# VALIDATION REPORT

# "TRUPAN BIOMASS POWER PLANT IN CHILE" PROJECT

REPORT NO. 2005-0525

REVISION NO. 02

DET NORSKE VERITAS

# VALIDATION REPORT

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Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Trupan Biomass Power Plant in Chile" project on the basis of UNFCCC for CDM projects as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV's opinion that the project, as described in the project design document of 24 May 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0006. Hence, DNV requests the registration of the "Trupan Biomass Power Plant in Chile" project as CDM project activity.

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| Report title:<br>"Trupan Biomass Power Plant in Chile" Project | | |
| Work carried out by:<br>C. Kumaraswamy, Andres Gomez-Lobo, Javiera Labbé | | |
| Work verified by:<br>Michael Lehmann | | |
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**Indexing terms**

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## *Abbreviations*

| | |
|---|---|
| BM | Build margin |
| CAR | Corrective Action Request |
| CDEC-SIC | Dispatch Centre for the Central Interconnected System of the Republic of Chile |
| CDM | Clean Development Mechanism |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reduction |
| $CH_4$ | Methane |
| CL | Clarification request |
| CONAMA | National Commission for the Environment (the DNA of Chile) |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| DNV | Det Norske Veritas |
| DNA | Designated National Authority |
| EID | Environmental Impact Declaration |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| GHG | Greenhouse gas(es) |
| GWP | Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| $N_2O$ | Nitrous oxide |
| NGO | Non-governmental Organisation |
| ODA | Official Development Assistance |
| OM | Operating margin |
| PDD | Project Design Document |
| SIC | Central Interconnected System of the Republic of Chile |
| $tCO_2e$ | Tonne of $CO_2$ equivalents |
| UNFCCC | United Nations Framework Convention on Climate Change |

# 1 INTRODUCTION

Celulosa Arauco y Constitución S.A. (Arauco) has commissioned Det Norske Veritas Certification Ltd. (hereafter DNV) to validate the "Trupan Biomass Power Plant in Chile" project (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC and host Party criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consisted of the following personnel:

| | | |
|---|---|---|
| Mr Michael Lehmann | DNV Oslo, Norway | Team leader, Energy sector expert, Technical reviewer |
| Mr C. Kumaraswamy | DNV Bangalore, India | CDM auditor |
| Mr Andres Gomez | DNV Santiago, Chile | CDM auditor |
| Ms Javiera Labbé | DNV Santiago, Chile | CDM auditor |

## 1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

## 1.2 Validation Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against Kyoto Protocol criteria for the CDM, the CDM rules and modalities as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and relevant decisions by the CDM Executive Board. The validation team has, based on the recommendations in the Validation and Verification Manual /5/, employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project design.

## 1.3 The Trupan Biomass Power Plant in Chile Project

The objective of the "Trupan Biomass Power Plant in Chile" project activity was to establish a new biomass co-generation unit with 30 MW of installed capacity using climate change neutral biomass (wood chips and wood residue) as fuel and supplying heat and power to the Trupan industrial complex and exporting surplus electricity to the grid. The project is already implemented and started regular operation on 1 May 2003.

Emission reductions are generated by displacing fossil-fuel based grid-electricity and avoiding that biomass will be left to decay or is burned in an uncontrolled manner. Over a 21-year

crediting period starting on 1 May 2003, the project's expected annual emission reductions are on average 101 846 tonnes of $CO_2$ equivalents ($tCO_2e$). Actual emission reductions will be dependent on the annual updated baseline grid emission factor to be calculated from data provided by CDEC-SIC (Dispatch Centre for the Central Interconnected System of Chile).

## 2 METHODOLOGY

The validation of the project started in October 2004. The validation consisted of the following three phases:

i) a desk review of the project design, baseline and monitoring plan

ii) follow-up interviews with project stakeholders

iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to Validation and Verification Manual /5/. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the "Trupan Biomass Power Plant in Chile" project is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of validation protocol criteria or where a risk to the fulfilment of project objectives is identified. Corrective Action Requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;

ii) validation protocol requirements have not been met; or

iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue.

| *Validation Protocol Table 1: Mandatory Requirements* | | | |
|---|---|---|---|
| ***Requirement*** | ***Reference*** | ***Conclusion*** | ***Cross reference*** |
| *The requirements the project must meet.* | *Gives reference to the legislation or agreement where the requirement is found.* | *This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.* | *Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.* |

| *Validation Protocol Table 2: Requirement checklist* | | | | |
|---|---|---|---|---|
| ***Checklist Question*** | ***Reference*** | ***Means of verification (MoV)*** | ***Comment*** | ***Draft and/or Final Conclusion*** |
| *The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.* | *Gives reference to documents where the answer to the checklist question or item is found.* | *Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.* | *The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.* | *This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below). **Clarification** is used when the validation team has identified a need for further clarification.* |

| *Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests* | | | |
|---|---|---|---|
| ***Draft report clarifications and corrective action requests*** | ***Ref. to checklist question in table 2*** | ***Summary of project participants' response*** | ***Validation conclusion*** |
| *If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.* | *Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.* | *The responses given by the Client or other project participants during the communications with the validation team should be summarised in this section.* | *This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".* |

**Figure 1 Validation protocol tables**

## 2.1 Review of Documents

The PDD (draft version of October 2004 applying the proposed baseline and monitoring methodology NM0081 and the versions of 24 October 2005, 5 January 2006 and 24 May 2006 applying the consolidated baseline and monitoring methodology ACM0006) /1/ for the "Trupan Biomass Power Plant in Chile" project were assessed. In addition, background documents related to the project design and the baseline determination were reviewed /6/-/10/.

## 2.2 Follow-up Interviews

On 5-6 May 2005 DNV performed interviews with Arauco in Chile and visited the Trupan industrial complex to confirm selected information and to resolve issues identified during the document review. The main topics of the interviews were:

- Resources, training needs, procedures for operation and maintenance,
- Land-use, construction and operation permits,
- Identification of the communities potentially affected by the project, stakeholder consultation process,
- Environmental Impact Assessment,
- Further information regarding the project's IRR and potential financial incentives
- Analysis of biomass availability,
- Data provided by CDEC-SIC,
- Evidence that CDM was seriously considered in the decision to implement the project.

## 2.3 Resolution of Clarifications and Corrective Action Requests

The objective of this phase of the validation was the resolution of any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design.

The initial validation of the draft PDD (applying NM0081) of the project identified two *Corrective Action Requests* and five requests for *Clarification*. These were presented to Arauco in the form of a draft validation report (rev. 0 of 1 June 2005).

The PDD of 24 October 2005, which was submitted after the consolidation of NM0081 into the consolidated baseline and monitoring methodology ACM0006, addressed some of the *Corrective Action Request* and request for *Clarification* identified in the assessment of the draft PDD of October 2004. However, the assessment of the PDD of 24 October 2005 identified one further *Corrective Action Request* and further four requests for *Clarification*. These requests, which were presented to the project participants in DNV's revised draft validation report of 2 December 2005 (rev. 0B), were resolved during communications between Arauco and DNV and through the submission of a revised PDD (version 3 of 5 January 2006).

To guarantee the transparency of the validation process, the concerns raised and responses given are documented in the validation protocol in Appendix A.

A review was requested for the request for registration of the "Trupan Biomass Power Plant in Chile" project. At is 24$^{th}$ meeting the CDM Executive Board requested that the monitoring plan

of the project is amended to also include monitoring of the sources of the biomass to be used by the project. Hence, the PDD (version 4 of 24 May 2006) and consequently this validation report were revised.

# 3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the revised PDD of 24 May 2006 /1/.

## 3.1 Participation Requirements

The only project participant is Celulosa Arauco y Constitución S.A. of Chile. The host Party Chile meets all relevant participation requirements. No participating Annex I Party was identified for the project. The DNA of Chile has provided written approval of voluntary participation /4/.

## 3.2 Project Design

The project is a renewable energy project activity with an installed capacity of 30 MW using climate change neutral biomass (wood chips and wood residue) as fuel and supplying heat and power to the Trupan industrial complex and exporting surplus electricity to the grid. Approximately 60% of the electricity generated by the new power plant will be destined to serve the needs of the expansion of the Trupan industrial complex. The remaining 40% of the electric power generation will be sold to free (unregulated) customers and to the spot market of the Central Interconnected System (SIC grid).

The proposed project activity is designed to use own and third party biomass for steam and electric power generation. The project sources a significant part of its consumption requirements from a great number of small providers (mostly local sawmills). Without the project, the biomass at these mills would continue to be either dumped or in some cases burned in the open air or in simple incinerators.

The new power plant was a consequence of a project expansion of the Trupan wood panel mill (Trupan Line Nº2). Before the expansion, Trupan had steam generating capacity but no electric power generating capacity and the Trupan industrial complex sourced all its electricity requirements through the grid. When the Trupan management evaluated the expansion, it considered building a new on-site biomass fuelled power plant, with enough capacity to provide not only enough power to the industrial complex itself, but also to supply electricity to the Central Interconnected System (SIC grid).

The project involved the installation of high-pressure boiler and a steam turbine, employing steam-Rankine cycle technology for generating electricity. The applied technology essentially comprises direct combustion of biomass in a boiler to generate steam, which is subsequently expanded through a turbine. The technology has been being successfully applied for many years for steam turbines.

A renewable crediting period of 7 years is selected (with the potential of being renewed twice), starting on 1 May 2003. The starting date of the project activity (construction) is 4 April 2001. The expected operational lifetime of the project is 25 years.

The project is expected to bring social (employment), environmental and economic benefits, thus contributing to the sustainable development objectives of the Chilean Government. The DNA of Chile confirmed that the project assists in achieving sustainable development /4/.

The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Chile.

## 3.3 Baseline Determination

The project applies the approved consolidated baseline methodology ACM0006 *"Consolidated baseline methodology for grid-connected electricity generation from biomass residues"* /6/. The project fulfils the conditions under which ACM0006 is applicable.

The project activity complies with project scenario 3 of ACM0006, i.e. the project activity involves the installation of a new cogeneration plant at a site where currently no power generation occurs. The power generated by the project plant is fed into the grid or would in the absence of the project activity be purchased from the grid. The biomass would in the absence of the project activity (a) be used for heat generation in boilers at the project site and (b) be dumped or left to decay or burned in an uncontrolled manner without utilizing it for energy purposes.

The selected baseline scenario is that in absence of the CDM project activity Arauco would have installed a conventional power plant using biomass as fuel, but only generating low pressure steam and no electricity. This conventional power plant design is business-as-usual in the MDF panel board mill industry. The following baseline scenarios for project scenario 3 were selected in accordance with ACM0006:

| | |
|---|---|
| For power generation: | The generation of power in existing and/or new grid-connected power plants (P4). |
| For heat generation: | The generation of heat in the boilers using the same type of biomass residues (H4). |
| For biomass use: | The biomass is dumped and left to decay or burned in an uncontrolled manner without utilising it for energy purposes AND the biomass is used for heat and/or electricity generation at the project site (B1 and B2) |

In accordance with ACM0006, an grid emission coefficient is calculated for the power generation baseline scenario in accordance with ACM0002 /8/ as a combined margin emission coefficient. The electricity system selected to determine the combined margin emission coefficient is the SIC grid system in Chile. The combined margin emission coefficient is calculated as the weighted average of the simple adjusted operating margin (OM) emission coefficient and the build margin (BM) emission coefficient (see section 3.6).

For the heat generation, it is assumed that the same amount of heat that is produced by the biomass power plant in the project scenario would have been produced by a conventional low pressure boiler using biomass in the baseline scenario. Hence, no emission reductions result from heat generation.

Project scenario 3 of ACM0006 requires that the biomass baseline scenarios B1 and B2 are combined. Indeed, only part of the biomass used by the project would be left for decay or burned in an uncontrolled manner in the baseline scenario (B1) while some biomass would have been used for heat generation at the project site also in the baseline scenario (B2). It is thus assumed that only the "additional" biomass necessary to generate electricity is left for decay or burned in uncontrolled manner and that the remaining biomass would have been used for heat generation also in the baseline scenario.

## 3.4 Additionality

In accordance with ACM0006, the additionality of the project is demonstrated through the "*Tool for the demonstration and assessment of additionality*" /9/, which includes the following steps:

*Step 0 -Preliminary screening based on the starting date of the project activity*: The starting date of the CDM project activity (construction), i.e. 4 April 2001, falls between 1 January 2000 and the date of the registration of the first CDM project activity (18 November 2004). Evidence for the project's starting date was presented.

Evidence that the benefits of the CDM were considered in the decision to proceed with the project was presented in the form of a "Feasibility study of Cogeneration in Chile" developed by Sigma S.A. in 1998. This study identified cogeneration as a means for reducing $CO_2$ emissions within Arauco's operations and can thus be considered as evidence that one of the objectives of the implementation of the project was to mitigate climate change. In DNV's opinion, this study, in combination with evidence provided for the Arauco Group's engagement in the CDM related to forestry projects prior to the implementation of the "Trupan Biomass Power Plant in Chile" project, sufficiently demonstrates that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.

*Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations*: Alternatives to the project activity consistent with current laws and regulation were identified, simulating how electric power would be generated in the absence of the CDM project activity, how the heat would be generated in the absence of the project activity and what would happen to the biomass in the absence of the project activity.

Step 2 - *Investment analysis*: A marginal investment analysis of the project has been presented which shows that the IRR is 4.2% higher than Arauco's normal discount required rate of return at 12% pa. The investment analysis does thus not support the project's additionality claim.

*Step 3 - Barrier analysis: Investment barriers, Technological barriers, and barriers due to prevailing practice are presented in the PDD:*

a) *Investment barrier:* DNV has been able to confirm that in Chile there is a higher risk exposure for being a big (visible) player in the electric power generation industry. As a member of the CDEC-SIC dispatch centre, Arauco is exposed to fines applied to power generators by the national authority. According to the law, these fines are applied in proportion to the installed capacity of each electric power company. This higher risk exposure prevents companies whose core business is not power generation from investing in power cogeneration projects.
b) *Technological barrier.* DNV has been able to confirm that there are no other MDF panel board mills with integrated power generation in Chile. This could result in lack of skilled and trained manpower to operate this facility. In terms of the project design, the design is to

maximise the energy output and uses high pressure steam, which is not a suitable system to the steam requirements of the saw mill and plywood mill. The mill had to modify their systems to suit to high pressure steam. This provides a technological barrier since this is the first MDF panel board mill with integrated cogeneration.

c) *Barriers due to prevailing practice:* DNV has been able to confirm that the steam requirements in a MDF panel board mill are low pressure steam and that this project produces high pressure steam in order to maximize the power output which is not prevailing practise.

*Step 4 - Common practice analysis:* DNV has been able to confirm that the project is first of its kind as an integrated cogeneration plant using biomass residues installed at a MDF panel board mill. DNV investigated whether a comparison (common practise analysis) with the wood panel board industry is sufficient or whether a broader comparison with the pulp industry, sawmill industry and wood products industry as a whole would be more appropriate. Cogeneration is for example widely applied in the pulp industry. However, the complimentary information provided by the project participants demonstrated that the operational characteristics of the MDF panel board industry differ and that a broader comparison with the common practise in the pulp industry, sawmill industry and wood products industry is not appropriate.

*Step 5 - Impact of CDM registration:* It is demonstrated that the incentives from CDM will alleviate the identified barriers.

Given the above and in particular the investment, technological and common practice barriers that the project faces, it is sufficiently demonstrated that the project is not a likely baseline scenario. As additionality can be demonstrated either through an investment analysis (step 2) or a barrier analysis (step 3), the economical attractiveness of the project identified in the investment analysis does not question the overall additionality of the project.

## 3.5 Monitoring Plan

The project correctly applies the approved consolidated monitoring methodology ACM0006 *"Consolidated baseline methodology for grid-connected electricity generation from biomass residues"* /7/.

Most of the data necessary to calculate baseline and project emissions will be directly monitored at regular intervals. The following parameters are to be monitored:

- Net electricity generated by the biomass power plant;
- Quantity of biomass combusted in the project plant;
- Average return trip distance between biomass supply sites and the project site;
- Average truck load of the trucks used for transportation of biomass;
- On-site use of fuel for transportation of biomass;
- Fossil fuel used in power boiler.

Moreover, the OM and BM emission coefficient will be updated annually based on data provided by CDEC-SIC.

Finally, as requested by the CDM Executive Board at its 24$^{th}$ meeting, the monitoring plan was amended to also include monitoring of the sources of the biomass to be used by the project.

Detailed responsibilities and authorities for project management, monitoring procedures and QA/QC procedures have been presented and were checked during follow-up interviews. The monitoring practices are considered appropriate.

In the absence of any guidance in ACM0006 for calculating the "additional" biomass necessary for generating electricity in addition to heat, the approach proposed by Arauco is deemed adequate for determining the share of biomass that is additionally needed in the project scenario compared to the amount of biomass that would have been consumed in the baseline scenario.

An electric power generation factor has been calculated based on an energy / mass balance carried out by a consultant for the design of the power plant in the project scenario and the design of the power plant in the baseline scenario (i.e. the technical specifications of a biomass power plant that would meet the heat demand of the expansion of the Trupan industrial complex, but which would not have generated electricity). The result of the energy / mass balances, which was the basis for determining the electric power generation factor, was assessed by DNV and deemed appropriate. The electric power generation factor remains fixed over the crediting period of the project. The gross (monitored) electric power generation per month (MWh/month) of the Trupan power plant will be divided by this factor, resulting in an estimation of the "additional" biomass that was consumed by the power plant to generate electricity.

The PDD was revised to explicitly describe how additional biomass will be monitored and determined and that only additional biomass will be considered in the calculation of project and baseline emissions.

## 3.6 Calculation of GHG Emissions

In accordance with ACM0006, $CH_4$ emissions from combusting biomass and $CO_2$ emissions from of-site and on-site transports of biomass are accounted as project emissions.

A potential source of leakage is that the project diverts biomass from other users and thereby increases fossil fuel use. To account for this, a "biomass surplus index" indicator will be periodically calculated and monitored and if the indicator shows that there is a sufficient surplus of biomass in the area where the project is located, then leakage will be considered zero. In 2005, the ratio total biomass supply/total biomass demand was 1.73, confirming that the project is not expected to cause any leakage effects. Therefore, the project is not likely to result in biomass scarcity which could cause other biomass users to switch to other fuels (leakage effects to third parties).

The project has two baseline components. The first is the emissions that would be produced by the grid when producing an equivalent amount of electricity that is generated by the project and the second is the emissions that would have been produced from uncontrolled burning of biomass.

For the displacement of grid electricity, the combined margin emission coefficient for the SIC Chilean grid will be determined *ex-post* in accordance with the "simple- adjusted OM" approach and BM approach described in ACM0002.

For the *ex-ante* estimation of the project's emission reductions for displacing grid electricity, actual data on plant specific electricity generation and plant specific fuel consumption factors have been used to determine combined margin emission factors for the years 2003-2005. For future years, the OM and BM emission factors were calculated based on forecasted power

generation in the SIC grid (based on the latest expansion plan and average hydropower generation). For 2004, the simple-adjusted OM emission coefficient was calculated to be 0.614 $tCO_2e/MWh$ (applying a $\lambda$ of 0.001) and the BM emission coefficient 0.313 $tCO_2e/MWh$, resulting in a combined margin emission coefficient of 0.464 $tCO_2e/MWh$ (weighted average of the build and operating margin). The OM and BM emission coefficient calculations are in accordance with ACM0002 and were transparently presented in spreadsheets /2/. Since the OM and BM emission coefficients will be updated *ex-post* on an annual basis with date provided by CDEC-SIC for each year in which the projects generated electricity, DNV has not in detail verified the input data used to calculate the OM and BM emission coefficients used for the *ex-ante* estimation of the project's emission reductions.

$7CH_4$ emissions from uncontrolled burning of biomass in the absence of the project are determined using an adequate IPCC default emission factor which was adjusted for uncertainty in accordance with ACM0006. However, Arauco will attempt measurements of $CH_4$ emissions to determine a specific $CH_4$ emission factor for uncontrolled burning of biomass.

## 3.7 Environmental Impacts

The impacts from the project were assessed through an Environment Impact Declaration. As per the Chilean EIA procedures, the Environmental Impact Declaration (EID) was presented to the regional environmental authorities. The project activity fully meets environmental legislation in force, based on which an approval was obtained from the local authorities (COREMA).

## 3.8 Comments by Local Stakeholders

The general public was informed about the project through publication in the Official gazette, as part of the approval of the EID. No other modes of communication were employed. However, given that the project has only limited social and environmental impacts, the local stakeholder consultation process is deemed sufficient.

No comments were received from the general public. Some technical comments were received from environmental authorities. The technical comments received have been resolved.

# 4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD of 24 October 2005 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 26 October 2005 to 24 November 2005.

One comment was received on 24 November 2005. The comment received (in unedited form) is given in the below text box.

**Comment by**: Kurt, ORGONG
**Inserted on**: 2005-11-24
**Subject**: Arauco projects are not additional!

**Comment**:

Please consider this comment for your validation:

The use of black liquor in pulp mills is a common practice in most of the world. It is an evident use of energy efficiency to take an advantage from black liquor and most of the biomass residues in big forest industry installations, that have big energetic needs that coincide with big volumes of waste. The installation of a power boiler is justified by the need to supply power for the start up of the recovery boiler in pulp mills, so it is indeed convenient to install a power boiler in a huge forestry complex that includes so different products (sawmill, pulp mill, MDF, etc)

Also the ACM0006 methodology is not completely applied, because the reasons for non existence of leakage are not quantified and explicited. The balances for each biomass category must be presented, or show that there are no markets related. Also Arauco has developed even before the CDM other cogeneration projects such as Constitucion, for there is no reason to prove that they "where thinking on the CDM" when installing this cogeneration systems.

Also the Trupan cogeneration plant is a project largely old enough that hardly would have any kind of justification for proving that was though originally thought as CDM.

I wish this comment would justify a profound examination of every Arauco project activity, in order to make CDM a transparent and rigorous mechanism for climate change mitigation.

Thanks!

DNV requested the project participant to provide a response to the comment received. Arauco's response is given in below text box.

*The use of black liquor in pulp mills is a common practice in most of the world. It is an evident use of energy efficiency to take an advantage from black liquor and most of the biomass residues in big forest industry installations, that have big energetic needs that coincide with big volumes of waste. The installation of a power boiler is justified by the need to supply power for the start up of the recovery boiler in pulp mills, so it is indeed convenient to install a power boiler in a huge forestry complex that includes so different products (sawmill, pulp mill, MDF, etc)*

Though the comment regarding the use of black liquor for energy purposes in the pulp mill industry is correct, the Trupan industrial complex does not have a pulp mill, so this part of the comment is out of context.

In the Trupan project activity PDD as well as in the validation, the Project Proponent presented substantial evidence that indicated that building a biomass cogeneration power plant inside an industrial complex such as the Trupan, is something that clearly departs from the common practice observed in the MDF, Sawmill, Hardboard industries not only in Chile, but in the world. It is a common practice in these industries to burn the biomass residues (mainly bark and sawdust) in low pressure power boilers to generate saturated steam for the processes, but the cogeneration of electric power is not part of the normal practice in these industries in Chile.

Given that the generation of steam for the industrial complex is less intensive in biomass fuel consumption than the cogeneration of steam and electric power for the industrial complex and / or the grid, the Trupan cogeneration power plant must supplement the internal biomass fuel sources of the industrial complex with external biomass sources from third parties. This indicates that the Trupan cogeneration initiative is not just "a way of getting rid of big volumes of waste" as the comment suggests, but a genuine initiative aimed at mitigating climate change through the

maximization of renewable electric power generation inside an industrial facility. On the same lines, it is true that pulp mills normally have biomass power boilers for start-up operations, but in Arauco's CDM cogeneration initiatives, these power boilers have been designed with significant higher capacity in order to maximize electric power output. As in Trupan's case, these power boilers do not only consume all the biomass residues generated inside the industrial complex, but also consume significant amounts of biomass residues generated by third parties. To back these arguments, the Project Proponent presented plenty and substantial evidence of other similar (and recent) projects in Chile, that do not contemplate power cogeneration inside the industrial facilities.

*Also the ACM0006 methodology is not completely applied, because the reasons for non existence of leakage are not quantified and explicited. The balances for each biomass category must be presented, or show that there are no markets related.*

The Project Proponent of the Trupan project activity duly and clearly accounted for ALL project and leakage emissions related to the project activity. Biomass supply / demand situation was fully addressed in the PDD as well as during the validation. Proper justification according to the ACM0006 methodology was presented in the Trupan PDD and further developed during the on-site validation visit of the project activity by the validator. Substantial evidence regarding the absence of leakage due to the Trupan project activity was also presented in the PDD and during the validation. For these reasons, this comment is considered not pertinent to the Trupan project activity.

*Also Arauco has developed even before the CDM other cogeneration projects such as Constitucion, for there is no reason to prove that they "where thinking on the CDM" when installing this cogeneration systems.*

It is true that Arauco developed some cogeneration initiatives before the CDM became a viable mechanism. In fact, the Trupan PDD and the information presented to the validator mentioned these initiatives very clearly and transparently. This information fully explained the circumstances and context in which the early cogeneration projects were undertaken, the motivations behind these initiatives and how these motivations evolved in time to incorporate the "climate change and the CDM principles" after the formulation of the Kyoto Protocol in 1997. Since then, Arauco has adopted the CDM postulates as part of its Corporate Environmental Policy and has consistently considered the CDM as a facilitating tool to develop several cogeneration initiatives in Chile.

*Also the Trupan cogeneration plant is a project largely old enough that hardly would have any kind of justification for proving that was though originally thought as CDM.*

The Trupan Line Nº2 MDF expansion project was an idea that dated before the year 2000. However, the original expansion project contemplated sourcing the electric power from the local SIC grid and NOT through the construction of a cogeneration plant inside the Trupan industrial complex. Before Arauco acquired 100% of the Trupan ownership, the previous Trupan administration had started this new expansion project by building the interconnection system with the grid (relays, transformer, connection space in the bus, etc.) to obtain the additional power from the grid. Since Arauco decided to build the cogeneration power plant instead, these installations became redundant and under utilized, since the new biomass power plant injected the energy to the grid through another circuit and in a different voltage. These installations were visited by the validators during the Trupan validation on-site visit. Arauco could have

maintained the original project idea of sourcing the electric power through the grid and used the newly installed assets in a more rational way. Instead, it decided to build a biomass cogeneration power plant and source all the electric power requirements of the Trupan industrial complex internally. This clearly demonstrates Arauco's commitment with global warming mitigation and the CDM postulates.

***How DNV has taken due account of the comment received***

The project participant's response showed that some of the statement made in the comments were due to misunderstandings. The comment received questioned that additionality of the project, in particular that the CDM the benefits of the CDM were considered in the decision to proceed with the project. Moreover, the comment questioned the appropriateness of the provided biomass supply/total biomass demand ratio analysis.

DNV has thoroughly assessed the additionality of the project. DNV investigated whether a comparison (common practise analysis) with the wood panel board industry is sufficient or whether a broader comparison with the pulp industry, sawmill industry and wood products industry as a whole would be more appropriate. The complimentary information provided by the project participants demonstrated that the operational characteristics of the MDF panel board industry differ and that a broader comparison with the common practise in the pulp industry, sawmill industry and wood products industry is not appropriate (see section 3.4 and Table 3 in Appendix A).

DNV also thoroughly assessed the presented evidence that the benefits of the CDM were considered in the decision to proceed with the project. In DNV's opinion, the presented feasibility study, in combination with evidence provided for the Arauco Group's engagement in the CDM related to forestry projects prior to the implementation of the "Trupan Biomass Power Plant in Chile" project, sufficiently demonstrates that the incentive from the CDM was seriously considered in the decision to proceed with the project activity (see section 3.4 and Table 3 in Appendix A).

In DNV's opinion, the analysis of the total biomass supply/total biomass ration given in the PDD is adequate and in accordance with the requirements of ACM0006. In 2005, the ratio was 1.73, confirming that the project is not expected to cause any leakage effects (see section 3.6).

# 5 VALIDATION OPINION

*Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Trupan Biomass Power Plant in Chile" project. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism (CDM) as well as criteria given to provide for consistent project operations, monitoring and reporting.*

*The review of the project design document and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.*

*The objective of the project activity was to establish a new biomass co-generation unit with 30 MW of installed capacity using biomass (wood chips and wood residue) and supplying heat and power to the Trupan industrial complex and exporting surplus electricity to the grid.*

*The only project participant is Celulosa Arauco y Constitución S.A. of Chile. The host Party Chile meets all relevant participation requirements. No participating Annex I Party was identified for the project. The DNA of Chile has provided written approval of voluntary participation.*

*By promoting renewable energy, the project is in line with the current sustainable development priorities of Chile. The DNA of Chile confirmed that the project assists in achieving sustainable development.*

*The project applies the approved consolidated baseline methodology ACM0006 "Consolidated baseline methodology for grid-connected electricity generation from biomass residues". The baseline methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound. The selected baseline scenario is the installation of a conventional power plant using biomass as fuel, but only generating low pressure steam and no electricity. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are thus additional.*

*By displacing fossil fuel-based electricity with electricity generated from a renewable source and by avoiding emissions from uncontrolled burning of biomass, the project will result in emission reductions that are real, measurable and will give long-term benefits to the mitigation of climate change. The emission reductions forecast stated in the PDD is a likely estimate.*

*The monitoring methodology ACM0006 has been correctly applied. The monitoring plan provides for monitoring of the indicators necessary for the ex-post determination of project and baseline emissions. The combined margin emission coefficient will be updated on an annual basis.*

*Local stakeholders' comments were consulted and comments received were taken into account in the project design. Comments by Parties, stakeholders and NGOs were also invited via the UNFCCC web-site. The comment received was taken into account in the validation.*

*In summary, it is DNV's opinion that the project, as described in the project design document of 24 May 2006, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0006. Hence, DNV requests the registration of the "Trupan Biomass Power Plant in Chile" project as CDM project activity.*

## REFERENCES

*Documents provided by the project proponent that relate directly to the project:*

/1/ Celulosa Arauco y Constitución S.A.: *CDM-PDD for the "Trupan Biomass Power Plant in Chile"*. Draft PDD of October 2004 applying the proposed baseline and monitoring methodology NM0081 and PDD Version Nº2 of 24 October 2005, Version Nº3 of 5 January 2006 and Version Nº4 of 24 May 2006 applying the consolidated baseline and monitoring methodology ACM0006.

/2/ Celulosa Arauco y Constitución S.A.: *Combined margin calculations*. Excel Spreadsheets.

/3/ Celulosa Arauco y Constitución S.A.: *Estimation of biomass from forest operations in Chile*. Excel Spreadsheets received on 30 April 2005.

/4/ CONAMA (DNA of Chile*): Letter of Approval.* 22 September 2004.

*Background documents related to the design and/or methodologies employed in the design or other reference documents:*

/5/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/6/ Approved Baseline Methodology ACM0006: *Consolidated baseline and monitoring methodology for grid-connected electricity generation from biomass residues.* Version 01 of 30 September 2005.

/7/ Approved Monitoring Methodology ACM0006: *"Consolidated monitoring methodology for grid-connected electricity generation from biomass residues".* Version 01 of 30 September 2005.

/8/ Approved Baseline Methodology ACM0002: *"Consolidated baseline methodology for grid-connected electricity generation from renewable sources".* Version 04 of 28 November 2005.

/9/ CDM Executive Board: *Tool for the demonstration and assessment of additionality.* Version 02 of 28 November 2005.

/10/ IPCC: *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. http://www.ipcc.ch/

*Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:*

/11/ Christian A. Patrickson - Operations Manager of Arauco Generación S.A.

/12/ Raúl Zapata - Plant Manger of Trupan Plant

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# APPENDIX A

## CDM VALIDATION PROTOCOL

## Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

| Requirement | Reference | Conclusion | Cross Reference / Comment |
|---|---|---|---|
| 1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3 | Kyoto Protocol Art.12.2 | Annex I party has not been identified yet. | Table 2, Section E.4.1 |
| 2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof | Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a | OK | Table 2, Section A.3 |
| 3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC | Kyoto Protocol Art.12.2. | OK | Table 2, Section E.4.1 |
| 4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved | Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a | OK | |
| 5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change | Kyoto Protocol Art. 12.5b | OK | Table 2, Section E |
| 6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity | Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43 | OK | Table 2, Section B.2 |
| 7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties | Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2 | OK | No public funding is involved |

| Requirement | Reference | Conclusion | Cross Reference / Comment |
|---|---|---|---|
| 8. Parties participating in the CDM shall designate a national authority for the CDM | CDM Modalities and Procedures §29 | OK | Chile: Comisión Nacional del Medio Ambiente (CONAMA) |
| 9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol | CDM Modalities §30/31a | OK | Chile: Ratification on 26 August 2002 |
| 10. The participating Annex I Party's assigned amount shall have been calculated and recorded | CDM Modalities and Procedures §31b | *Not applicable-* | Annex I party has not been identified yet. |
| 11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7 | CDM Modalities and Procedures §31b | *Not applicable* | Annex I party has not been identified yet. |
| 12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received | CDM Modalities and Procedures §37b | OK | Table 2, Section G |
| 13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out. | CDM Modalities and Procedures §37c | OK | Table 2, Section F |
| 14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board | CDM Modalities and Procedures §37e | OK | Table 2, Section B.1.1 and D.1.1 |
| 15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP | CDM Modalities and Procedures §37f | OK | Table 2, Section D |

| Requirement | Reference | Conclusion | Cross Reference / Comment |
|---|---|---|---|
| 16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available | CDM Modalities and Procedures §40 | OK | The PDD of 24 October 2005 has been made publicly available on DNV's climate change website www.dnv.com/certification/climatechange and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 day period from 26 October 2005 to 24 November 2005. Once comment was received and made publicly available on the above mentioned website. |
| 17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances | CDM Modalities and Procedures §45c,d | OK | Table 2, Section B.2 |
| 18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure | CDM Modalities and Procedures §47 | OK | Table 2, Section B.2 |
| 19. The project design document shall be in conformance with the UNFCCC CDM-PDD format | CDM Modalities and Procedures Appendix B, EB Decision | OK | |

## Table 2 Requirements Checklist (Based on assessment of draft PDD of October 2004)

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| ***A. General Description of Project Activity***<br>*The project design is assessed.* | | | | | |
| **A.1. Project Boundaries**<br>*Project Boundaries are the limits and borders defining the GHG emission reduction project.* | | | | | |
| A.1.1. Are the project's spatial (geographical) boundaries clearly defined? | /1/ | DR | The project is located in the Trupan industrial complex Site on Cholguan road near Yungay, in the Ñuble Province of Bío-Bío Region. | | OK |
| A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined? | /1/ | DR | The project's system boundary mainly includes the Biomass Boiler, Boiler Water systems, Steam Distribution System, Turbo generator, Process Equipment and Electrical Equipment. | | OK |
| **A.2. Technology to be employed**<br>*Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.* | | | | | |
| A.2.1. Does the project design engineering reflect current good practices? | /1/ | DR | The project design engineering reflects current good practices. | | OK |
| A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host | /1/ | DR | The project will employ Steam-Rankine cycle technology for generating electricity from biomass. This essentially comprises direct combustion of biomass in a boiler to | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| country? | | | generate steam, which is subsequently expanded through a turbine. | | |
| A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period? | /1/ | DR | The technology is being successfully used since many years for steam turbines and so is unlikely to be substituted by other better technologies at least during the project lifetime. | | OK |
| A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? | /1/ /11/ /12/ | DR I | Staff has been trained. The fact that the project is successfully in operation demonstrates that training and maintenance needs in this regard have been sufficiently addressed. | | OK |
| A.2.5. Does the project make provisions for meeting training and maintenance needs? | /1/ | DR | As above | | OK |
| **A.3. Contribution to Sustainable Development** *The project's contribution to sustainable development is assessed.* | | | | | |
| A.3.1. Is the project in line with relevant legislation and plans in the host country? | /1/ /11/ /12/ | DR I | The project is in line with the relevant legislation in Chile. | | OK |
| A.3.2. Is the project in line with host-country specific CDM requirements? | /1/ | DR | The written confirmation by the DNA of Chile that the project assists in achieving sustainable development has been received. | | OK |
| A.3.3. Is the project in line with sustainable development policies of the host country? | /1/ | DR | Biomass power cogeneration constitutes a sustainable source of power generation that brings advantages for mitigating global warming. Using the available natural resources in a more rational way, the project may help to enhance the | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| | | | development of renewable energy sources, in particular the use of biomass generated as a by-product of the forestry industry, which has a significant potential in Chile. | | |
| A.3.4. Will the project create other environmental or social benefits than GHG emission reductions? | /1/ | DR | The project will enable sustainable development by employing renewable resource such as biomass for electricity generation and reducing methane emissions due to uncontrolled disposal and burning of biomass. | | OK |
| ***B. Project Baseline***<br>*The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.* | | | | | |
| **B.1. Baseline Methodology**<br>*It is assessed whether the project applies an appropriate baseline methodology.* | | | | | |
| B.1.1. Is the baseline methodology previously approved by the CDM Executive Board? | /1/ | DR | The project applies the approved consolidated baseline methodology for grid-connected electricity generation from biomass residues, ACM0006. | | OK |
| B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified? | /1/ | DR | Yes. The methodology is applicable for the following reasons:<br>- Project utilizes biomass which would otherwise would have lead to uncontrolled burning of biomass<br>- Project generates electricity through renewable resources that displace fossil | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| | | | fuel based power<br>- The project generates thermal energy which would otherwise have been generated by fossil fuelled sources. | | |
| **B.2. Baseline Determination**<br>*The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.* | | | | | |
| B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent? | /1/ | DR | Yes, the baseline methodology considers power plants fuelled by fossil fuels to be displaced at the margin of an electricity system by a biomass fuelled cogeneration plant, producing electricity from a renewable source. This applies the criteria that :<br>- Own or third party biomass that would otherwise have been dumped or burned uncontrollable, would only be used.<br>- Currently unutilized and abundant supply of biomass availability<br>- Project implementation would not lead to increase in biomass production in the facility<br>- Biomass stored in the facility shall not exceed more than a year. | | OK |
| B.2.2. Has the baseline been determined using conservative assumptions where possible? | /1/ | DR | Yes, to make the baseline conservative, open air burning of all currently unused biomass is assumed excluding the baseline methane emissions from decaying biomass. | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| B.2.3. Has the baseline been established on a project-specific basis? | /1/ | DR | Yes | | OK |
| B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations? | /1/ | DR | Yes, the baseline scenario takes into account national policies, in terms of policies for electricity generation.<br>Most recent modifications of the Chilean electric legislation (Short Law I, approved in January 20th, 2004 and Short Law II, approved in May 2005) have tried to spur investment in the electric power sector, and are intended to contribute to reverse the low trend of investment in the industry. | | OK |
| B.2.5. Is the baseline determination compatible with the available data? | /1/ | DR | Compatible as per available data and based on IPCC guidelines | | OK |
| B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios? | /1/ | DR | In the absence of the project scenario only one alternative has been identified i.e., continuation of the current scenario and dependence on fossil fuel based energy. | | OK |
| B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario (e.g. through (a) a flow-chart or series of questions that lead to a narrowing of potential baseline options, (b) a qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely, (c) a qualitative or quantitative assessment of one or more barriers facing the proposed project activity or (d) an indication that the project type is not common practice in the proposed area of implementation, and not required by a Party's legislation/regulations)? | /1/ | DR | The project's additionality is demonstrated through a series of steps in line with the *Tool for the demonstration and assessment of additionality*:<br>STEP 0 - Preliminary screening based on the starting date of the project activity: Evidence has been provided that construction of the power plant started in April 2001 (Letter of 4 April 2001 to the Environmental Authority informing about the start of construction of the Trupan Biomass Power Plant. The evidence submitted by Arauco to demonstrate that the incentive from the CDM was seriously considered in | ~~CL 1~~<br>~~CL 2~~ | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| | | | the decision to proceed with the project activity includes reports by Arauco and consultants and copies of e-mail communications. The provided evidence demonstrates that the CDM was considered by Arauco for its forestry activities (development of pilot forestry CDM projects in 1999-2002) at the time the decision to proceed with the Trupan Biomass Power Plant was made. However, there is no clear link between Arauco's engagement in the development of forestry CDM projects and the Trupan Biomass Power Plant project. Also the study of SERCOR of 2003 still seems to focus mostly on the opportunities for CDM projects in the forestry sector (not direct link to Arauco's renewable cogeneration activities). Only in 2003 there is clear link between Arauco's cogeneration activities and the CDM (e-mails sent by Arauco to project developers and consultants). Further evidence is requested linking Arauco's engagement in the development of forestry CDM projects with the Trupan Biomass Power Plant project (CL 1).<br><br>STEP 1 - Identification and justification of plausible alternatives: The proposed project, and the current practice scenario (Also Refer B.2.6).<br><br>STEP 2 - Investment Analysis: A marginal investment analysis of the project has been | | |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| | | | presented which shows that the IRR is 4.2% higher than Arauco's normal discount rate of 12%. As a green field stand alone project, NPV is presented as negative at MMUS$4.3 at 12% discount rate and an IRR of 7.3%. However, as the project is part of expansion of the Trupan industrial complex, the negative NPV of the project as a greenfield project is not accepted as a mean to demonstrate that the project is not financially attractive.<br>STEP 3 - Barrier Analysis: Trupan Biomass Power Plant is projected to be the first of its kind in the wood panel board industry due to its additional energy generation capacity and technology thus facing investment and technological barriers. Moreover, there are barriers due to unfavourable market conditions for cogeneration systems supplying electricity to the SIC grid. For example, when the cogeneration facility is not functional, then the developer has to pay for the maximum power demand from the grid for the entire billing period.<br>STEP 4 - Common Practice Analysis: It is stated that the Trupan Biomass Power Plant is to be the first plant of this type in the wood panel board industry in Chile. It needs to be clarified whether a comparison with the wood panel board industry is sufficient or whether a broader comparison with the pulp industry, sawmill industry and wood products industry as a whole would be more | | |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| | | | appropriate (CL 2). Cogeneration is for example widely applied in the pulp industry.<br>STEP 5: It is claimed that the project is unlikely to go ahead without the additional financial support of the CDM. However, further evidence should be provided to demonstrate that the incentive provided by the CDM was seriously considered in the decision to implement the project (CL 1). | | |
| B.2.8. Have the major risks to the baseline been identified? | /1/ | DR | The only risk to the baseline seems to be the possibility of other renewable energy sources (like Hydroelectricity) taking up a major share of the generation capacity in Chile. | | OK |
| B.2.9. Is all literature and sources clearly referenced? | /1/ | DR | Yes | | OK |
| **C. *Duration of the Project/ Crediting Period***<br>*It is assessed whether the temporary boundaries of the project are clearly defined.* | | | | | |
| C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable? | /1/ | DR | The project starting date is 04/04/2001 (construction) and the expected operational lifetime is 25 years. | | OK |
| C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)? | /1/ | DR | Yes, the project applies for a renewable crediting period of 7 years starting on 01/05/2003. | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| ***D. Monitoring Plan***<br>*The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).* | | | | | |
| **D.1. Monitoring Methodology**<br>*It is assessed whether the project applies an appropriate baseline methodology.* | | | | | |
| D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board? | /1/ | DR | The project applies the approved consolidated monitoring methodology for grid-connected electricity generation from biomass residues ACM0006. | | OK |
| D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified? | /1/ | DR | Yes, the adopted monitoring methodology is applicable. | | OK |
| D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices? | /1/ | DR | Yes, the data is directly monitored wherever possible which should ensure more accurate estimation of GHG emission reductions. | | OK |
| D.1.4. Is the discussion and selection of the monitoring methodology transparent? | /1/ | DR | OK | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| **D.2. Monitoring of Project Emissions**<br>*It is established whether the monitoring plan provides for reliable and complete project emission data over time.* | | | | | |
| D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period? | /1/ | DR | Yes. The data will be archived in electronic form and be kept for two years after the end of the last crediting period. | | OK |
| D.2.2. Are the choices of project GHG indicators reasonable? | /1/ | DR | Yes, The project emissions are estimated in terms of:<br>- Emissions from biomass controlled burning in the Power Plant,<br>- Emissions from biomass transportation to the biomass Power Plant<br>- Emissions from biomass transportation within the power plant site<br>- Emissions from fossil fuel consumption in the Plant's power boiler. | | OK |
| D.2.3. Will it be possible to monitor / measure the specified project GHG indicators? | /1/ | DR | Yes, most of the data will be directly monitored at regular intervals. | | OK |
| D.2.4. Will the indicators give opportunity for real measurements of achieved emission reductions? | /1/<br>/11/<br>/12/ | DR<br>I | As per the conditions given in Section A.3 of the NMB, biomass cannot be stored in the project facility for more than a year. During the site visit it was observed that there is a biomass storage backyard with a capacity of 150 000 $m^3$. The daily biomass consumption is approximately 5000 to 5400 $m^3$. Hence, the available stock corresponds approximately to the quantity for 1 month or 1 1/2 months. | | OK |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| D.2.5. Will the indicators enable comparison of project data and performance over time? | /1/ | DR | Yes | | OK |
| **D.3. Monitoring of Leakage**<br>*It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.* | | | | | |
| D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage? | /1/<br>/3/ | DR<br>I | The probable source identified for leakage is that the project diverts biomass from other users and thereby increases fossil fuel use. Leakage will be accounted-for only if the biomass supply is not abundant around the power plant. To account for this, a "biomass surplus index" indicator will be periodically calculated and monitored and if the indicator shows enough quantity of biomass, then leakage will be considered zero.<br>A model developed by Arauco is used to calculate the "biomass surplus index". Data is taken from Arauco Trading (Arauco's enterprise created 2 years ago). Arauco Trading has a data base including information on sawmill production. From this the quantity of biomass available is estimated. As information is not available from all sawmills, the "biomass surplus index" is conservative.<br>Arauco's data base is continuously up-dated and cross checked with official information. | | OK |
| D.3.2. Have relevant indicators for GHG leakage been included? | /1/ | DR | As above | | OK |

* MoV = Means of Verification, DR= Document Review, I= Interview

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| D.3.3. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage? | /1/ | DR | Yes, In the event biomass is not abundant around the power plant, leakage is calculated | | OK |
| D.3.4. Will it be possible to monitor the specified GHG leakage indicators? | /1/ | DR | Yes. | | OK |
| **D.4. Monitoring of Baseline Emissions**<br>*It is established whether the monitoring plan provides for reliable and complete project emission data over time.* | | | | | |
| D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period? | /1/ | DR | Yes, as determined by emissions from avoided biomass disposal; from energy displaced from the grid and from thermal energy displacement.<br>With regard to the data vintages, the emission factor for the operating margin (OM) and build margin (BM) will be monitored ex-post and updated based on the data for the year in which electricity generation occurs. | | OK |
| D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable? | /1/ | DR | The baseline indicators are according to the baseline methodology. | | OK |
| D.4.3. Will it be possible to monitor the specified baseline indicators? | /1/ | DR | Data on fuel consumption, electricity generation and merit order of the power plants of the SIC grid are obtained from the CDEC-SIC dispatch centre. Power generation of each plant in the SIC grid is available hourly. Data on fuel consumption of each thermal power plant is available each year from an official report, and is presented annually. In case this data is not complete, data from National Energy | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | Commission are taken. | | |
| **D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts**<br>*It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.* | | | | | |
| D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts? | /1/ | DR | Neither the baseline and monitoring methodology applied by the project nor the DNA of Chile requires monitoring of sustainable development indicators. | | OK |
| **D.6. Project Management Planning**<br>*It is checked that project implementation is properly prepared for and that critical arrangements are addressed.* | | | | | |
| D.6.1. Is the authority and responsibility of project management clearly described? | /1/ /11/ /12/ | DR I | Arauco is responsible for project management | | OK |
| D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described? | /1/ | DR | Yes. These have been described in section D.4 of the PDD | | OK |
| D.6.3. Are procedures identified for training of monitoring personnel? | /1/ /11/ /12/ | DR I | Procedures for training of monitoring personnel have not been described, but the site visit confirmed that staff has been appropriately trained. | | OK |
| D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions? | /1/ | DR | No emergency situations that can cause unintended emissions are anticipated. | | OK |
| D.6.5. Are procedures identified for calibration of | /1/ | DR | Flow meters, steam meters, electricity | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| monitoring equipment? | /11/ /12/ | I | meters etc. are subjected to periodic calibration as per industry standards. | | |
| D.6.6. Are procedures identified for maintenance of monitoring equipment and installations? | /1/ | DR | Yes, as applicable for flow meters, electricity meters and steam meters. | | OK |
| D.6.7. Are procedures identified for monitoring, measurements and reporting? | /1/ | DR | Yes. These have been described in section D.4 of the PDD | | OK |
| D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation) | /1/ /11/ /12/ | DR I | Yes. Indicated in the monitoring plan.<br>Data on consumed oil and biomass, generated electricity and SIC purchased energy have been monitored since project start. However, initially without monitoring procedures, reporting and calibration. Some other information, such as fuel consumption of trucks has not been monitored in the past, but will be monitored from now on.<br>However, it must be noted there is a very detailed level of monitoring at Arauco. All (or most) of the equipments are linked to the DCS (Distributed Control System), and therefore, all the information is recorded in the DCS databases.<br>Truck fossil fuel consumption have not been directly monitored in the past. Nonetheless, it should be possible to estimate this based on recorded biomass consumption. | | OK |
| D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties? | /1/ /11/ /12/ | DR I | Uncertainties are expected to be minimal, considering the nature of the project. Such procedures are not imperative to the project. | | OK |
| D.6.10. Are procedures identified for review of reported results/data? | /1/ /11/ | DR I | Yes. These have been described in section D.4 of the PDD | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | /12/ | | | | |
| D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable? | /1/ /11/ /12/ | DR I | No procedures for internal audits are described in the PDD. However, the interview confirmed that there is a manual with procedures for internal audits, performance reviews and corrective actions. | | (OK) |
| D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally? | /1/ /11/ /12/ | DR I | No procedures for project performance reviews are described in the PDD. However, the interview confirmed that there is a manual with procedures for internal audits, performance reviews and corrective actions. | | (OK) |
| D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting? | /1/ /11/ /12/ | DR I | No procedures for corrective actions are described in the PDD. However, the interview confirmed that there is a manual with procedures for internal audits, performance reviews and corrective actions. | | (OK) |
| ***E. Calculation of GHG Emissions by Source*** *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.* | | | | | |
| **E.1. Predicted Project GHG Emissions** *The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.* | | | | | |
| E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design? | /1/ | DR | Direct on-site emissions are restricted to – $CH_4$ emissions from controlled combustion of biomass; $CO_2$ emissions from the | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | combustion of supplementary fossil fuels; $CO_2$ emissions from on-site transportation. Off site emissions are those due to off-site transportation | | |
| E.1.2. Are the GHG calculations documented in a complete and transparent manner? | /1/ | DR | Yes. | | OK |
| E.1.3. Have conservative assumptions been used to calculate project GHG emissions? | /1/ | DR | IPCC guidelines and default factors have been used, wherever applicable | | OK |
| E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation? | /1/ | DR | Yes | | OK |
| E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated? | /1/ | DR | $CH_4$ and $CO_2$ have been considered. | | OK |
| **E.2. Leakage**<br>*It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.* | | | | | |
| E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified? | /1/<br>/3/ | DR<br>I | It has been determined that the biomass supply/demand situation in the Trupan area is surplus at 1.73 and hence, no leakage has been considered.<br>The calculation of the biomass surplus index is transparently documents in Excel spreadsheets and the data sources were verified during the site visit. | | OK |
| E.2.2. Have these leakage effects been properly accounted for in calculations? | /1/ | DR | According to ACM0006, if the project proponent is not able to demonstrate the | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | abundance of biomass through approaches L1, L2 or L3, then leakage must be calculated. According to the L2 approach, the quantity of available biomass in the region must be at least 25% larger than the quantity of biomass that is utilized (e.g. for energy generation or as feedstock), including the project plant. | | |
| E.2.3. Does the methodology for calculating leakage comply with existing good practice? | /1/ | DR | Yes. | | OK |
| E.2.4. Are the calculations documented in a complete and transparent manner? | /1/ | DR | Yes. | | OK |
| E.2.5. Have conservative assumptions been used when calculating leakage? | /1/ | DR | Yes, as applicable | | OK |
| E.2.6. Are uncertainties in the leakage estimates properly addressed? | /1/ | DR | Yes. | | OK |
| **E.3. Baseline Emissions**<br>*The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.* | | | | | |
| E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions? | /1//2/ | DR | Baseline emissions are from 1) avoided open air burning of biomass, 2) displacement of grid electricity and 3) displacement of thermal energy.<br>Baseline emissions for avoided open air burning of biomass are transparently calculated using appropriate emission coefficients.<br>For the displacement of grid electricity, the electricity baseline emission coefficient of the SIC Chilean grid, based on the OM and | ~~CL 3~~ | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | BM emission coefficient is estimated. Data from SIC grid for the years 2002-2004 has been used to calculate the OM and BM.<br>Displacement of thermal energy is claimed by the project due to the quantity of thermal energy (steam) generated by the cogeneration plant. However, thermal energy would also have been generated in the baseline scenario. Hence, a justification that additional thermal energy is produced by the project compared to the baseline scenario is requested (the baseline scenario is the expansion of production and increased steam production, but not cogeneration of electricity). | | |
| E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions? | /1/ | DR | Imports from neighbouring grids are not discussed as required by the baseline methodology. | ~~CL 4~~ | OK |
| E.3.3. Are the GHG calculations documented in a complete and transparent manner? | /1/<br>/2/<br>/11/ | DR<br><br>I | The calculations and the assumptions made are transparently documented. The OM and BM emission coefficient are correctly determined in accordance with the baseline methodology.<br>The simple adjusted OM method has been adopted for calculating the operating margin and 20% of the system generation (in MWh) for build margin. Although much data on the SIC grid is available, the project participants sufficiently justify that a dispatch data analysis (the preferred option for calculating the OM) entails unreasonable costs and efforts. | ~~CAR 1~~<br>~~CAR 2~~ | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | An average OM is calculated based on data from 2002-2004 in accordance with option 1 for the data vintage given in the methodology, i.e. "A 3-year average, based on the most recent statistics available at the time of PDD submission". However, according to the monitoring plan, the OM will be recalculated annually, i.e. data of "the year in which project generation occurs". Hence, the combined margin emission coefficient should be calculated based on the OM emission factor of the year in question (and not using a 3-year average).<br>Some power plants are identified as CDM projects and not included in the calculation of the BM. However, these projects are not yet registered as CDM projects and the methodology only allows to exclude registered CDM projects. Proposed CDM projects shall be included in the BM until they are registered.<br>Lambda (λ) is correctly calculated based on on-line information from SIC. | | |
| E.3.4. Have conservative assumptions been used when calculating baseline emissions? | /1/ | DR | It is assumed that the biomass would have resorted to open air burning, if not used in the project. | | OK |
| E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation? | /1/ | DR | Yes. | | OK |
| E.3.6. Have the project baseline(s) and the project emissions been determined using the same | /1/ | DR | Yes. | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
|---|---|---|---|---|---|
| appropriate methodology and conservative assumptions? | | | | | |
| **E.4. Emission Reductions**<br>Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations. | | | | | |
| E.4.1. Will the project result in fewer GHG emissions than the baseline scenario? | /1/ | DR | Yes, the project is expected to on the average reduce 101 846 tonnes of $CO_2$ per year over a 21 years crediting period. | | OK |
| ***F. Environmental Impacts***<br>*Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.* | | | | | |
| F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described? | /1/ | DR | The impacts from the project, assessed through an Environment Impact Declaration, are:<br>- Solid and liquid wastes which would be treated in a sewage treatment plant. Solid residues such as ash, plastics and industrial wastes would be sent to a landfill site. These practices fall in line with the Chilean regulations.<br>- Atmospheric emissions such as noise and particulate matter, which are to be treated as per Chilean regulations | | OK |
| F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? | /1/ | DR | As per the Chilean EIA procedures, an Environmental Impact Declaration (EID) was presented to the regional | | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| | | | environmental authorities stating that the project activity fully meets environmental legislation in force, based on which an approval was obtained from COREMA VII Region. | | |
| F.1.3. Will the project create any adverse environmental effects? | /1/ | DR | Not likely, all the major environmental impacts identified in the EID will be taken care of through proper waste treatment and disposal methods as per the Chilean regulations. | | OK |
| F.1.4. Are transboundary environmental impacts considered in the analysis? | /1/ | DR | Transboundary environmental impacts are not likely to occur | | OK |
| F.1.5. Have identified environmental impacts been addressed in the project design? | /1/ | DR | Yes | | OK |
| F.1.6. Does the project comply with environmental legislation in the host country? | /1/ | DR | Yes. | | OK |
| ***G. Stakeholder Comments***<br>*The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.* | | | | | |
| G.1.1. Have relevant stakeholders been consulted? | /1/ | DR | The general public was informed about the project through publication in the Official gazette, as part of the approval of EID by the Environmental Commission. No other modes of communication were employed. | | OK |
| G.1.2. Have appropriate media been used to invite comments by local stakeholders? | /1/ | DR | As above | | OK |
| G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation | /1/ | DR | With the submission of the EID, the project has been approved by COREMA.<br>The required consultation process is the | ~~CL 5~~ | OK |

| Checklist Question | Ref. | MoV* | Comments | Draft Concl | Final Concl |
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| process been carried out in accordance with such regulations/laws? | | | publication in the Official Gazette. This process was carried out according to the law.<br>However, the approval by COREMA is conditional to carrying out an environmental audit within the first 3 years of the project, focused to the verification of the project's fulfilment of relevant requirements (Requirement included in the environmental approval of the project, Res. 087/2001, point 2.4). However, there is no evidences of an Environmental Audits Program of evidence for carrying out of environmental audits | | |
| G.1.4. Is a summary of the stakeholder comments received provided? | /1/ | DR | No comments were received from the general public. Some technical comments were received from environmental authorities that have been resolved. | | OK |
| G.1.5. Has due account been taken of any stakeholder comments received? | /1/ | DR | The technical comments received have been resolved. | | OK |

## Table 3 Resolution of Corrective Action and Clarification Requests

***Corrective Action and Clarification Requests after the assessment of the draft PDD of October 2004 applying NM0081***

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
|---|---|---|---|
| CAR 1<br>An average OM is calculated based on data from 2002-2004. However, according to the monitoring plan, the OM will be recalculated annually, i.e. data of "the year in which project generation occurs". Hence, the combined margin emission coefficient should be calculated based on the OM emission factor of the year in question (and not using a 3-year average). | E.3.3 | Revised PDD of 24 October 2005 is submitted. | OK.<br>The final PDD clarified that the OM and BM emission coefficients will be updated annually based on data for the year in which generation occurs. 2002-2005 data is used to determine combined margin emission coefficients for the years 2002-2005. For future years, the OM and BM emission factors were calculated based on forecasted power generation in the SIC grid (based on the latest expansion plan and average hydropower generation. |
| CAR 2<br>Some power plants are identified as CDM projects and not included in the calculation of the BM. However, these projects are not yet registered CDM projects and the methodology only allows to exclude registered CDM projects. Proposed CDM projects shall be included in the BM until they are registered. | E.3.3 | Revised PDD of 24 October 2005 is submitted. | OK.<br>Proposed CDM projects are included in the BM calculations. |
| CL 1<br>Further evidence is requested linking Arauco's engagement in the development of forestry CDM projects with the Trupan | B.2.7 | It is true that the evidence presented mostly refers to the CDM in forestry projects, however given the flat and highly integrated organizational structure of Arauco, all or most of the strategic decisions and | DNV still questions whether there is sufficient "evidence that the incentive from the CDM was seriously considered in the |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
|---|---|---|---|
| Biomass Power Plant project. | | policies adopted by the upper management also compromise and affect all of Arauco related companies. Arauco is mainly a highly integrated forestry company, which participates in the pulp business, sawmill business, wood panel board business, wood products business, and a little bit in the energy business through its cogeneration initiatives. Arauco cogeneration plants are intimately related and totally dependent of the rest of Arauco forest operations (in fact, the biomass power plants are located inside of Arauco pulp mills and panel board facilities). If there is no forestry operation, there is not wood chips for pulp, no wood for panel board manufacturing and no biomass for Arauco cogeneration power plants (excluding biomass from external sources, of course). For this reason (and this is explicitly said in all of Arauco's Annual Reports extracts sent to DNV), the decisions and policies adopted by Arauco in the forestry line of business also affect in the rest of the businesses of Arauco (i.e. Paneles Arauco, Trupan project). In fact, many of Arauco high executives are board members or CEOs of Arauco subsidiaries. Considering the above, I believe that there is a link between Arauco policy of considering the CDM in forestry projects with Arauco's biomass cogeneration initiatives.<br>Regarding the Trupan Power Plant project, we do not explicitly mention the CDM in the Trupan DIA, but we do explicitly mention that the Trupan project "(…) contributes to minimize the environmental impact of its gaseous emissions to the atmosphere. (…)". In other words, Arauco (through the Trupan | decision to proceed with the project activity", i.e. the Trupan Biomass Power Plant project. It can for example be questioned why Arauco decided not to explicitly mention the CDM for the Trupan Biomass Power Plant project while the company was publicly involved in a forestry CDM project. |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| | | administration) took into consideration the impact that the Trupan project gaseous emissions might have in the atmosphere. That includes $CO_2$ emissions. Yes, you may argue that is too general…. but then you must also consider what was happening with the reforestation program Arauco was implementing during 2001 and 2002 and the CDM. Please take into consideration that Arauco administration is very conservative and prudent, that is why it decided not to explicitly mention the CDM until the system was more officially available and reliable. | |
| CL 1 (continued)<br>Further evidence is requested linking Arauco's engagement in the development of forestry CDM projects with the Trupan Biomass Power Plant project. | B.2.7 | Another study provides new elements to establish the incentives that were considered to build the Trupan cogeneration project. The study was done by Sigma S.A. and handed out for discussion in the first half of 1998. Sigma is one of the Arauco Group "think tanks" and the company that performed the study in 2003 about the Kyoto Protocol and the possibilities offered by the CDM in the forestry area.<br>The name of the study is "Estudio de Factibilidad de Cogenerar en Chile" which can be translated as "Feasibility study of Cogeneration in Chile". The study is written in Spanish, however I translated in English the first introductory paragraph, which I regard as the most relevant in terms of what we intend to prove:<br>"Cogeneration in Chile. The cogeneration is a world-wide known technology, but in Chile has not become very popular yet. This technology consists in generating electric and thermal energy from the same fuel, obtaining efficiencies of around 85%. | OK.<br>The "Feasibility study of Cogeneration in Chile" developed by Sigma S.A. in 1998, which identified cogeneration as a means for reducing $CO_2$ emissions, can be considered as evidence that one of the objectives of the implementation of the project was to mitigate climate change. This evidence, in combination with the evidence provided for the Arauco Group's engagement in the CDM related to forestry projects prior to the implementation of the Trupan Biomass Power Plant is accepted as evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| | | This makes it very attractive for those who consume great amounts of steam and electricity. In addition, it presents social benefits related to lower emissions of contaminants ($CO_2$, $SO_2$, $NO_x$), and postpones investments in more inefficient power plants.(...)"<br>As it can be seen, the study explicitly mentions the $CO_2$ as a polluting gas in circumstances that the Chilean legislation does not consider or regulate the $CO_2$ as a polluting agent. In another part of the study this is again mentioned and even quantified. It also mentions the social benefits related to the cogeneration initiative and the concept of "postponing the investment in more inefficient plants". This is clearly in line with the CDM, particularly if you consider that the phrase in ("") is one of the principles used calculate the grid emission factor (Build Margin) in most of the approved CDM grid-connected project methodologies. The rest of the study is also a useful evidence to prove the additionality of the Trupan project, since from the study it is possible to conclude that cogeneration is not a common practice of power generation in Chile.<br>Finally, the study also reinforces how a big conglomerate such as Arauco functions. Ideas and initiatives that are generated in the Arauco subsidiaries flow and converge to the Arauco CEO and Corporate Management; they are considered, evaluated and eventually incorporated as part of the corporate policy. The corporate policy is then deployed in such a way that synergies among subsidiaries are maximized, and the whole | |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| | | operation of the Conglomerate is sound, efficient and consistent. So must have happened with Arauco's cogeneration initiatives. | |
| CL 2<br>It needs to be clarified whether a comparison (common practise analysis) with the wood panel board industry is sufficient or whether a broader comparison with the pulp industry, sawmill industry and wood products industry as a whole would be more appropriate. Cogeneration is for example widely applied in the pulp industry. | B.2.7 | The comparison with the MDF panel board industry is considered appropriate because of the following reasons:<br>• MDF panel board mills are structured and configured along straight and continuous production lines, which differs from the configuration and operation of a pulp mill. For example, if in an MDF panel board mill, the cogeneration unit (turbo generator) goes off line, a considerable amount of high-pressure steam is deviated from the turbo generator to the process. This steam can cause serious imbalances in the MDF production process and can compromise the life span of the equipment, which is normally not designed to deal with the high level of superheating of the steam required to generate electric power in the facility. This is clearly not the case with modern pulp mills, which have a more flexible process configuration, are designed to deal with higher levels of superheated steam and therefore can absorb high-pressure steam fluctuations in a better way. In other words, adding a cogeneration unit in a MDF plant implies different operational considerations than adding it in a pulp mill and therefore, these two industries should not be considered comparable when assessing the common practice analysis of cogeneration in the relevant industry. The only other example in the world of a biomass | OK<br>The provided complimentary information that the operational characteristics of the wood panel board industry differ and that a broader comparison with the common practise in the pulp industry, sawmill industry and wood products industry is not appropriate. |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| | | cogeneration facility integrated with an MDF plant existed in Germany. Unfortunately, the biomass cogeneration facility was sold to the city municipality due to an accident (explosion) related to the operational problems presented above. The same type of arguments can be presented for sawmills and plywood mills.<br>Even if the pulp mill industry were considered comparable with the MDF industry in the common practice analysis of the Trupan project activity, there would still be arguments that would indicate that the Trupan cogeneration power plant does not constitute the common practice in the industry:<br>• It is true that cogeneration is widely used in the pulp mill industry and therefore part of the business as usual practice. However, modern pulp mills do not install big cogeneration units fuelled with forest biomass to become a net electric power exporter to the grid. In fact, there are some examples of both older and newer (under construction) pulp mills in Chile that still have to import electric power from the grid. Moreover, modern pulp mills tend to be self-sufficient in terms of energy generation mostly by burning black liquor in their recovery boilers rather than biomass from forestry operations in a power boiler. Black liquor is an intermediate product of the chemical pulping process (Kraft process) that MUST be burned in order to recover the inorganic compounds used to separate (dissolve) the lignin from the cellulose fibres in the wood (NaOH and Na2SO4). | |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| CL 3<br>Displacement of thermal energy is claimed by the project due to the quantity of thermal energy (steam) generated by the cogeneration plant. However, thermal energy would also have been generated in the baseline scenario. Hence, a justification that additional thermal energy is produced by the project compared to the baseline scenario is requested (the baseline scenario is the expansion of production and increased steam production, but not cogeneration of electricity). | E.3.1 | Revised PDD of 24 October 2005 is submitted. | OK.<br>In the PDD of 24 October 2005, the heat generation scenario H4 is selected, i.e. that the generation of heat would be in boilers using the same type of biomass residues. |
| CL 4<br>Imports from neighbouring grids are not discussed as required by the baseline methodology. | E.3.2 | Even though there have been some attempts of interconnection between the SIC and the SING grid systems, the interconnection is highly uneconomic, therefore highly unlikely. Therefore, there are currently no electricity imports and / or exports to the SIC system. | OK. Since there currently are not electricity imports to the SIC system, no imports have to be considered. |
| CL 5<br>The approval by COREMA is conditional to carrying out an environmental audit within the first 3 years of the project, focused to the verification of the project's fulfilment of relevant requirements (Requirement included in the environmental approval of the project, Res. 087/2001, point 2.4). However, there is no evidences of an Environmental Audits Program of evidence for carrying out of environmental audits. | G.1.3 | The Trupan management has acknowledged this issue and will proceed with the implementation of the corresponding environmental audit program. In addition, the Trupan Industrial Complex is currently undergoing an ISO 14.001 certification process, which will guarantee the compliance with all outstanding environmental (and any other) pending compromises with the authorities.<br>An environmental diagnostic audit (preparing for ISO 14.001 certification for Trupan) was carried out by MAC Consultores in March 2005. This diagnostic included the pending audit for the DIA | OK<br>The complimentary information provided demonstrates that the project is in compliance with environmental requirements. |

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| | | compliance, which was scheduled for July / August 2005. Unfortunately, the ISO certification process suffered a delay and the pending audit has now been rescheduled for the second week of January 2006. It must be noted –however- that in this case the environmental audit is just a formality, since the Trupan environmental department has regularly and rigorously monitored and reported the actual emission parameters of the Trupan mill to the local environmental authority. Given that all parameters have complied with the norm, the local environmental authority has expressed satisfaction in the way the Trupan administration has proceeded in this regard, and has not requested the external audit and / or questioned by any means the validity of the DIA. Despite the above, the external audit confirming the above will be carried out in the new date. | |

***Corrective Action and Clarification Requests identified in the assessment of the PDD of 24 October 2005 applying ACM0006***

| Draft report corrective action requests and requests for clarifications | Ref. to Table 2 | Summary of project participants' response | Final conclusion |
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| CAR 3<br>Scenario 3 of ACM0006 requires that the biomass scenarios B1 and B2 are combined. Indeed, only part of the biomass would be left to decay or burned in an uncontrolled manner in the baseline scenario (B1). Some biomass would be used for heat generation at the project site (B2). Section D.2.1.4.1 of the PDD states that "Consistent with D.2.1.2, only the additional biomass related to the project activity will be considered for estimating baseline emissions due to avoided biomass disposal and therefore, susceptible for being credited with CERs." In, addition, Annex 3 describes an approach for calculating additional biomass. However, the PDD needs to be revised to explicitly describe how additional biomass will be monitored and determined (Section D.2.1.1 and D.2.1.4.1) and whether only CH4 emission from the combustion of additional biomass will considered (Section D.2.1.2.1). | - | In the proposed project activity only the "additional biomass" will be considered related to the project activity. That is, the additional biomass that results from comparing the real (with project) situation with a baseline situation in which a conventional power plant with no electric power generation would have been installed in the Trupan site.<br>For simplicity reasons, the PDD states that ALL the biomass consumed in the power boiler will be monitored. Then, following the calculation steps described in Annex 3 of the PDD, the additional biomass will be calculated. This calculation is based in energy / mass balances of the real power plant and a power plant without electric power generation. It must be realized that given that the Trupan project activity is part of an expansion project of the Trupan mill, it is not possible to take past biomass consumption figures of Trupan in order to estimate a baseline biomass fuel consumption. The same thing happens with the additional fossil fuel consumption. The proposed method is based on theoretical parameters and calculations of a baseline plant configuration that would have used the same type of equipment used in the real (with project) power plant. This approach allows to calculate:<br>1. The additional biomass related to the project activity. Thus, by monitoring the total biomass consumption in the Trupan biomass power plant, the additional | OK<br>Annex 3, which describes the approach for calculating "additional biomass", was further elaborated.<br>In the absence of any guidance in ACM0006 for calculating the "additional" biomass necessary for generating electricity in addition to heat, the approach proposed by Arauco is deemed adequate for determining the share of biomass that is needed additionally in the project scenario compared to the amount of biomass that would have been consumed in the baseline scenario.<br>Based on an energy / mass balance carried out by a consultant for the design of the power plant in the project scenario and the design of the power plant in the baseline scenario (i.e. the technical specifications of a biomass power plant that would meet the heat demand of the expansion of the Trupan industrial complex, but which would not have generated electricity), an electric power generation factor has been calculated. The results of the |

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| | | biomass can be calculated and therefore monitored.<br>2. The fossil fuel consumption related to the project activity for both; the fossil fuel for external biomass transportation to the power plant and the internal fossil fuel consumption. The underlying rationale behind this calculation simply assumes a relation of direct proportionality between the amount of biomass burned in the power boiler and the fossil fuel consumption, either for biomass transportation and for start-up operations.<br>The calculations in 1 and 2 allow to calculate part of the baseline and project emissions. In particular, the additional biomass calculation allows to calculate / estimate the CH4 emission in both the baseline scenario (biomass decomposition) and the project scenario (minor CH4 emissions in the Trupan power boiler). According to this method, ONLY the additional biomass is considered for baseline and project emissions. The same happens with the emissions related to fossil fuels.<br>A detailed explanation of the monitoring of the total biomass and the calculation of the additional biomass and fossil fuel was added in sections: D.2.1.1 and D.2.1.2.4. An explicit link to Annex 3 was also provided, in which a step-by-step calculation of the additional biomass was added. | energy / mass balances, which was the basis for determining the electric power generation factor, was reviewed by DNV. The electric power generation factor remains fixed over the crediting period of the project. The gross (monitored) electric power generation per month (MWh/month) of the Trupan power plant will be divided by this factor, resulting in an estimation of the "additional" biomass that was consumed by the power plant to generate electricity.<br>The PDD was revised to explicitly describe how additional biomass will be monitored and determined (Section D.2.1.1 and D.2.1.4.1) and that only $CH_4$ emission from the combustion of additional biomass will be considered (Section D.2.1.2.1). |
| CL 6<br>Since the project will apply the simple adjusted OM method, it needs to be | - | The observation is indeed pertinent, since the project proponent does not intend to use the dispatch method to calculate the OM. This | OK<br>The PDD was revised accordingly.<br>However, it needs to be clarified if |

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| clarified why the merit order in which power plants are dispatched will be monitored.<br>Sine the project will not displace heat generation based on fossil fuels (the project applies H4), it needs to be clarified why net quantity of thermal energy generated by the cogeneration plant and the net calorific value of the fossil fuel in a boiler in the absence of the project activity will be monitored. | | information will not be monitored and thus, can be deleted from the monitoring plan of the PDD.<br>The same argument used above applies for the monitoring of the net quantity of thermal energy generated by the cogeneration plant and the net calorific values of the fossil fuels that would have been used in the absence of the project activity. Steam generation in the Trupan power plant is considered part of the baseline and therefore not subject to be credited with CERs. This information can be deleted from the monitoring plan in the PDD as well. | the net quantity of steam needs to be monitored in order to calculate electric power generation factor and thus the additional biomass. |
| CL 6 (continued)<br>It needs to be clarified if the net quantity of steam needs to be monitored in order to calculate the electric power generation factor used to determine the additional biomass. | - | To calculate the electric power generation factor it is possible to monitor the total amount of steam (enthalpy, in reality) or the total amount of biomass. Both variables are directly related. However, the monitoring of steam has the disadvantage that some of the steam is used for both the process and to generate electric power (i.e. turbine extractions), while the rest goes straight through the turbine for electric power generation alone. This adds complexity to the monitoring of this variable and consequently to the calculation of the project and baseline biomass quantities. Using total biomass amounts in each scenario is much simpler, accurate and straightforward. More so, if the biomass consumption will have to be monitored anyway for baseline and project emissions. | OK<br>The complimentary information provided clarifies that the net quantity of steam does not need to be monitored to calculate the electric power generation factor used to determine the additional biomass. The revised PDD confirmed that the calculated electric power generation factor remains fixed over the crediting period of the project and is not updated ex-post. |
| CL 7<br>The calculation of "additional" biomass and additional fossil fuel consumption is described in the Annex 3 of the PDD. The | - | The PDD presents a detailed energy / mass balance of the project scenario and the baseline scenario. From these calculations, the project proponent obtained the total biomass that would be consumed in a power plant that does not generate | OK<br>In the absence of any guidance by ACM0006 for calculating "additional biomass" for situations |

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| 1st equation to calculate the electric power factor needs further clarifications, in particular with regard to how the biomass consumption without the CDM project is determined. In addition, section E.1.1.1 and E.4.1 should describe how the additional biomass has been calculated, including the results of the application of the three calculation steps described in Annex 3. | | electric power but the necessary steam required by the Trupan plant.<br>A detailed calculation of the additional biomass for the Trupan project activity is provided to illustrate how the equations are applied in this case.<br>A more detailed explanation about the baseline steam generation and steam consumption was provided in pages 7 and 10 of the PDD. The baseline biomass (and fossil fuel) consumption result from a standard and modern MDF panel board mill design. These figures were calculated and provided by the consultant who designed the MDF plant expansion in Trupan. The calculations are based on energy / mass conservation principles and modern equipment parameters (i.e. efficiencies) which are used to simulate the behaviour of these types of plants. | where biomass scenarios B1 and B2 are combined, the approach proposed by Arauco is deemed adequate for determining the share of additional biomass that is needed in the project compared to the amount of biomass that would have been consumed in the baseline scenario (see also final conclusion on CAR 3). |
| CL 8<br>$CH_4$ emission factor for determining baseline $CH_4$ emissions due to natural decay or uncontrolled burning of biomass:<br>It is correct that $CH_4$ emissions from decay of biomass are larger than $CH_4$ emissions from uncontrolled burning of $CH_4$. It also confirms the B1 scenario for biomass in ACM0006, which assumes that all biomass would be burned in an uncontrolled manner, is conservative. Nonetheless, despite the above, ACM006 requires to discount the IPCC emission factor for $CH_4$ emissions from uncontrolled burning to 219 kg/TJ. | - | The project proponent acknowledges that according to the ACM0006, the conservativeness factor that must be used for uncontrolled burning of biomass in agriculture and / or forestry is 0.73 if the measurement uncertainty is deemed greater than 100%.<br>Nevertheless, given the way in which the biomass is burned in Chile, even without performing any measurement and / or assuming a high level of uncertainty, the most likely $CH_4$ coefficient for biomass burning will probably be higher than 300kg/TJ. This happens because in Chile, the open-air combustion of biomass normally happens spontaneously, when the biomass is stored in piles. The combustion, therefore, is highly inefficient as it | DNV acknowledges that the actual CH4 emission factor for uncontrolled, spontaneous combustion of biomass may be higher than the IPCC default emission factor of 300 kg/TJ. However, in the absence of any measurements of actual $CH_4$ emissions, an emission factor of 219 kg/TJ which is discounted for uncertainties needs to be applied as stipulated by ACM0006. |

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| | | takes place in low presence of oxygen, which translates into the generation of high levels of $CH_4$ and probably $N_2O$. For this reason, the project proponent believes that it would be inadequate to use the lowest $CH_4$ emission factor for the CH4 baseline emission calculation in this case, since there are good arguments to consider the proposed $CH_4$ emission factor as a valid and still conservative factor for the $CH_4$ baseline emissions for the Trupan project activity. The photos provided for biomass availability confirm the way in which the biomass is stored (and combusted) if not used as fuel in power boilers. | |
| CL 8 (continued)<br>ACM006 requires to discount the IPCC emission factor for $CH_4$ emissions from uncontrolled burning of biomass to 219 kg/TJ. | - | The most conservative figure will be used instead. However, the project participant will probably attempt a $CH_4$ emission coefficient measurement in the future, in order to have a more fair (and accurate) CH4 emission coefficient for the baseline scenario. | OK<br>The PDD was revised and the IPCC emission factor for $CH_4$ emissions from uncontrolled burning was discounted to 219 kg/TJ. |
| CL 9<br>It seems that the selection of the most recent 20% (based on generation in GWh) is based on other generation data in GWh than the generation data used to calculate the emission factor. While the most recent 20% are selected based on generation data for each plant in each year, the emission factor is determined based on multiplying the output capacity with a load factor, which seems to be an average load factor. This does not result in the same generation for a specific year. | - | The BM calculation was corrected as requested. | OK<br>The BM emission coefficient is calculated in accordance with ACM0002. |

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| According to ACM0002 (as required by ACM0006), the OM and BM emission factor shall be calculated based on yearly generation data per power plant (actual generation per year) and plant specific emission coefficients (based on either actual fuel consumption of the plant or based on plant efficiencies and IPCC emission factors) | | | |

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