. The plant is grid connected and the electricity supplied from the project activity to the grid would be expected to replace existing and planned generation from the grid, the majority of which is fossil fuel based.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

The emission reductions from the project will arise directly from exports of electricity to the grid. These exports result directly from the combustion of bagasse, which is a by-product of sugar cane processing and other biomass. The project activity will therefore generate renewable electricity.

We expect the project to result in an average reduction in emissions of 40,392 tonnes of CO_2e per annum.

A.4.4 Public funding of the project activity:

No public funds will be invested in the project activity.

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

[5] For cogeneration plants the limits set on the rating of the primary boiler in section ID is $45MW_{thermal}$. This criterion would apply if CERs were claimed for heat used by the sugar factory. This is not the case as we assume in our baseline that sugar factories are power independent. However, we have calculated the maximum $MW_{thermal}$ rating of the boiler capacity used by TG5, which is 29 $MW_{thermal}$.

Appendix C, paragraph 2 of the Simplified Modalities and Procedures for Small-Scale CDM project activities states:

“A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.”

As there is currently no registered CDM project at the site either large scale or small scale, the project will meet the criteria on debundling.

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:

Type I – Renewable Energy Projects
I D - Renewable electricity generation for a grid

B.2 Project category applicable to the project activity:

The project activity will produce renewable energy from the combustion of bagasse and other biomass. The plant will be connected to the grid and the electricity supplied from the project activity to the grid would be expected to displace existing and planned electricity generation from the grid, the majority of which is fossil fuel based.

With regard to Appendix B of the Simplified Baseline and Monitoring Methodologies, the project does not fall under point 28 and therefore there is a choice of two approaches left, 29 (a) or (b). We have chosen approach (a) as the baseline for this project:

In determining the baseline emission factor, approach 7 (a) is selected – the kWh produced by the renewable generating unit multiplied by the average of the "approximate operating margin" and "build margin".

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity *(i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario)*

B. 3.1 National policies and circumstances

Electricity generation in India is primarily managed by privatised companies that were previously state run electricity boards. The Electricity Act, 2003 is now the main driver of reform in the electricity sector. The Electricity Act, 2003 consolidated the laws relating to the generation, transmission, and distribution and trading of electricity and generally sought to put in place measures to promote the development and supply of electricity across India.

The Electricity Act, 2003 consolidated: the Indian Electricity Act, 1910; the Electricity (Supply) Act, 1948; and the Electricity Regulatory Commissions Act, 1998. The Indian Electricity Act, 1910 granted licences for the supply of electricity and provided the general framework for distribution. The Electricity (Supply) Act, 1948 mandated the creation of State Electricity Boards (SEB), each with the responsibility for supplying electricity in the state. Each state through successive Five Year Plans undertook expansion through the utilisation of Plan funds. Over time the performance of SEBs deteriorated due to a number of factors notably the ability to set tariffs and the political implications of such a measure. To break this link the Electricity Regulatory Commissions Act, 1998 was enacted which created the Central Electricity Regulatory Commission. This permits State Governments to create State Electricity Regulatory Commissions. In conjunction with these reforms some states have undertaken reforms of their own, unbundling supply into separate generation, transmission and distribution companies.

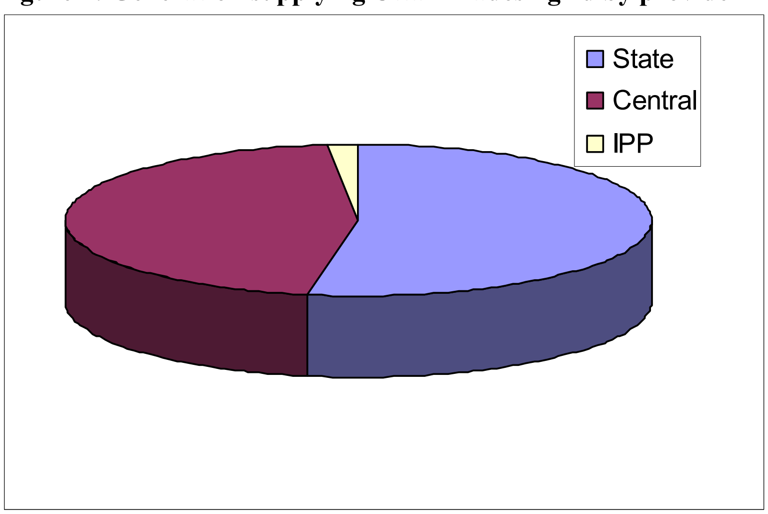
In Uttar Pradesh, the Electricity Reform Act was introduced in 1999. This provided the basis for reform of the electricity sector in the state. In January 2000, the UPSEB was unbundled into three corporations: Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited (UPRVUNL) which owns and operates the existing thermal power stations of UPSEB; Uttar Pradesh Jal Vidyut Nigam Limited (UPJVNL) which in addition to their own small hydro power houses owns and operates the existing and under construction hydro power stations of UPSEB; and Uttar Pradesh Power Corporation Limited (UPPCL), which is responsible for transmission and distribution of electricity in Uttar Pradesh. The Electricity Act, 2003 goes further than most state legislation, introducing new elements like open access and power trading into the sector.

Whilst the Electricity Act, 2003 does not explicitly set any targets for renewable energy it does mention that the National Electricity Policy should develop the power sector with regard to the optimal utilisation of resources and renewable is mentioned. It also states that the Central Government should, in consultation with State Governments, set out a national policy "permitting stand alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas"[6]. There are some incentives for bagasse cogeneration projects from the Ministry of Non-conventional Energy: Interest subsidies exist if boiler pressures are above 60 bar (in the case of the Ajbapur cogeneration project this does not apply) and there is a recommended price for power from renewable sources of Rs 2.25/kWh, paid on a base year of 1994/95 and increased annually at 5%. The latter incentive is a directive from the Ministry of Non-conventional Energy but is unregulated and individual negotiation with the power companies is the norm across India. Indeed, as highlighted below, in the case of the Ajbapur project, UPPCL have raised the prospect that they will approach the regulatory commission to renegotiate the already agreed tariff, and this is a major risk that has provided a barrier to the project activity.

The Indian power grid system is split into five regions, of which Uttar Pradesh falls within the Northern Region. Within the Northern Region, each state has state-owned generation capacity and as outlined above, in UP this is managed by UPRVUNL and UPJVNL. Moreover, as part of the Northern Region, the UP grid also receives power generated by central-government owned plants feeding into the Northern Grid, and power produced by private owned generators which is exported to UPPCL.

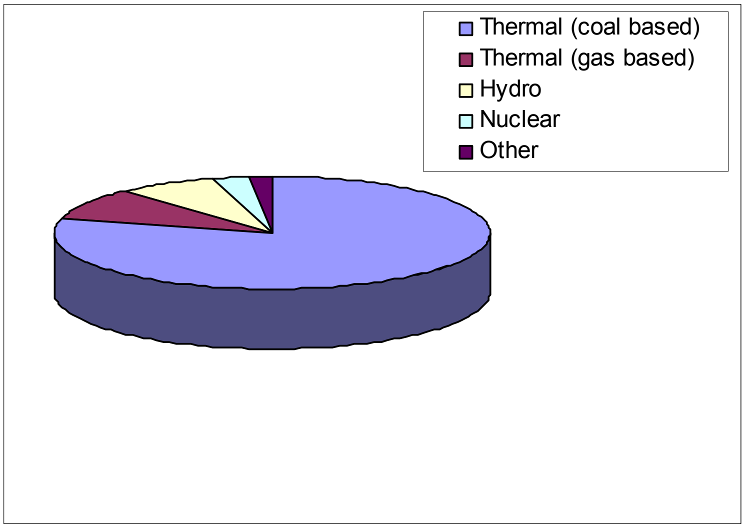
The current generation mix feeding into UP may be divided into three categories: state run generation companies, independent power producers and the central government controlled generation. The following figure shows the mix of these entities by generation capacity and also the make up of the generation capacity.

Figure 1: Generation supplying Uttar Pradesh grid by provider



[6] The Electricity Act, 2003, Part II, paragraph 4

Figure 2: Generation type in Uttar Pradesh by capacity, MW



B. 3.2 Determination of additionality

In line with attachment A to appendix B of the simplified M&P for small-scale CDM project activities, demonstration of additionality focuses on the barriers facing the project. In showing that the project is additional we demonstrate that it is not part of the baseline scenario, which in the case of the Ajbapur cogeneration project is that the factory remains self sufficient in power, but does not export any electricity to the grid.

We undertake additionality analysis through an investment scenario analysis of the project and then turn to examine other barriers facing the project. We examine the financials of the project with and without emission reduction revenue, highlighting the importance of emission reduction revenue to the viability of the project. This analysis is supplemented with information on other barriers the project has faced and how the prospect of CER revenue will allow these to be overcome.

a) Financial barriers:

The Ajbapur Sugar Complex is a part of DCM Shriram Consolidated Limited (DSCL), a successful diversified Indian company engaged in the manufacture of PVC Resin, Caustic Soda, Chlorine, Sugar, Cement and Urea and other agri-inputs. DSCL has also developed an Energy Service Company (ESCO). The turnover of DSCL in 2004-05 amounted to Rs19.80billion (USD 450 Million). Being undertaken within a large commercial organisation, the project activity has undergone detailed scrutiny, and it is the prospect of CER revenue that brings the financial performance of the investment up to a level that is considered sufficient to meet the benchmarks set by the company.

The project IRR of the project activity increases from 13% to 23% when CER revenues are taken into account. The financial analyses and assumptions underlying this section will be made available to the validators but briefly these utilise the capital costs of the project, the returns associated with the sale of electricity and the fuel costs required to generate the electricity for supply to the grid (other relatively minor costs are included in the financial analysis e.g. operation and maintenance of power unit, salaries, grid maintenance). In line with the definition of the boundary this analysis is conducted solely for the new turbine generator and fuel costs have been derived from industry specific and factory data on existing fuel usage per tonne of steam and conversion costs of steam to electricity.

The cost of fuel is taken from the current sales price of bagasse in the area. The price of bagasse has been set at Rs 800/mt in the first year and this has been escalated at 2% per annum (which is less than the annual escalation in the sales price of power). The electricity price for the project is governed by a power purchase (PPA) agreement; under this PPA the price paid for electricity from the project will be Rs 2.80/kWh, escalated at Rs 0.11/kWh per annum, under a non-firm contract.

Without CER revenue, the project does not meet the DSCL payback period and IRR hurdles (5 years and 20% respectively). With the inclusion of CER revenue, the project just meets the DSCL payback period hurdle and exceeds the IRR hurdle[7]. DSCL being a diversified group has a bank of projects, which are implemented based on the return on investment (list shall be provided to validators). The projects are ranked in order of return on investment and the investment. DSCL had options to invest in various projects where returns are more than 25%. Moreover, it was felt that the experience gained in undertaking a CDM project was a further incentive to proceed with the project (DSCL Energy Services Co. Ltd, a subsidiary of DSCL and is engaged in Energy business, hopes to develop a CDM team and the other business units of DSCL hope to utilise the CDM in fuel switching and energy efficiency projects).

Table 1: Sensitivity analysis of project IRR, with electricity tariff escalation

	Bagasse Price			
	Rs 800 /MT	Rs 850 /MT	Rs 900/MT	Rs 950 /MT
IRR excl. CDM revenue	13.11%	8.16%	2.67%	-3.71%
IRR inc. CDM Revenue	23.17%	18.82%	14.23%	9.30%

Table 2: Sensitivity analysis of project IRR, with revised electricity tariff (see box 1 overleaf)

	Bagasse Price
	Rs 800 /MT
IRR excl. CDM revenue	>(5%)
IRR inc. CDM Revenue	8.48%

The project is highly sensitive to the financial barriers outlined below and CER revenue is a key factor mitigating the impact of these.

b) Other barriers:

Risks in the pricing of both bagasse and other biomass are a substantial barrier to the project activity. The factory has the option to sell bagasse on the open market, and bagasse prices have exhibited volatility in the recent past. (Actual prices of bagasse for year 2003-04 and year 2004-05 are Rs. 800/ MT and Rs. 940/ MT respectively). High opportunity values for bagasse will make the project activity unviable. Allied to the volatility of bagasse prices, availability of bagasse and prices of alternative sources of biomass also present risks and barriers. Should yields of sugarcane fall (dependent on rainfall[8]) and thus bagasse supply from the unit be reduced the factory may need to purchase other biomass. Under this scenario there is the compounding risk that the same conditions adversely impact other biomass availability.

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[7] As outlined in Box 1, subsequent to the start of implementation of the project, the tariff was revised by UPERC. With the revised applicable tariff, CER revenue rings the IRR from a negative figure to a positive figure of 8.48%.

[8] "The economics of sugar in India are more complicated than those of sugar industries in many other countries. Both area and production of sugarcane fluctuate considerably from year to year. This is due to variations in climatic conditions, the vulnerability of areas cultivated under rainfed conditions, fluctuations in prices of gur and khandsari, and changes in returns from competing crops." Source: FAO. Sugar yields in our the ASC catchment area in last 5 years were 45, 40, 43, 43, 38 Tons/ Hectare.

Moreover, should the factory need to purchase additional volumes of biomass (most probably rice husks which is available in the area), collection and transport infrastructure will have to be established, incurring additional costs. The ability of the boilers to utilise rice husk is limited, the factory has tested the usage of rice husk in the boilers and without further modification this source is unlikely to be viable at the prevailing price.

A second major barrier that has faced the project activity is the uncertainty surrounding the received price in the PPA. Although UPPCL has agreed an electricity tariff with the Ajbapur Sugar Complex and signed a PPA, during talks between the UPPCL board and representatives of DSCL, UPPCL asserted that they are considering approaching the regulatory commission to renegotiate the tariff. This is a major risk that the project has faced, as a lower tariff would negatively impact the financial viability of the project. CER revenue will to an extent act as a buffer should this occur (see box below)

Box 1 – Tariff Revision
Subsequent to implementation of the project, a tariff revision has occurred. The revised tariff structure as per UP Electricity Regulatory Commission order dated 19th July 2005 is Rs 2.80 per unit with only modest escalation (the tariff rises to Rs 2.92 by 2014/15). Under this revised tariff structure, the IRR before CER revenue is <(5%) and it is only CER revenue that rings the IRR into positive territory (although this figure, at 8.48% is still below the DSCL hurdle). This illustrates that the risks and barriers that the CDM revenue was forecast to mitigate against can, and have (in the case of the tariff) occurred, and that CER revenue has indeed managed to, at least partially, mitigate this effect.

The project was upgraded from 33KV transmission line to 132 KV transmission to overcome following anticipated issues:

- 33 KV systems are rural feeders (in our area), which have roastering for 6 to 12 hours, leading to low plant load factor.
- High frequency and voltage fluctuations causing thermal and electrical shocks to Turbine, generator, boilers and auxiliary equipments (Protection like vector surge relay can island the plant but these cause thermal shocks to system and normally turbine manufacturers design the life period as 1000 thermal cycles, hence life is endangered) .
- High fluctuations can lead to turbine being islanding or tripping. Restoration time is few hours.
- The rural with drawl is limited causing turbine to run at lower loads. This causes higher vibrations and higher vacuum levels causing damage to moving parts and last stages of blade of turbine

132 KV systems offer advantage on account of

- Better system stability
- Better voltage regulation
- Exception from roastering

The prospect of CER revenue, which can be priced forward and is euro or dollar based, has therefore helped the project management overcome the risks and barriers faced by the project activity.

The barriers inherent in bagasse cogeneration projects are highlighted by the lack of projects that have emerged successfully. To provide an idea of prevailing practice, Bajaj Hindustan, the largest sugar player in India with its capacity concentrated in Uttar Pradesh, is currently undertaking a period of capacity expansion investing in six new plants, each with a capacity of 7,000 tonnes of cane per day. All of these new investments will not employ cogeneration systems capable of exporting surplus power to the grid. It is therefore fair to say that the project is not common practice in the sector and region. More generally the barriers inherent in bagasse cogeneration projects are highlighted by the lack of projects that have emerged successfully. India is the largest cane producer in the world, with over 450 factories, and whilst there is the capacity to export 4000 to 5000MW, only about 450MW is currently grid connected.[9]

B.4 Description of the project boundary for the project activity:

The project boundary is drawn around the export of electrical power from TG5 to the 132kV grid. Using bagasse to generate steam and electricity for process operations is standard procedure in most modern sugar factories. Therefore power used by the factory is outside the boundary[10]. The export of electricity at 132kV is solely as a result of the project activity and a distinct boundary can be drawn around this activity, although it is necessary to consider leakage that may occur outside this CDM project boundary as a direct result of implementing the project.

There is no potential for leakage from power generated at the sugar plant from purchased biomass fuels, which may have been used at other sites to generate electricity. The balance small quantity of purchases the factory will make will be from the nearby Rupapur Sugar Complex (also unit of DSCL SUGAR). This does not have any cogeneration capacity for export, and therefore these purchases will not cause leakage. In the case of any requirement for further purchases, we believe that given the relatively small quantity that is likely to be purchased (below 10,000 tonnes per annum) these should not influence others in their decision to generate power. This is reinforced by the expected source of these purchases – rice husks. There are a number of small rice processing units in the vicinity, which would be in a position to supply rice husk and which do not have their own co-generating capacity.

The gases considered within the boundary are limited to carbon dioxide as the bagasse is not stored for any significant period of time that might give rise to methane emissions.

The boundary for the calculation of the grid coefficient is the Northern Region grid of India.

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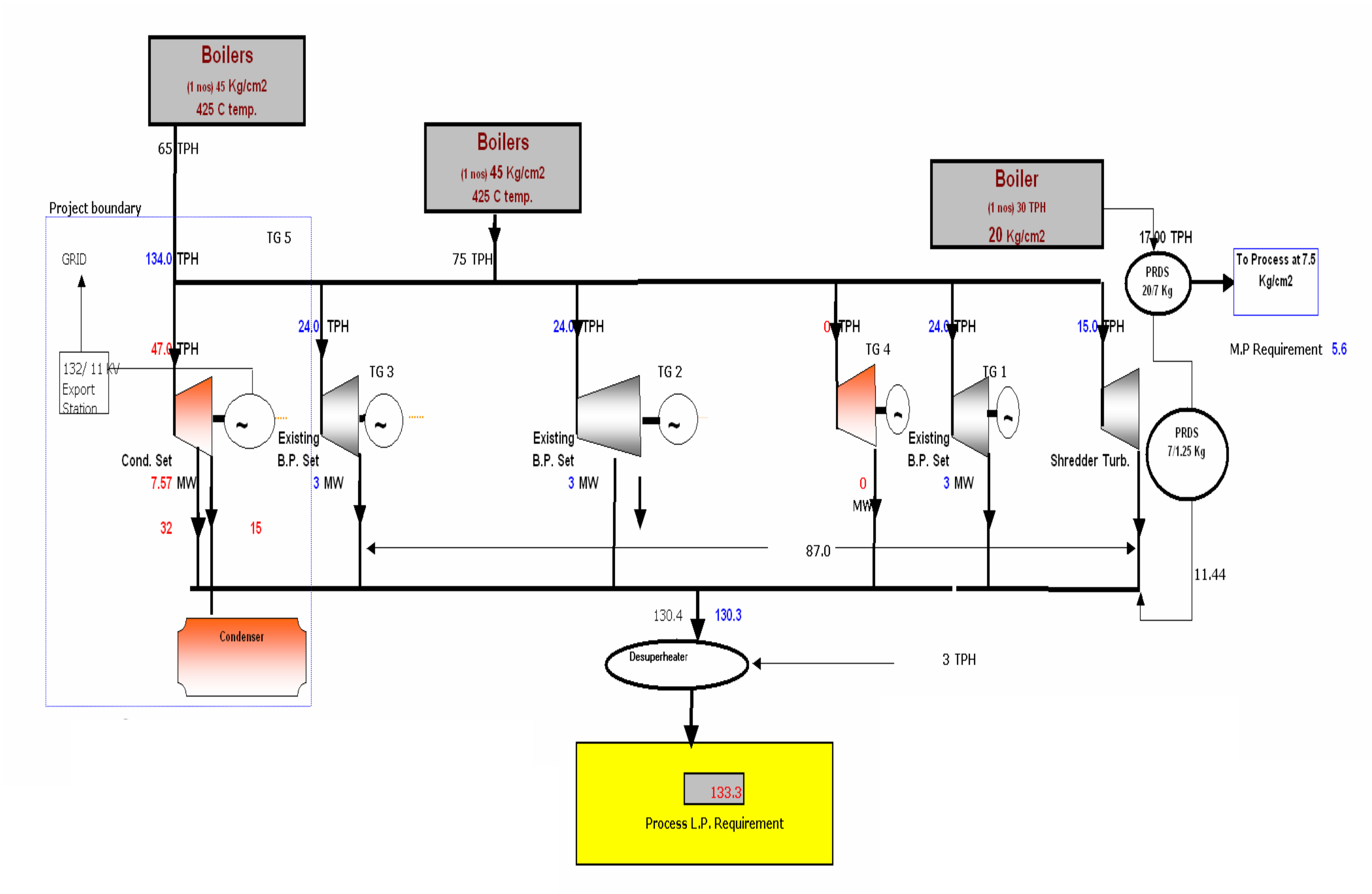
[9] Presentation of S V Shiralkar, MITCON: "Experience Sharing on Grid Connected Bagasse Based Cogeneration in India" from Cogeneration Association of India's Brazil Mission, Sept-Oct 2003.

[10] Should a non-core facility, such as a distillery or stand-alone refinery, be subsequently installed, any power supplied to this from the project activity should qualify for CERs as under the baseline scenario, these units would import power from the grid. It should be noted that there are no plans for the installation of such units.

Figure 3: Project Boundary



B.5 Details of the baseline and its development:

B.5.1 Specify the baseline for the proposed project activity using a methodology specified in the applicable project category for small-scale CDM project activities contained in appendix B of the simplified M&P for small-scale CDM project activities:

In the specific case of the Ajbapur Sugar Complex project, the baseline scenario is that the sugar factory remains self sufficient in power, and does not export to the grid. That this is the case and that the project activity is not the baseline has been demonstrated in previous sections through analysis of:

1. Project financials - the project activity is non-viable without the revenue from emission reductions;
2. Other barriers to the project which were highlighted in section B3 and which include uncertainty surrounding biomass availability and pricing and PPA risk.

The project activity consists of investment in a grid connection, step-up unit, boiler improvements and TG5. This will allow for exports of electricity to the grid, which will be metered and is the volume of electricity that will qualify for emission reductions. The project set up does not allow for the combustion of coal or other fossil fuels, and therefore the monitoring plan simply requires confirmation that no fossil fuels have been combusted.

To obtain the number of CERs generated, qualifying exports of electricity in MWh must be multiplied by the relevant CO_2 emission factor. Thus:

$$CERs = P_e.C \qquad \text{Equation 1}$$

Where:

P_e = Exports of electricity from the Ajbapur Sugar Complex to the grid

C = Constant representing the CO_2 emission factor of displaced power, tCO_2/MWh

Table 2: Determination of baseline variables

Variable	Type	Comment
P_e	Total power exported to the grid	Basis of power that qualifies for emission reductions. MWh.
C	CO_2 emission factor	The CO_2 emission factor that will be applied to qualifying exports to determine the emission reductions arising from the project.

Determination of C

The emissions baseline is the product of the energy baseline and the CO_2 emissions coefficient for the fuel displaced. As discussed earlier we have adopted the approach specified in the Simplified Baseline and Monitoring Methodologies for Type ID projects to calculate the CO_2 emissions coefficient of the electricity grid. Specifically, we have chosen approach 7 (a), the kWh produced by the renewable generating unit multiplied by the average of the "approximate operating margin" and "build margin". This is appropriate as in the case of the project activity the baseline scenario is that the factory continues to purchase power from the grid.

In order to determine the CO_2 emissions coefficient we are required to calculate the approximate operating margin and the build margin where the operating margin is defined as:

> "the weighted average emissions (in $kgCO_2equ/kWh$) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;"

and the build margin is defined as:

"the weighted average emissions (in kgCO_2equ/kWh) of recent capacity additions to the system, defined as the greater of most recent 20% of existing plants or the 5 most recent plants;"

The relevant grid for the determination of the combined margin is selected as the Northern Region grid. This grid has been selected as the regional grid is becoming more integrated even though electricity generation and distribution remains largely in the hands of the Uttar Pradesh State Electricity Board (PSEB).

Approximate Operating Margin

The approximate operating margin is calculated directly from actual Central Electricity Authority (CEA) data on generation and fuel consumption. The CEA provides generation data for each plant in the Northern Region for the year 2004-5. Coal consumption data for individual coal based power plants is also provided by the CEA for the year 2004-5. The emission factor for coal is calculated as per ACM0002:

Coal Emission Factor

$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*,

$OXID_i$ is the oxidation factor of the fuel (see page 1.29 in the 1996 Revised IPCC Guidelines for default values),

$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

The NCV for Indian coal is 19.98 TJ/kt[11], the IPCC emission coefficient for other bituminous coal is 25.8 tC/TJ[12], the conversion factor from tC to tCO_2 is 44/12 and the fraction of carbon oxidised in coal is 0.98[13]. Thus COEF for coal is taken as:

19.98 * 25.8 * 44/12 * 0.98 = **1852.3** tCO2/kt coal.

Gas Stations Emission Factor

In the case of gas stations, individual fuel consumption for each plant is not available. Aggregate consumption at the state and regional level is instead provided by the CEA. These data are only available for 2003-4 and therefore we use these data to derive an average emission factor for gas stations in the Northern Region. The average emission factor is then applied to 04-05 generation in the calculation of the CM.

The data on fuel consumption and generation for gas stations in the Northern Region is outlined below:

Table 3 Fuel Consumption and generation from gas stations in the Northern Region (03-04)

State	**Nat Gas consumption (mcbm)**	**HSD consumption (kl)**	**Naptha consumption (kl)**	**Total Generation (GWh)**
Delhi	884	9298	0	3620
Jammu & Kashmir	0	6363	0	29
Rajasthan	163	1841	0	238.53
Central Sector	2761	223091	188981	14870.14
Total				**18757.67**

Source: Source: CEA General Review 2005, Table 6.1, pp. 117

11 Table 1.2 1996 Revised IPCC Guidelines, in line with decision of EB23.

12 Table 1.1 1996 Revised IPCC Guidelines

13 Table 1.6 (page 1.28) 1996 Revised IPCC Guidelines

These data are combined with the following data on fuel specific gravities, calorific values, emission factors and oxidation factors to determine total emission from the above gas stations:

Table 4 Fuel characteristics data

Fuel	Density (kt/kl)	Calorific Value	Emission Factor	Oxidation factor
Natural Gas		40 TJ/mcbm[14]	15.3[15]	0.995[16]
HSD	0.00088[17]	43.33 TJ/kt[18]	20.2[19]	0.99[20]
Naptha	0.00078[21]	45.01 TJ/kt[22]	20.0[23]	0.99[24]

Total emissions from gas stations are thus calculated as:

Table 5 Total emissions from gas stations in Northern Region, 03-04

State	Emission from Nat. Gas (tCO_2)	Emissions from HSD (tCO_2)	Emissions from Naptha (tCO_2)	Total Emissions (tCO_2)
Delhi	1973778	25997	0	1999774
Jammu & Kashmir	0	17791	0	17791
Rajasthan	363943	5147	0	369090
Central Sector	6164706	623751	481680	7270137
Total	**8502426**	**672686**	**481680**	**9656792**

Dividing total emissions (9656792 (tCO_2)) by total generation from gas stations (18757.67 GWh) gives an average emission factor for gas stations in the Northern Region of **0.51** tCO_2/MWh.

Annual generation data for each power plant in the Northern Region is provided by the CEA. (http://cea.nic.in/data/18ca0305.pdf).

Coal consumption data for thermal power plants is also provided by the CEA report "Performance Review of Thermal Power Stations 2004-5". (http://cea.nic.in/Th_per_rev/start.pdf).

Combining the above emission factors for coal and for gas based stations, with generation data (and in the case of coal plants fuel consumption data) from the CEA provides the following[25]:

[14] http://www.interconnector.com/onlineservices/converter.htm
[15] IPCC Table 1.1
[16] IPCC Table 1.6
[17] http://www.dec.state.ak.us/spar/perp/response/sum_fy05/041207201/041207201_vsl_fuelcap.pdf
[18] IPCC Table 1.3
[19] IPCC Table 1.1
[20] IPCC Table 1.6
[21] http://www.arb.ca.gov/db/solvents/solvent_pages/Hydrocarbon-HTML/vmp-ii.htm
[22] IPCC Table 1.3
[23] IPCC Table 1.1
[24] IPCC Table 1.6
[25] It should be noted that the CEA also provide data on specific secondary fuel oil consumption in coal plants. For conservativeness we have no included these emissions in calculation of the OM and BM.

Table 6 Northern Region Fuel Consumption, Emissions and Generation, 2004-5 (excluding hydro and nuclear)

COAL PLANTS	Fuel Consumption (kt coal)	Emissions Factor (tCO2/t coal)	Emissions ($ktCO_2$)	Generation (GWh)	Emissions Factor (tCO_2/ MWh)
Delhi					
Badarpur	3732	1.8523	6913	5463	1.27
I.P.Stn.(DVB)	789	1.8523	1461	921	1.59
Rajghat(DVB)	541	1.8523	1002	696	1.44
Haryana					
Faridabad	822	1.8523	1523	869	1.75
Panipat	4447	1.8523	8237	6008	1.37
Punjab					
Bhatinda	1469	1.8523	2721	1993	1.37
Lehra Mohabbat	1995	1.8523	3695	3308	1.12
Roper	6056	1.8523	11218	9082	1.24
Rajasthan					
Kota	5213	1.8523	9656	7751	1.25
Suratgarh	5920	1.8523	10966	9363	1.17
Uttar Pradesh					
Anpara	8339	1.8523	15446	11511	1.34
Harduaganj	670	1.8523	1241	632	1.96
Obra	4761	1.8523	8819	5550	1.59
Panki Extn.	913	1.8523	1691	1043	1.62
Paricha	876	1.8523	1623	966	1.68
Tanda (NTPC)	2596	1.8523	4809	3320	1.45
Unchahar (NTPC)	4604	1.8523	8528	6781	1.26
Rihand STPS	4768	1.8523	8832	7987	1.11
Singrauli(STPS)	10336	1.8523	19145	15806	1.21
NCTPP(Dadri)	4432	1.8523	8209	6830	1.20
GAS PLANTS			**Emissions ($ktCO_2$)**	**Generation (GWh)**	**Emissions Factor (tCO_2/ MWh)**
Delhi					
I.P GT			597	1162	0.51
I.P. WHP			194	378	0.51
Pragata CCGT			1310	2551	0.51
Haryana					
F'bad CCGT			1623	3162	0.51
Jammu & Kashmir					
Pampore GT			12	24	0.51
Rajasthan					
Ramgarh GT			176	343	0.51
Ramgarh ST			9	17	0.51
Anta GT (NTPC)			1430	2785	0.51
Uttar Pradesh					
Auraiya GT			2115	4120	0.51
Dadri GT			2802	5458	0.51
Total			**146031**	**125881**	
Operating Margin				**1.160**	

Build Margin

Commissioning dates have been obtained from various sources for all plants located in the Northern Region. Total generation in the Northern grid in the period April 2004 to March 2005 was 169323.56 GWh. The most recent 5 capacity additions in the grid account for only 3% of this, and the most recent capacity additions accounting for 20% of generation must therefore be taken as the base for the build margin calculation. These capacity additions and the associated fuel consumption and emissions are outlined below. (Generation data, fuel consumption and emissions are derived as for the approximate operating margin above.)

Table 7 Recent Capacity Additions, Generation and Emissions

Plant	Plant Type	Capacity Addition (MW)	Commissioning Date	Generation 04-05 (GWh)	Emissions (kt)
Tanda	Thermal	110	30/12/1998	830	1202
Unchahar	Thermal	210	15/01/1999	1695	2132
Suratgrah	Thermal	250	01/02/1999	1873	2193
F'bad CCGT	Gas	143	26/09/1999	1054	543
Unchahar	Thermal	210	15/10/1999	1695	2132
F'bad CCGT	Gas	143	18/10/1999	1054	543
RAPS I-IV	Nuclear	220	01/06/2000	1361	0
Ranjit Sagar	Hydro	600	01/07/2000	1145	0
Ghanvi	Hydro	11.25	30/07/2000	37	0
F'bad CCGT	Gas	143	31/07/2000	1054	543
Suratgrah	Thermal	250	01/10/2000	1873	2193
Ghanvi	Hydro	11.25	07/12/2000	37	0
RAPS I-IV	Nuclear	220	23/12/2000	1361	0
Panipat	Thermal	210	31/03/2001	1467	2011
Malana	Hydro	86	15/06/2001	270	0
Upper Sindh	Hydro	70	30/12/2001	98	0
Suratgrah	Thermal	250	15/01/2002	1873	2193
Pragati	Gas	104.6	15/03/2002	808	416
Suratgrah	Thermal	250	31/07/2002	1873	2193
Upper Sindh	Hydro	35	30/09/2002	49	0
Pragati	Gas	104.6	09/11/2002	808	416
Pragati	Gas	121.2	31/01/2003	936	482
Baspa	Hydro	300	15/06/2003	1193	0
Chamera II	Hydro	300	01/07/2003	1347	0
Suratgrah	Thermal	250	19/08/2003	1873	2193
Ramgarh GT	Gas	37.5	15/09/2003	171	88
Ramgarh ST	Gas	37.8	15/09/2003	17	9
Nathpa Jhakri	Hydro	250	06/10/2003	852	0
Chenani III	Hydro	9.8	01/01/2004	23	0
Gumma	Hydro	3	01/01/2004	4	0
Nathpa Jhakri	Hydro	250	02/01/2004	852	0
Nathpa Jhakri	Hydro	250	30/03/2004	852	0
Nathpa Jhakri	Hydro	250	31/03/2004	852	0
Nathpa Jhakri	Hydro	250	06/05/2004	852	0
Nathpa Jhakri	Hydro	250	18/05/2004	852	0
Kota	Thermal	195	01/08/2004	1446	1802
Total				**34432**	**22888**
Build Margin					**0.676**

Sources of data on commissioning dates are outlined below:

1. **General Links**

HPGCL: http://haryanaelectricity.com/hpgc/link4.htm
Nathpa Jhakri: http://sjvn.nic.in/stats/important_statistics.htm
UPVUNL: http://www.uppcl.org/uprvunl/Aboutus_un/installed_capacity.htm
NTPC: http://www.ntpc.co.in/aboutus/installed_capac.shtml
PSEB: http://www.psebindia.org/pseb.htm
NHPC: http://nhpcindia.com/english/opR.htm

2. **HP Hydro**

Giri Bata: Commissioned during 4th 5 year plan (http://planningcommission.nic.in/plans/planrel/fiveyr/4th/4planch12.html)
Sanjay Bhaba (or Sanjay Vidyut Pariyojna: Commissioned in 1987 (http://www.cclindia.com/expertise/SanjayVidyutPariyojna.htm)
Bassi: Commissioned during 4th 5 year plan (http://planningcommission.nic.in/plans/planrel/fiveyr/4th/4planch12.html)
Binwa: Commissioned during 6th 5 year plan (http://planningcommission.nic.in/plans/planrel/fiveyr/4th/4planch12.html)
Thirot: http://powermin.gov.in/reports/pdf/ar94-95.pdf
Ghanvi: http://planningcommission.nic.in/plans/annualplan/ap21_02/ch8.pdf
Gaj: http://powermin.nic.in/reports/pdf/ar92-93.pdf
Baner: http://powermin.gov.in/reports/pdf/ar95-96.pdf
Baspa: http://www.blonnet.com/iw/2005/03/20/stories/2005032000520900.htm
Malana: http://www.tribuneindia.com/2001/20010324/himachal.htm#7
Dehar: http://bhakra.nic.in/english/powerdata.asp
Pong : http://bhakra.nic.in/english/powerdata.asp

3. **J&K Gas**

Pampore: http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-10.pdf
J&K Hydro
Lower Jhelum: http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf
Upper Sindh: http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf
Upper Sindh: www.narmada.org/sandrp/sep2002.doc
Chenani: Commissioned during 4th 5 year plan (http://planningcommission.nic.in/plans/planrel/fiveyr/4th/4planch12.html)
Mohara: http://www.dailyexcelsior.com/web1/05june08/state.htm
Kargil: http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf
Stakna : http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf

4. **Punjab Thermal**

Bhatinda: http://www.psebindia.org/pseb/thermal/gurunanak.html
Leh. Moh. : http://www.psebindia.org/pseb/thermal/guruhargobind.html

5. **Punjab Hydro**

Bhakra: http://bhakra.nic.in/english/powerdata.asp
Ganguwal: http://bhakra.nic.in/english/powerdata.asp

6. **Rajasthan GT**

Anta: http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-10.pdf
Rajasthan Nuclear
RAPS: http://www.npcil.nic.in/raps.asp

7. **Rajasthan Hydro**

RP Sagar: http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf
J. Sagar: http://www.cea.nic.in/data/opt1_design_engg_hydro.pdf

8. **UP Hydro**

Obra Hydro: Commissioned during 3rd 5 year plan http://planningcommission.nic.in/plans/planrel/fiveyr/3rd/3planch24-1.html
Ganga Canel : http://irrigation.up.nic.in/history.htm
Khara : http://planning.up.nic.in/statements/10562801.htm

9. **UP Thermal**

Singrauli: http://www.ntpc.co.in/powerplants/ntpc_pw_singrauli1.shtml

10. **UP Gas**

Auraiya GT: http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-10.pdf

Dadri GT: http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-10.pdf

11. Uttaranchal Hydro

Ramganga : Commissioned during 3rd 5 year plan
http://planningcommission.nic.in/plans/planrel/fiveyr/3rd/3planch24-1.html
Khatima: http://www.tendercity.indiatimes.com/ViewProdDetail.asp?stype=12&stext=249&t=3&o=1&l=8
Pathri: Commissioned during 3rd 5 year plan
http://planningcommission.nic.in/plans/planrel/fiveyr/3rd/3planch24-1.html
Chibro : http://www.narmada.org/sandrp/dec2001.html
Khodri: Commissioned during 6th 5 year plan
http://planningcommission.nic.in/plans/planrel/fiveyr/6th/6planch15.html
Chilla: http://www.uttaranchalirrigation.com/vision/vision_index.htm
Maneri Bhali: http://www.narmada.org/sandrp/dec2001.html

12. Delhi

Pragati : http://powermin.nic.in/projects/projects_commissioned_during.htm
F'bad CCGT :
http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-10.pdf
Delhi Indraprastha Thermal & Rajghat TPS:
http://www.ntpc.co.in/Services_Offered/services_experience.shtml

Applicable Emission Coefficient

As outlined in AMS-I.D, the baseline emission coefficient is taken as the average of the approximate operating margin and the build margin, and is therefore **0.918 tCO_2e/MWh**.

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*: 07/03/2006

B.5.3 Name of person/entity determining the baseline: Ben Atkinson/Robert Taylor, Agrinergy Ltd (contact information as listed in annex 1).

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity: *10/08/2003*

This date was the start of civil activity. The decision to proceed with the project activity was made in April 2003.

C.1.2 Expected operational lifetime of the project activity: *(in years and months, e.g. two years and four months would be shown as: 2y-4m.):* 20 years

C.2 Choice of the crediting period and related information:

C.2.1 Renewable crediting period *(at most seven (7) years per crediting period)*

C.2.1.1 Starting date of the first crediting period *(DD/MM/YYYY)*:
C.2.1.2 Length of the first crediting period

C.2.2 Fixed crediting period:

C.2.2.1 Starting date: 01/10/2005

C.2.2.2 Length: 10y

D. Monitoring methodology and plan

D.1 Name and reference of approved methodology applied to the project activity:

Type I – Renewable Energy Projects
I D - Renewable electricity generation for a grid

"Monitoring shall consist of metering the electricity generated by the renewable technology."

D.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The project activity will provide electricity to the Uttar Pradesh grid. This electricity will displace existing grid generation capacity and future planned grid capacity additions. The main variable in determining the volume of emission reductions is the quantity of power exported to the grid.

Exports of power from the project activity will be metered at the nearby Mohammadi substation and at the factory. Meter readings will be recorded at the end of each month in the presence of both a senior executive engineer of UPPCL and a representative of the Ajbapur Sugar Complex and will form the basis for invoicing and payment for electricity sold. These invoices will form the basis of the monitoring.

The plan, responsibility, authority, frequency and management for carrying out the monitoring systems will be governed by the quality systems in place at the factory. The QA systems are well established for the boiler and TG operations. These include testing of fuel, ash, water, steam measurement, water measurement, power generation, in house consumption and export of power. The export meters are situated at our end and import meter is at Mohamadi sub-station. Both these meters are calibrated annually by authorised authority. The meter at our end shall be calibrated by the manufacturer while the meter at Mohamadi shall be calibrated under supervision of UPPCL by their approved testing and calibrating laboratory.

The DOE used to verify emission reductions from the project activity is required to ensure that the monitoring plan has been implemented correctly and is required to appraise the data according to accuracy, comparability, completeness and validity. In performing verification, the DOE should conduct regular on-site inspections that may comprise; interviews with managers and operators and observation of processes and controls. The project operator will make available all relevant data as outlined in section D3 in a timely manner as and when requested by the verifier.

All data will be kept until 2 years after the end of the crediting period or the last issuance of CERs for the project activity, whichever occurs later. This will be the responsibility of the project developers.

D.3 Data to be monitored:

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (Electronic/ paper)	For how long is archived data to be kept?	Comment
1 Electricity exports to the UPPCL grid	Quantitative	P_e	MWh	M	Monthly	100%	Paper	12 years	
2 Confirmation that no fossil fuels have been combusted	Qualitative	-	-	Measured	Annually	100%	Electronic	12 years	

The DOE used to verify the emission reductions from the project activity is required to ensure that the monitoring plan has been implemented correctly and is required to appraise the data according to accuracy, comparability, completeness and validity. In performing verification, the DOE should conduct regular on-site inspections that may comprise; interviews with managers and operators and observation of processes and controls. The project operator will make available all relevant data as outlined in section D3 in a timely manner as and when requested by the verifier.

All data will be kept for a minimum of 2 years following issuance of certified emission reductions or the end of the crediting period, whichever is later, and this will be the responsibility of the project developers.

The data will be collected monthly and held on the following spreadsheet tool which has been designed for the project activity. This will permit the monitoring and reporting of emission reductions on a monthly basis. Data input is required in the blue cells with resultant calculations of the emission reductions performed automatically. Supporting data calculations should also be presented at the time of each verification as required by the DOE.

Calibrations of the equipment will be regularly undertaken and made available at time of verification; if calibration is not deemed sufficient by the DOE then the meters will be re-calibrated at the time of verification and adjustments made to readings if necessary.

D.4 Name of person/entity determining the monitoring methodology:

Mr A P Yadav, Ajbapur Sugar Complex
Ben Atkinson, Agrinergy Ltd.
Project participants, as listed in Annex I

The following spreadsheet tool has been designed for the project activity. This will permit the monitoring and reporting of emission reductions on a monthly basis. Data input is required in the blue cells with resultant calculations of the CERs performed automatically.

MVP – *to be completed monthly*

Static data	
CIF, tonnes CO2e/MWh	0.918

	2004/05	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**2013/2014**
Time										
Start date										
End date										
Hours	0	0	0	0	0	0	0	0	0	0
Electricity exports										
Sept										
Oct										
Nov										
Dec										
Jan										
Feb										
Mar										
Apr										
May										
June										
Jul										
Aug										
Total exports	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CERs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

In order to calculate the emission reductions arising from the project we have followed the formula specified in Appendix B for Type I D projects - power exports multiplied by an emission coefficient. This is shown by Equation 1, with the derivation of C outlined in section B5.1.

E.1.1 Selected formulae as provided in appendix B:

$$CERs = P_e.C$$

$$CERs = 0.918.P_e$$

Where:

P_e = Exports of electricity from the Ajbapur Sugar Complex to the grid

C = Constant representing the CO_2 emission factor of displaced power, tCO_2/MWh (0.901 tCO_2/MWh as derived in Section B5.1)

E.2 Table providing values obtained when applying formulae above:

Variable	Value			
C	0.918			
P_e (MWh per annum)	30,000	35,000	40,000	45,000
CERs				
2005/06	27,540	32,130	36,720	41,310
2006/07	27,540	32,130	36,720	41,310
2007/08	27,540	32,130	36,720	41,310
2008/09	27,540	32,130	36,720	41,310
2009/10	27,540	32,130	36,720	41,310
2010/11	27,540	32,130	36,720	41,310
2011/12	27,540	32,130	36,720	41,310
2012/13	27,540	32,130	36,720	41,310
20013/14	27,540	32,130	36,720	41,310
2014/15	27,540	32,130	36,720	41,310
Total	275,400	321,300	367,200	413,100

The following outlines expected generation and CERs:

	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Pe (MWh	35,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000
CERs	32,130	41,310	41,310	41,310	41,310	41,310	41,310	41,310	41,310	41,310

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity: *(if applicable, please provide a short summary and attach documentation)*

In relation to the baseline scenario no negative environmental impacts will arise as a result of the project activity.

The positive environmental impacts arising from the project activity are:

- A reduction in carbon dioxide emissions from the replacement of fossil fuels which would be generated under the baseline scenario
- A reduction in the emissions of other harmful gases (NOx and SOx) that arise from the combustion of coal in power generation
- A reduction in the production of ash as bagasse has a lower ash content[26] than that of Indian coal which typically has an ash content of 30 to 40%

The Ajbapur Sugar Complex meets all environmental guidelines and regulations as set out by the regional and national environmental agencies. When the plant was constructed in 1997 a complete Environmental Impact Assessment was carried out and a further EIA is was carried out twice during the capacity enhancement to 5000 TCD and again for 8000 TCD and as such a separate study is not required for the project activity.

Each year the Ajbapur Sugar Complex must obtain consent from the Uttar Pradesh Pollution Control Board (UPPCB) for air and water pollution. The current consent form expires on 31st December 2005 and the factory is in constant compliance with the requirements of UPPCB. At each verification, an up to date consent form will be produced. The DSCL management is highly environmental conscious and plant has got in place Quality Management System Standard ISO-9001-2000, Environmental Management System Standard ISO-14001: 1996 and Occupational Health and Safety Management System Standard OHSAS-18001: 1999 certified by DNV and effective since 15.10.2003.

Emissions to air

An emissions evaluation is carried out annually. The latest test carried on 24.02.2005 by Envirochem Test Laboratories, Lucknow, reported concentration of SPM matter at 142 mg/ Nm3 against the norm of 150 mg/ Nm3

Solid Waste Disposal

Ash disposal is one of the most significant concerns associated with power generation. This concern is addressed as Bagasse has only 2% ash compared to 30-40% of ash in coal. Leading coal-based power units on an average generate 1,368 tonnes of ash/year/ MW of installed capacity. In comparison, the proposed unit shall generate ash at the rate of 350 tonnes/year/MW of installed capacity. The current method of ash disposal followed at ASC is to collect the ash in tractor trolleys and discharge in their own low lying area plot for land filling purposes. The same will occur with ash arising from the project activity. ASC is planning to set up a brick building plant using fly ash for use in house construction and, if surplus, for the community development like roads, rest houses, common sitting places etc.

Emission to water

Typically, residual chlorine of about 0.1 ppm is added at the condenser outlet in cooling water. Chlorine dosing is primarily done to prevent biological growth in the cooling tower system. In the case of the ASC

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[26] The ash content on bagasse is normally 2%.

project, an alternative of dosing liquid sodium hypochloride will be followed. This will not result in any chemical pollution of water and also meets the national standards for the liquid effluent.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

The stakeholder review has been conducted on three levels:

- A local stakeholder review; Approximately 90% of the local population is involved in the growing of sugar cane, and therefore key stakeholders identified were growers and farmers. A stakeholder meeting was organised, and 29 representatives of cane growers associations and of the local community attended. Notification of the project activity was also provided in a newsletter produced by the Ajbapur Sugar Complex for growers, and in a local newspaper. Both notifications invited comments.
- A national stakeholder review which was undertaken through the approval by the Ministry of Environment and Forests, this was received on 27th December 2004, after a presentation had been made to the Designated National Authority and other invited Ministries.
- An international stakeholder review which will be conducted at the time of validation when the PDD is placed on the UNFCCC website.

Other stakeholders that have been consulted are the Uttar Pradesh Pollution Control Board from which regulatory approvals and consents have been obtained, as detailed in section F, the UPPCL from whom the PPA and the state director of boilers, from which certification of the boiler obtained.

G.2 Summary of the comments received:

Local stakeholders' comments at the meeting demonstrated that electricity availability was a key concern for them, and that therefore the generation of electricity at the sugar factory for export to the grid was viewed positively as a step towards their achieving adequate provision of electricity. There was a wish expressed by some that the factory could become involved in electricity distribution itself, to ensure that the local villagers could benefit directly from the electricity generated.

No comments were received from the written notifications.

G.3 Report on how due account was taken of any comments received:

In terms of the latter point raised in section G.2, the Vice President of the Ajbapur Sugar Complex (who was present at the meeting) explained that it was not possible at the moment for the company to become involved in electricity distribution, and that UPPCL had insisted that the factory supply power to the 132 kV grid.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project has not received any public funding.

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