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

[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:

LHSF Bagasse Project

A.2 Description of the project activity:

The project is located at the L H Sugar Factory. Sugar factories are typically energy independent, employing co-generation for their own internal steam and power requirements from the combustion of bagasse (a fibrous material resulting from the milling of sugar cane). 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 sugar plant's own consumption. In the absence of the incremental power generation and supply by co-generating plants, the regional electricity companies generate power from their existing thermal and hydro based power plants. Where additional generation capacity is planned this will generally be thermal. The proposed CDM project - increasing power generation at the plant, leading to exports of power to the grid - will therefore supplement current and planned electricity generation from traditional fossil fuel based power plants. As the project only utilises bagasse for the generation of electricity it will qualify as a renewable source of electricity.

The project involves the installation of a high pressure boiler and turbine generator. The purpose of the project activity is to provide 6.2 MW of electrical power to the Uttar Pradesh Electricity Board and meet the internal requirements of the factory. The plant is currently increasing its capacity from 7,000 tonnes of cane per day to 8,000 tonnes of cane per day. This expansion in the facility will require more steam. The increase in steam demand will be 22.5 tonnes per hour which is accounted for through adjusting the investment cost downwards to reflect this and modelling the increased steam demand as a revenue to the project activity in the financial analysis. The plant currently sells surplus bagasse produced during the crushing season to a local paper company. These sales of bagasse will not be affected by the project activity and will continue after implementation.

The existing power demand at the factory is met through 9 boilers and 4 turbine generators. The configuration of these boilers and turbines is shown in the following table.

Table 1: Current boiler and turbine generator set-up

Boilers	
Capacity	Pressure
2 x 45 tph	21 kg/cm^2
1 x 21 tph	21 kg/cm^2
6 x 5 tph	11 kg/cm^2

Turbines
Capacity
1 x 3 MW
1 x 2.5 MW
2 x 1.5 MW

The project activity will replace all the 11 kg/cm^2 boilers and the smaller 21 tph 21 kg/cm^2 boiler. One of the existing 1.5 MW turbines is connected to the 11 kg/cm^2 boilers and one is connected to the 20 kg/cm^2 system, these turbines will no longer operate but will be held as back-up units[3]. The installation of a high pressure boiler will result in the more efficient combustion of the existing bagasse resource available at the sugar factory and will therefore result in greater electricity generation, whilst meeting the steam requirements of the plant.

Other on-site generation capacity consists of four DG sets, two 500 kVA, one 250 kVA and one 125 kVA. These are currently used as back-up units and will remain as back-up units – for use in off-season

[3] These turbines would be unable to operate due to the supply of steam under the new configuration.

and emergencies. The plant is grid connected through a 242 kVA connection. This is used for the provision of power to the factory in emergencies and for the colony throughout the year.

The project will contribute strongly to sustainable development not just directly through an increase in employment (19 people are expected to be employed as a result of the project activity and 150 people are involved in the construction of the plant) but also indirectly in terms of the benefits it will provide to the local community in the form of increased electricity availability and security of employment.

The factory is rurally based and provides an important source of employment for the local community. This is an important factor given that over 70% of India’s population is based in rural areas. The factory is the major industry in the area, employing a total of 720 people (175 of which are permanent with the remainder seasonal but held on retainers throughout the off-season) and receives sugar cane from over 60,000 farmers many of which cultivate on less than 1 acre.

The indirect benefits of the project are twofold. Firstly, the project will allow for the diversification of the revenue of the sugar factory through the sales of electricity and CERs, and thus the project will assist in establishing the viability of the unit. This will contribute to the continuation and furthering of the benefits the factory’s presently provides to the local economy. The factory currently provides seed at no up-front cost, and insecticides and pesticides at 50% of their cost, to farmers, deducting the cost from the cane price (with no interest charged). The extension work of the factory extends to the provision of loans for tube-wells, bullock carts and plant protection loans. 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 ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	If Party wishes to be considered as a project participant
India (host)	Public entity: Ministry of Environment and Forests Private entity: LH Sugar Factories Ltd	No
UK	Public entity: Department of Environment, Food and Rural Affairs Private entity: Agrinergy Ltd	No

Agrinergy is the designated official contact for the CDM project activity.

A.4 Technical description of the project activity:

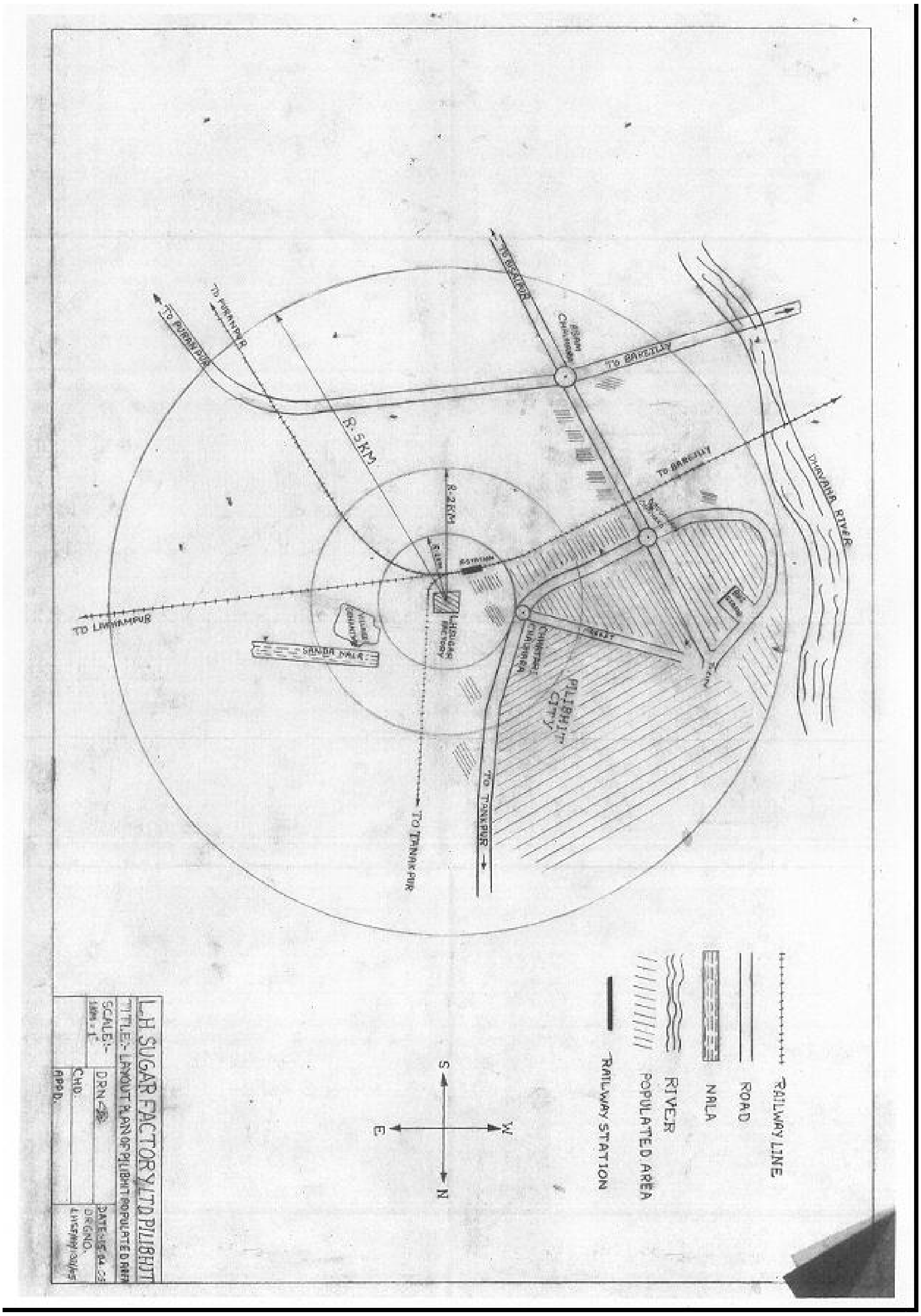
The project involves the installation of a 80 tph 67 kg/cm^2 Walchandnagar Industries boiler and a 12MW backpressure Triveni turbine. The turbine generator will produce electricity at 11 kV which will be stepped up at the plant to 132 kV and then supplied to the grid via the Roopurkamlu substation which is 5km from the plant. These technologies are readily available in India and have been supplied to other cogenerators.

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies): India
A.4.1.2 Region/State/Province etc.: Uttar Pradesh

A.4.1.3 City/Town/Community etc: Pilibhit

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity: See following map of project site.



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. The project falls within the small scale rating as the total generation capacity of the new unit is 12MW, i.e. below the 15MW outlined in section ID of Appendix B of the simplified modalities and procedures for small-scale CDM project activities[4]. The project will result in a grid connection to the plant 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 through substituting existing grid based generation capacity and planned expansions to the grid. These sources of generation are mainly fossil fuel based and therefore the proposed renewable (bagasse based) generation will reduce these emissions.

We expect the project to result in a reduction in emissions of 18,770 tonnes of CO_2e per annum.

A.4.4 Public funding of the project activity:

The project has not received any public funding.

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

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.

[4] Whilst the capacity of the turbine generator is 12 MW it will only supply just over 6 MW to the grid. The MW_{th} of the boiler is calculated at 42.8, which is below the limit of 45 for cogeneration systems to qualify as small scale projects.

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 produces renewable energy from the combustion of bagasse. The project activity will result in the plant having a grid connection and the electricity supplied from the project activity to the grid would be expected to supplement 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, Type I D projects, the project does not fall under point 6[5] and therefore there is a choice of two approaches, 7 (a) or (b). We have chosen approach (a) to determine the emission coefficient and apply this to the exports of electricity from the project:

"(a) The average of the "approximate operating margin" and "build margin", where:

(i) The "approximate operating margin" is 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;

(ii) The "build margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[6] 20%[7] of existing plants or the 5 most recent plants."

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)*

The project activity qualifies to use the simplified methodologies given the fact that the sum of new generation installed is less than 15MW, as highlighted earlier the actual electricity generation supplied to the grid will be of the order of 6MW.

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, 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

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[5] All existing generators use exclusively fuel oil and/or diesel fuel.
[6] Generation data available for the most recent year.
[7] If 20% falls on part capacity of a plant, that plant is included in the calculation.

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"[8]. 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 state level sectoral rates are the norm across India.

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.

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 - technological barriers, investment barriers and a brief analysis of prevailing practice in the state. In showing that the project is additional we demonstrate that it is not part of the baseline scenario, which in the case of the LHSF Bagasse Project is that the factory remains self sufficient in power, but does not export any electricity to the grid.

The project involves the installation of a high pressure boiler, and this presents a new set of operational challenges for the sugar factory. As previously indicated, sugar factories normally generate power through low pressure configurations, which are technically easier to operate. The factory has not historically been a grid generator and further operational barriers facing the project relate to the supply of power to the grid. Whilst synchronisation, variations in the grid voltage and frequency and grid failure affect all power plants the relative impact on the project is higher given that the primary activity of the factory is the manufacture of sugar.

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

The sale of power to UPPCL presents a risk to the project. There is currently uncertainty surrounding the received price in the power purchase agreement. Whilst there is an MNES advised tariff this is not applied in Uttar Pradesh, the current price for electricity from bagasse cogenerators in UP is Rs 2.85/kWh[9]. Not only is the final price for electricity a risk for project there is also the risk of late payment by the UPPCL. These two factors provide significant risk that the project will face and CER revenue will help to reduce these risks.

All assumptions inherent in the financial analysis will be made available to the validator but the following is a summary of the main points and results. We have worked on an electricity price of Rs 2.85/kWh. UPPCL has issued a PPA to the project (7th March, 2005) and has stated that the price to be paid for electricity will be the rate prevailing as a result of the UPERC Tariff Order (18th July 2005). As mentioned earlier in the PDD the factory has increased its steam demand by 22.5 tph, this has been treated as a revenue in the financial analysis to the power plant by taking an opportunity cost for the steam on its marketable value as electricity, i.e. if the steam was not fed to the factory it could be condensed to generate more electricity. The other revenue streams associated with the project are the sale of electricity to the grid and the CERs resulting from registering the project as a CDM. The costs revolve around the increased usage of bagasse to fuel the power plant.

The amount of bagasse produced will increase in line with the higher crushing capacity and the saving of bagasse will also increase (the saving of bagasse is 9% on cane). In the baseline case this bagasse is sold and there will be a continuation of these sales, the volume of bagasse sold will remain the same. However the increased saving will be used in the new boiler and therefore we have put this as a cost to the project on the basis of the opportunity cost of bagasse. The saving in the case of the expansion will increase by 12,600 tonnes[10] and we have costed the bagasse consumed by the project for the export of power in the project financials at the prevailing bagasse market price of Rs 1150/tonne.

Furthermore the investment cost has been reduced to reflect the increase in steam demand by the plant, the actual cost of the boiler is Rs 917 lacs, but this has been reduced to Rs 664 lacs to reflect the increased steam demand of the plant. On the basis of these assumptions the project IRR is 11.0% and increases to 15.5% when CER revenue is included[11]. The increase in the project IRR resulting from the registration of the project as a CDM is an important step in proceeding with the project for LHSF, the revenues are significant and will help overcome many of the risks that may arise as a result of undertaking the project activity – to provide an idea of the impact of carbon finance the project IRR increases by just over 1% with every Euro 2/tCO_2e increase in the price of CERs.

In line with the small scale guidance the national policies relevant to the project have been included and revolve around the power tariff and funding from the Sugar Development Fund. These have been incorporated into the financial analysis and are therefore explicitly presented.

The risks in the pricing of bagasse have provided 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. High opportunity values for bagasse will make the project activity unviable. Allied to the volatility of bagasse prices the availability of bagasse also presents a risks and barrier to undertaking the project. The prospect of CER revenue, which can be priced forward and is euro or dollar denominated, has helped the project management overcome the risks due to the uncertainty of bagasse pricing.

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[9] Experience across other states provides evidence of standardised rates for renewable electricity generation from biomass, which are all below the MNES guidelines (KN, MH, TN). The trend in these states is however for downward revisions of the unit price as highlighted by the recent KERC PPA issued in January 2005.

[10] Based on a 9% saving of bagasse on cane.

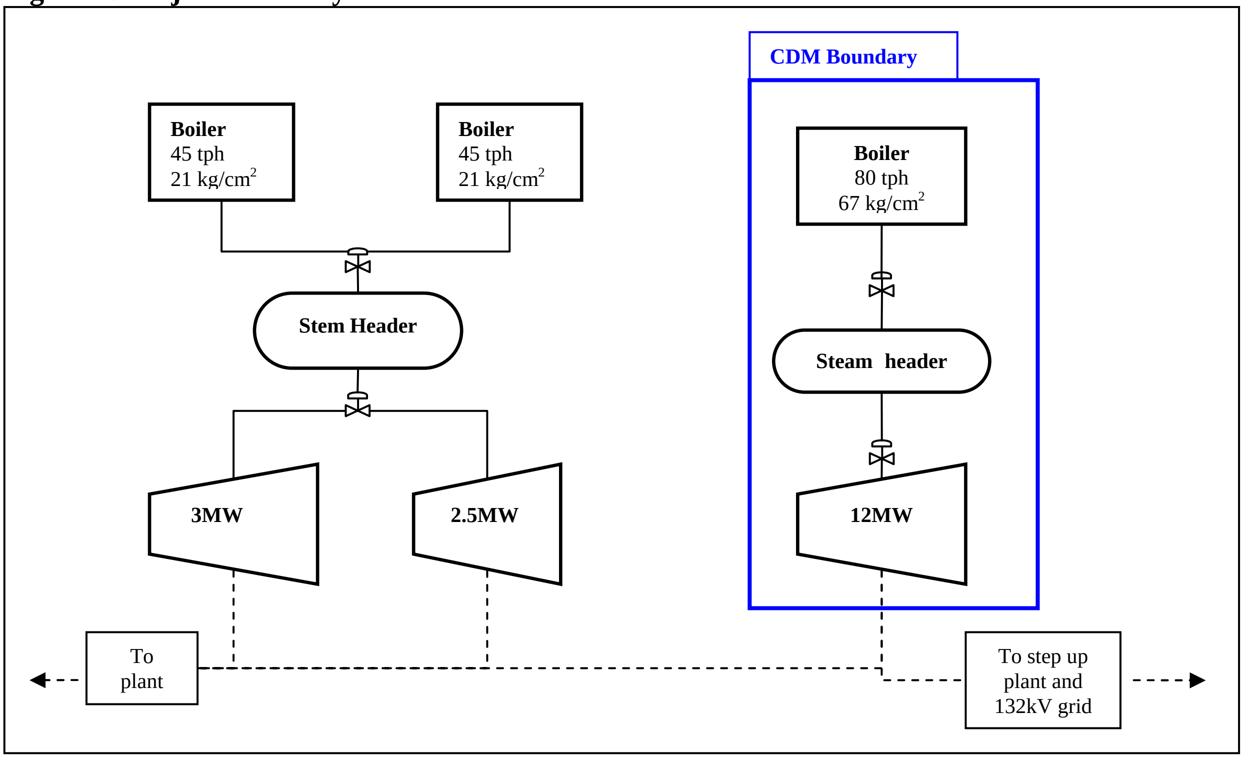
[11] We assume an €8/tonne CO_2e.

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.[12]

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

As highlighted in the guidance the boundary is placed around the new generating units resulting from the project activity, specifically the new high pressure boiler and the new 12MW turbine generator.

Figure 1: Project boundary



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 project will not result in any leakage, bagasse is not being drawn away from the existing outlets and the same amount of bagasse will be sold to the local paper company. The increase in capacity of the plant will be satisfied by a move away from the supply of cane to the informal sector, gur and khandsari units which do not generate bagasse and an increase in the productivity of cane production.

B.5 Details of the baseline and its development:

[12] 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.

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:

The baseline scenario for the project activity is that the sugar factory remains self sufficient in power and does not export to the grid. That this is the case and the project activity is not the baseline has been demonstrated in the previous section through an analysis of the barriers facing the project.

Referring to Appendix B of the Simplified Baseline and Monitoring Methodologies 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[13] 20%[14] 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 UPPCL.

Approximate Operating Margin

The approximate operating margin is calculated directly from actual Central Electricity Authority (CEA) data on generation and fuel consumption, combined with data from the IPCC on net calorific values and emission factors. The CEA provides coal consumption data for individual coal based power plants, and these data are therefore used. In the case of gas stations, aggregate consumption at the state and regional level is provided and these data are then used to derive an average emission factor for gas stations in the region (0.488 tCO_2/MWh). The approximate operating margin data are outlined below:

[13] Generation data available for the most recent year.

[14] If 20% falls on part capacity of a plant, that plant is included in the calculation.

Table 2: Northern Region Fuel Consumption, Emissions and Generation, 2004-5 (excluding hydro and nuclear)

	Fuel Consumption	Emissions (kt)	Generation (GWh)
Coal Plants			
Delhi			
Badarpur	3732	6913	5463
I.P.Stn.(DVB)	789	1461	921
Rajghat(DVB)	541	1002	696
Haryana			
Faridabad	822	1523	869
Panipat	4447	8237	6008
Punjab			
Bhatinda	1469	2721	1993
Lehra Mohabbat	1995	3695	3308
Roper	6056	11218	9082
Rajasthan			
Kota	5213	9656	7751
Suratgarh	5920	10966	9363
Uttar Pradesh			
Anpara	8339	15446	11511
Harduaganj	670	1241	632
Obra	4761	8819	5550
Panki Extn.	913	1691	1043
Paricha	876	1623	966
Tanda (NTPC)	2596	4809	3320
Unchahar (NTPC)	4604	8528	6781
Rihand STPS	4768	8832	7987
Singrauli(STPS)	10336	19145	15806
NCTPP(Dadri)	4432	8209	6830
Gas Plants			
Delhi			
I.P GT		568	1162
I.P. WHP		185	378
Pragata CCGT		1246	2551
Haryana			
F'bad CCGT		1544	3162
Jammu & Kashmir			
Pampore GT		12	24
Rajasthan			
Ramgarh GT		167	343
Ramgarh ST		8	17
Anta GT (NTPC)		1360	2785
Uttar Pradesh			
Auraiya GT		2012	4120
Dadri GT		2666	5458
Total		**145503**	**125880**
Operating Margin			**1.156**

Source: CEA, IPCC

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 obtained as for the approximate operating margin above.)

Table 3: Recent Capacity Additions, Generation and Emissions

Plant	Plant Type	Capacity Addition (MW)	Commissioning Date	Generation 04-05 (GWh)	Emissions (kt)
RAPS I-IV	Nuclear	220	15/06/2000	1361	0
Ghanvi	Hydro	22.6	01/07/2000	74	0
Ranjit Sagar	Hydro	600	01/07/2000	1145	0
Suratgrah	Thermal	250	15/10/2000	9363	10966
RAPS I-IV	Nuclear	220	15/11/2000	1361	0
Panipat	Thermal	210	31/03/2001	928	1272
Sanjay Bhaba	Hydro	120	01/07/2001	583	0
Malana	Hydro	86	01/07/2001	270	0
Suratgrah	Thermal	250	15/01/2002	1873	2193
Pragati	Thermal	104.6	15/03/2002	808	394
Suratgrah	Thermal	250	15/07/2002	1873	2193
Pragati	Thermal	104.6	09/11/2002	808	394
Pragati	Thermal	121.2	31/01/2003	882	431
Baspa	Hydro	300	01/07/2003	1193	0
Chamera II	Hydro	300	01/07/2003	1347	0
Suratgrah	Thermal	250	15/08/2003	1873	2193
Ramgarh GT	Thermal	37.5	15/09/2003	169	83
Ramgarh ST	Thermal	37.5	15/09/2003	17	8
Nathpa Jhakri	Hydro	250	06/10/2003	852	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
Kota	Thermal	195	15/08/2004	1261	1571
Nathpa Jhakri	Hydro	250	18/05/2004	852	0
Panipat	Thermal	500	29/12/2004	1703	2335
Total				**33988**	**24034**
Build Margin					**0.707**

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 **0.931**.

B.5.2 Date of completing the final draft of this baseline section *(DD/MM/YYYY)*: 26/04/2005

B.5.3 Name of person/entity determining the baseline: Robert Taylor, Agrinergy Ltd.

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: 09/06/2004. The order for the turbine was placed on this date. Discussions between Agrinergy and LHSF had taken place before this date concerning the application of CDM to the proposed project activity.

C.1.2 Expected operational lifetime of the project activity: 20y-0m

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

C.2.1 Renewable crediting period *(at most seven (7) years per crediting period):* Not applicable

C.2.1.1 Starting date of the first crediting period:

C.2.1.2 Length of the first crediting period:

C.2.2 **Fixed crediting period *(at most ten (10) years)*:** Proposed crediting period

C.2.2.1 Starting date: 15/11/2005

C.2.2.2 Length (max 10 years): 10y-0m

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. In the case of co-fired plants, the amount of biomass and fossil fuel input shall be monitored."

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

The expansion of the bagasse cogeneration unit at the LHSF factory will provide electricity to the UP 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 sale of power to the grid grid. Project emissions will also be calculated annually, should they arise, through the monitoring of any fossil fuels that are combusted to generate electricity. Therefore the monitoring methodology outlined in the small scale rules and procedures is appropriate for the project activity.

Sales of power will be measured by automated sensors (current transformers) installed at the 132kv step up plant for exports to the grid and a the Roopurkamalu substation. Monthly readings at the substation will be taken jointly by UPPCL and the factory and will form the basis for payments of power sold. This data recorded at the substation will be the primary data source for the monitoring plan.

The mass of bagasse produced by the plant, the use of bagasse in the new boiler and the sales of bagasse will also be monitored. Whilst these are not directly relevant for the calculation of emission reductions they will be held throughout the life of the project to cross check initial statements. Any usage of fossil fuel will be monitored through purchase receipts and may be cross checked against financial statements.

As set out in Section F the site requires an annual Approval to Operate from the Uttar Pradesh Pollution Control Board, this will be incorporated into the monitoring plan and will be produced at the time of verification.

Quality assurance for the data is high due to the commercial importance associated with electricity exports. The revenue associated with the sale of electricity will be recorded in annual financial statements and is therefore readily verifiable.

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.	*Electrical power*	P_y	*MWh*	*m*	*Continuously*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Continuous recording but will be taken from UPPCL sales receipts*
2.	*Mass*	Q_i	*t*	*m*	*Continuously*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Purchased fossil fuels*
3.	*Carbon emission factor*	$COEF_i$	*tC/TJ*	*m*	*Annually*	*100%*	*Electronic*	*2 yr or end of crediting period*	*IPCC data*
4.	*Net calorific value*	NCV_i	*TJ/kt*	*m*	*Monthly*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Taken from sales contract, if not available from IPCC data*
5.	*Oxidation*	*OXID*	*%*	*m*	*Annually*	*100%*	*Electronic*	*2 yr or end of crediting period*	*IPCC data*
6.	*Mass*	M_y	*t*	*m*	*Continuously*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Mass of bagasse saved. Automated recording at plant*
7.	*Mass*	$BOIL_y$	*t*	*m*	*Continuously*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Bagasse used in new boiler. Automated recording at plant*
8.	*Mass*	$SALE_y$	*t*	*m*	*Monthly*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Sale of bagasse, from sales receipts*
9.	*UPPCB approval*	*Approval to operate*			*Annually*	*100%*	*Electronic*	*2 yr or end of crediting period*	*Annual approval from UPPCB*

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 the above table 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 the storage of this data will be the responsibility of the project developers.

The data will be collected monthly and held on the attached 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.

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

Robert Taylor, Agrinergy Ltd, contact information as listed in annex I.

MVP - *to be completed monthly*
Data in blue should be entered by project administrator in a timely manner, data in yellow is fixed.

Static data	
CEF, tonnes CO2e/MWh	0.931

		Month 1	**Month 2**	**Month 3**	**Month 4**	**Month 5**	**Month 6**	**Month 7**	**Month 8**	**Month 9**	**Month 10**	**Month 11**	**Month 12**	**Total**
2006	P_y, MWh													0
	Pe_y, tCO_2e													
2007	P_y, MWh													0
	Pe_y, tCO_2e													
2008	P_y, MWh													0
	Pe_y, tCO_2e													
2009	P_y, MWh													0
	Pe_y, tCO_2e													
2010	P_y, MWh													0
	Pe_y, tCO_2e													
2011	P_y, MWh													0
	Pe_y, tCO_2e													
2012	P_y, MWh													0
	Pe_y, tCO_2e													
2013	P_y, MWh													0
	Pe_y, tCO_2e													
2014	P_y, MWh													0
	Pe_y, tCO_2e													
2015	P_y, MWh													0
	Pe_y, tCO_2e													

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

<u>Type I – Renewable Energy Projects</u>
<u>I D - Renewable electricity generation for a grid</u>

The guidance indicates that the formula to calculate baseline emission is the kWh produced by the renewable generating unit multiplied by an emission coefficient.

E.1.1 Selected formulae as provided in appendix B:

Whilst the Rules & Procedures provide an indication of the formula to be used we have detailed the equation in the following section. As stated in the boundary section only carbon dioxide will be considered.

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

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary: *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

Whilst no project emissions are expected we have included an variable to accommodate these should the factory set-up change at a point in the future, i.e. through a conversion of boilers etc. The calculation of these emissions will be performed at the time of each verification.

$$Pe_y = Q_i.COEF_i.NCV_i.OXID$$

Where:

Pe_y = project emissions in year y, tCO_2e
Q_i = mass of fossil fuel combusted, t
$COEF_i$ = emissions factor of fossil fuel combusted, tCO_2/TJ
NCV_i = net calorific value of fossil fuel combusted, TJ/t
OXID = oxidation factor, %

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities *(for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent)*

The project will not give rise to leakage.

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

$$Pe_y = Q_i.COEF_i.NCV_i.OXID$$

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities: *(for each gas, source, formulea/algorithm, emissions in units of CO_2 equivalent)*

$$BE_y = CEF.P_y$$
$$BE_y = 0.931.P_y$$

Where:

BE_y = Baseline emission, tCO_2e
CEF = constant representing the carbon emissions factor, tCO_2e/MWh (0.931 tCO_2/MWh as arrived at in section B5.1)
P_y = exported power in MWh

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

$$ER_y = 0.931.P_y - Pe_y$$

Where:

ER_y = Emission reductions resulting from the project activity, tCO_2e

Example of expected ER_y

$$ER_y = 0.931 \times 20{,}160 - 0$$
$$ER_y = 18{,}768$$

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

		Pe_y, tCO_2e		
		2,000	3,000	4,000
P_y, MWh	15,000	11,965	10,965	9,965
	17,500	14,293	13,293	12,293
	20,000	16,620	15,620	14,620
	22,500	18,948	17,948	16,948

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

The factory has an EIA under which the new investment will be covered and through this and monitoring from the Uttar Pradesh Pollution Control Board (UPPCB) will meet all local and national environmental legislation. A "Consent to Operate" and "Approval to Operate" will be required from the UPPCB in order to operate the plant.

The "Consent to Operate" has been provided to LHSF by the UPPCB and this has been made available to the validator. The UPPCB normally visit the plant 3 to 4 times per year in order to analyse the factory outputs and confirm they adhere to the standards laid down. The plant is required to maintain stack emissions at less than 150mg/Nm^3 and through its effluent treatment plant maintain BOD and suspended solids at levels less than 30mg/litre and 100mg/litre respectively. The factory has to date achieved these standards and evidence of this is provided by the UPPCB consent to operate.

The "Approval to Operate" will be obtained annually from the UPPCB and this will be provided at the time of each annual verification. This has been incorporated into the monitoring plan.

G. Stakeholders comments

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

The stakeholder review will be conducted on three levels:

A local stakeholder review

A national stakeholder review which will be undertaken through the approval by the Ministry of Environment and Forests (MoEF) and consent to operate from the Uttar Pradesh Pollution Control Board.

An international stakeholder review which will be conducted at the time of validation.

The institutions are already in place for the national and international stakeholder review and we will report these during the final phase of validation. The application to the MoEF was made on 3rd June 2005 and the project was presented on 25th August 2005.

Regarding the local stakeholder review a letter has also been sent to the Pilibhit District Administration and the local Cane Society informing them of the project activity and inviting comments. The Cane Society represents over 40,000 farmers who deliver sugar cane to the factory. The project has also received some publicity in the local press and an article was published in the local paper, the “Danik Jagrarn”, on 9th January 2004.

G.2 Summary of the comments received:

No comments have been received to date.

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

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project has not received any public funding

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