CLEAN DEVELOPMENT MECHANISM
PROPOSED NEW METHODOLOGY: BASELINE (CDM-NMB)
Version 01 - in effect as of: 1 July 2004

CONTENTS

SECTION A. Identification of methodology

A.1. Proposed methodology title:

Title of the methodology - "Baseline methodology for modal shifting in industry for product/feedstocks"
Version - 00
Date of completion of the document – 20/06/2005

A.2. List of category(ies) of project activity to which the methodology may apply:

The category of project activity applicable to Aracruz's project is:

'Emission reduction in the transport sector'

A.3. Conditions under which the methodology is applicable to CDM project activities:

The methodology was developed based on the circumstances of the Aracruz Plant of Barra do Riacho and its eucalyptus plantations in the south of Bahian State.

The methodology is applicable to general project activities in industry with the following basic conditions:

- CO_2 emission reductions generated from the use of a more efficient transportation mode to bring an industrial product or feedstock to the plant.

A.4. What are the potential strengths and weaknesses of this proposed new methodology?

Strengths

The baseline methodology:

- provides a transparent, easily calculated estimate of the baseline emission rate based on readily available data;
- does not require availability of difficult to acquire data, projections, or the running of non-transparent engineering process models;
- corrects for any fluctuations in the business cycle that would change year-to-year emissions but should not be attributed to the project activity.

These strengths are aptly demonstrated by the data components needed to determine the emission reductions. These data components are readily available from the combustion of fuels well-understood and documented by global industries. The calculation of the emission reductions is based on the fuel combustion of a more efficient transportation mode to bring a product critical to the industrial operation to the plant, while emissions avoided (baseline emissions) can be determined from the fuel consumption of the current mode of transportation (trucks) before the beginning of the project.

Weaknesses

We do not believe there are any significant weaknesses in the baseline methodology. There are always underlying uncertainties in the activity data required to estimate emissions for any methodology, but as noted earlier, these measurement uncertainties are believed to be low given the robust data collection

procedures and system in use at the proponent's industrial plant. Similar robust systems should be in use in other industries and at other companies.

SECTION B. Overall summary description:

Typically, an industry often uses on-road transportation to bring its product/feedstock to the plant. The project activity consists in using a more efficient transportation mode – in this case ocean-going barges – to transport the product/feedstock to the plant.

Then, emissions in the baseline derive from: emissions from the fuel used to transport the product/feedstock to the plant. In this case, the fuel used is diesel oil burned in the existing transportation mode (i.e., trucks) and the feedstock that is transported from the plantations to the plant is wood.

This value is the estimation of the total CO_2 emissions from the baseline operations. This emissions value is then divided by the quantity of product/feedstock transported during the year to create a metric defining the quantity of CO_2 emissions produced per ton of product/feedstock transported. This calculation provides an acceptable metric to factor out year-to-year fluctuations in the business cycle (i.e., quantity of CO_2 emitted per ton of product/feedstock transported in the baseline).

Emissions from the project need to capture all modes for transport of the product/feedstock. In the case of the proposed project, these emissions derive specifically from three sources:

1. Consumption of fossil fuel to transport product/feedstock to the plant (i.e., wood transportation by trucks from plantations to port 1 and from port 2 to the plant)

2. Consumption of fossil fuel to load and unload product/feedstock from alternative transportation mode (i.e., load and unload wood from barges).

3. Consumption of fossil fuels to transport product/feedstock to the plant (i.e., wood transportation by barges from port 1 to port 2)

This value is the estimation of the total CO_2 emissions from the project operations. This emissions value is then divided by the quantity of product/feedstock transported during the year to create a metric defining the quantity of CO_2 emissions produced per ton of product/feedstock transported. This calculation provides an acceptable metric to factor out year-to-year fluctuations in the business cycle.

Actual emission reductions from the project take this project value of CO_2 emissions/ton of product/feedstock transported, subtract it from the baseline value of CO_2 emissions/ton of product/feedstock transported, which provides a net reduction in CO_2 emissions per ton of product/feedstock transported. This net reduction value is then multiplied by the amount of product/feedstock transported in the project year to determine the total reduction in CO_2 emissions that has occurred from the project.

Please see section D6 for full details.

SECTION C. Choice of and justification as to why one of the baseline approaches listed in paragraph 48 of CDM modalities and procedures is considered to be the most appropriate:

C.1. General baseline approach:

■ **Existing actual or historical emissions, as applicable;**

☐ Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;

☐ The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

C.2. Justification of why the approach chosen in C.1 above is considered the most appropriate:

Out of the three approaches suggested, the choice of the first one (48 (a) of the Marrakesh accords) is based on the view that the baseline determination depends on the verifiable data of the historical or existing emissions in the absence of the project activity. Approach 48 (b) is not relevant, since the alternative is between continuing with the previous transport situation (of the same raw materials) and implementing the project activity (substitution of the mode of transportation for the raw materials). There is no new technology that represents an economically attractive course of action, taking into account barriers to investment, except for the existing and current one, which would be the less expensive option as noted. This baseline activity reflects the existing actual and historical emissions. Therefore 48 (a) is more appropriate. As far as 48 (c) is concerned, it is not an appropriate approach, since there is no example of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances.

Therefore, the suggested approach 48 (a) is the most suitable for the suggested methodology.

SECTION D. Explanation and justification of the proposed new baseline methodology:

D.1. Explanation of how the methodology determines the baseline scenario (that is, indicate the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity):

In the absence of the CDM project activity, the product/feedstock would be transported by the company using the existing transport mode. In this case, the wood is transported on roads using trucks. Indeed, this is the easiest and least expensive way of transporting eucalyptus wood.

In the proposed project activity, the selection of the baseline is relatively straightforward. The prevailing pulp and paper industry practice still relies heavily on road transportation as the main mode for product/feedstock transportation. The primary difference between the considered transportation mode of the project and the typical transportation mode in the baseline is the greater efficiency of the project transportation mode. In the case of this project, each barge can transport up to 5,000 tons of wood, which is the equivalent to the hauling capacity of 100 trucks, thus causing a reduction in the release of CO_2 that typically occurs.

D.2. Criteria used in developing the proposed baseline methodology:

The methodology relies on a basic change of transportation mode and consequent decrease in a CO_2 emitting reaction (fuel combustion). The calculation of any emission reductions is based on one conventional, well-known activity: decrease in the fuel combustion reaction.

Basically, the calculation takes into account the consumption of fuel to bring the product/feedstock to the plant. It also considers the chemical and physical characteristics of the fuel used and the quantity of product/feedstock transported to the plant.

The formulae used to calculate emissions rely on transparent, verifiable data, e.g., quantity of fuel used on the alternative transportation mode (i.e., trucks) and quantity of product/feedstock transported to the considered plant This last factor is particularly important to ensure that any emission reductions are based on net environmental benefits and not spurious factors such as fluctuations in the business cycle.

D.3. Explanation of how, through the methodology, it can be demonstrated that a project activity is additional and therefore not the baseline scenario (section B.3 of the CDM-PDD):

To demonstrate that the proposed project activity is additional, project participants shall use the "Tool for the demonstration and assessment of additionality" as agreed to by the Executive Board.

According to section B3 of the CDM-PDD, the proposed CDM project activity is undoubtedly additional, since it passes all the steps of the tool for the demonstration and assessment of additionality. The project is not the most financially attractive (step 2) and it faces other barriers (technical and prevailing practices, step 3). The registration of the project as a CDM project and any associated CER revenue will definitely help overcome these barriers and will have a decisive impact on the realization of the project.

D.4. How national and/or sectoral policies and circumstances can been taken into account by the methodology:

The methodology takes national, regional and sectoral regulations into account since the baseline scenario is built from historical data. Historical data already include the impact of national, regional and sectoral policies and circumstances. They are furthermore incorporated in the "Tool for the demonstration and assessment of additionality" (especially, but not only, in Step 1) that will be used by the project participant (see D3).

D.5. Project boundary (gases and sources included, physical delineation):

The project is about the implementation of a new transportation mode to move the product/feedstock to the plant. In this project activity for Aracruz, it is the maritime wood transportation project of a Pulp and Paper Company, i.e., through the utilization of maritime barges to transport wood from plantations in to the plant. The project boundary is defined as the roadway from the plantations to the loading facility for the ocean-going barges, the transport of the product/feedstock via the barges to the unloading facility, and finally, the unloading of the product/feedstock and transport into the plant.

The project is about using a more efficient transportation mode to bring the product/feedstock to the plant; in the case of this specific project, it is the transport of wood from the plantation to the plant. Since the project activity involves only the route for the product/feedstock to get to the plant (in this case for the wood to be transported from the plantation to the plant), the project boundary is defined as mentioned above. The only exception is for the emissions from actual transportation of the fuel used in the operations, which are believed to be slightly lower in the project activity (as explained in section D8 about potential leakage),

Prior to the beginning of the project, and in the absence of the project, the company would keep using trucks as the main transportation mode to bring product/feedstocks (i.e., wood) from the plantations to the plant. As soon as the project starts, an alternative transportation mode – barges – will be used to transport product/feedstocks from the plantations to the plant.

Thus, the baseline is determined by the emissions from combustion of fuel during road transportation of product/feedstocks from the plantation to the plant utilizing the existing transportation mode (i.e., trucks). Fuel combustion from transportation also occurs in the project activity, but at a higher efficiency level,

thereby bringing a clear reduction of fuel-based CO_2 generation. Emissions of CH_4 and N_2O are also estimated in both the baseline and project activity. However, while these emissions are expected to be lower in the project activity, these emission reductions are not included in the quantified project reductions to ensure a more conservative approach to estimation of the environmental benefits.

By defining the project boundary as proposed here, the only concern is with the impact of transportation activities from the project on emissions.

Project and baseline emissions, direct and indirect, estimated and not estimated		
Sources	Project	Baseline
Direct, Estimated	▪ CO_2 emissions from fossil fuel consumption to transport products/feedstocks (i.e., wood from plantation to port 1 and to transport wood from port 2 to the plant by trucks). ▪ CO_2 emission from fossil fuels consumption for products/feedstocks transportation (by alternative transportation mode, i.e. barges). ▪ CO_2 emission from fossil fuel consumption related to loading and unloading on alternative transportation mode (i.e. barges). ▪ Minor quantities of CH_4 and N_2O from fossil fuel combustion.	▪ CO_2 emissions from fossil fuel consumption in products/feedstocks transportation (by existing transportation mode, i.e. trucks). ▪ Minor quantities of CH_4 and N_2O from fossil fuel combustion.
Direct, Not Estimated	None	None
Indirect, Estimated	None	None
Indirect, Not Estimated	▪ CO_2 emission reductions from decrease of truck trips to bring fuel to the plantations and plant.	▪ CO_2 emissions from truck trips to bring fuel to the plantations and plant.

D.6. Elaborate and justify formulae/algorithms used to determine the baseline scenario. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

Baseline emissions derive from:

- Fuel-based CO_2 Generation – the combustion of fossil fuels used by the existing transportation mode to transport product/feedstock to the plant (i.e., wood transportation by trucks from plantations to the plant), producing CO_2 as an energy-related emission source

Basically, the calculation takes into account the fuel consumption of a certain transportation mode (trucks) to bring product/feedstock to the plant. It also considers the chemical and physical characteristics of the fuel used and the quantity of product/feedstock transported.

So, the first step for determining the CO_2 emissions from the fuel combustion of the baseline transportation mode is to sum the total quantity of fuel consumed to bring the product/feedstock to the plant (in this case by trucks to bring wood from the plantations to the plant).

After obtaining the 'quantity of fuel consumed by existing transport mode', the next step is to determine the chemical and physical characteristics of the fuel, such as, Net Calorific Value, Specific Weight and Carbon emission factor.

The last step of the calculation of CO_2 emitted from the fossil fuel combustion reaction is straightforward and is based on net heating value:

> (Quantity of fuel consumed by existing transport mode, i.e., trucks) * (Net Calorific Value of fuel) * (Specific Weight of fuel) * (Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

This value is an estimation of the total CO_2 emissions from the baseline operations. This emissions value is then divided by the quantity of product/feedstock transported during the year to create a metric defining the quantity of CO_2 emissions produced per ton of product/feedstock transported. This adjustment is done for each year to ensure that any emission reduction credits are based on the efficiency and environmental improvements at the plant, not on year-to-year fluctuations in the amount of business (as measured by the quantity of product/feedstock transported).

For CH_4 and N_2O emissions due to fuel consumption, the following formulae will be used:

> (Quantity of fuel consumed by existing transportation mode, i.e., trucks) * (Net Calorific Value of fuel) * (Methane emission factor of fuel) * (GWP CH_4) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.
>
> (Quantity of fuel consumed by existing transportation mode, i.e., trucks) * (Net Calorific Value of fuel) * (Nitrous oxide emission factor of fuel) * (GWP N_2O) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.

D.7. Elaborate and justify formulae/algorithms used to determine the emissions from the project activity. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

Project emissions derive from the same source described above and use a similar formula to calculate the emissions and in the project case is detailed as follows:

- Fuel-based CO_2 Generation – the combustion of fossil fuel used on alternative transportation mode to transport product/feedstock (i.e., wood transportation by trucks from plantations to port 1 and from port 2 to the plant), producing CO_2 as an energy-related emission source

- Fuel-based CO_2 Generation – the combustion of fossil fuel used for loading and unloading from alternative transportation mode (i.e., barges), producing CO_2 as an energy-related emission source

- Fuel-based CO_2 Generation – the combustion of fossil fuels used on alternative transportation mode to transport product/feedstock (i.e., wood transportation by barges from port 1 to port 2), producing CO_2 as an energy-related emission source

Although the same basic combustion formula is used, a more efficient transportation mode (such as barges) will generate lower CO_2 emissions.

As in the baseline case, the CO_2 emission calculation takes into account the fuel consumption of some existing transportation modes to bring the product/feedstock to the plant (in this project activity it is from plantation – to port 1; from port 1 – to port 2; from port 2 – to plant). It also considers the chemical and physical characteristics of the fuels used and product/feedstock transported to the plant.

So, the first step for determining the CO_2 emissions from the fuel combustion of each existing transportation mode is to sum the total quantity of fuel consumed by each mode to bring the product/feedstock to the plant (i.e., wood from the plantations to the plant).

After obtaining the 'quantity of fuel consumed by each mode', the next step is to determine the chemical and physical characteristics of each fuel, such as, Net Calorific Value, Specific Weight and Carbon emission factor.

The last step of the calculation of CO_2 emitted from the fuel combustion reaction is straightforward and is based on net heating value:

For energy consumption to transport product/feedstock to the plant (i.e., wood from the plantations to port 1 and from port 2 to the plant):

> (Quantity of fuel consumed by the transport mode, i.e., trucks)*(Net Calorific Value of fuel)* (Specific Weight of fuel) * (Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

For energy consumption to load and unload from alternative transportation mode (i.e., barges):

> (Quantity of fuel to load and unload from the alternative transport mode, i.e., barges)*(Net Calorific Value of fuel)*(Specific Weight of fuel)*(Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

For energy consumption to transport product/feedstock by alternative transportation mode (i.e., wood transportation by barges from the port 1 to port 2):

> (Quantity of each fuel consumed by alternative transportation mode, i.e. barges) * (Net Calorific Value of each fuel) * (Specific Weight of each fuel) * (Carbon emission factor for each fuel) *44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

These three values are then added together to estimate total CO_2 emissions from the project operations. This emissions value is then divided by the quantity of product/feedstock transported during the year to create a metric defining the quantity of CO_2 emissions produced per ton of product/feedstock transported. This calculation provides an acceptable metric to factor out year-to-year fluctuations in the business cycle.

For CH_4 and N_2O emissions due to fuels consumption, the following formulae will be used:

> (Quantity of each fuel consumed by alternative transportation mode, i.e., trucks and barges) * (Net Calorific Value of each fuel) * (Methane emission factor of each fuel) * (GWP CH_4) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.

> (Quantity of each fuel consumed by alternative transportation mode, i.e., trucks and barges) * (Net Calorific Value of each fuel) * (Nitrous oxide emission factor of each fuel) * (GWP N_2O) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.

D.8. Description of how the baseline methodology addresses any potential leakage of the project activity:

This project is not expected to create leakage problems, largely because emissions from the baseline and project activities are totally controlled by the company according to the boundaries defined in this project.

Moreover, the data collected to monitor the project benefits and the baseline activity are straightforward to collect from the company's Integrated Data System. The data include information on the quantity of product/feedstock transported, the amount of fuel used for existing transportation mode, and the amount of fuels used for the alternative transportation mode. The emission reductions that occur from this project activity are directly related to the transparent monitoring and reporting of these variables. That is, GHG emissions within the project boundaries derive from CO_2 from fuel combustion activities.

As noted, there are also small amounts of CH_4 and N_2O emissions that occur from combustion in both the project and baseline activities. However, according to the calculations, the CH_4 and N_2O emissions due to fuel consumption are not significant when compared to the total emissions in the baseline and in the project. These emissions are expected to be lower in the project activity. There are also emission reductions resulting from the fuel savings since fuel supply trucks no longer need to deliver oil to the plant, as they were required to do in the baseline. These additional emission reductions, however, have not been included as the project's quantified benefits.

D.9. Elaborate and justify formulae/algorithms used to determine the emissions reductions from the project activity. Variables, fixed parameters and values have to be reported (e.g. fuel(s) used, fuel consumption rates):

In this section only, and for the simplicity of the demonstration, we will use the example of Aracruz as the considered Company.

Project Life-time Emission Reductions = Σ_{yr} (Annual Emissions Reductions) = Σ_{yr} [$(Em_{baseline} - Em_{proj\ yr})$]

where:

$Em_{baseline}$ = baseline emissions

$Em_{proj\ yr}$ = project emissions per year

Yr = project years

Baseline emissions derive from one source:

- Fuel-based CO_2 Generation – the combustion of fossil fuel used by the existing transport mode to transport product/feedstock to the plant (in this case, trucks to transport wood from plantations to the plant), producing CO_2 as an energy-related emission source

Emissions from this source were determined by the following formula:

For energy consumption to transport product/feedstock by existing transportation mode to the plant (i.e. wood transportation by trucks from the plantations to the plant):

> (Quantity of fuel consumed by the existing transport mode, i.e., trucks) * (Net Calorific Value of fuel) * (Specific Weight of fuel) * (Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

Project emissions derive from the same source described above and use a similar formula to calculate the emissions:

- Fuel-based CO_2 Generation – the combustion of fossil fuel used on alternative transportation mode to transport product/feedstock (i.e., wood transportation by trucks from plantations to port 1 and from port 2 to the plant), producing CO_2 as an energy-related emission source

- Fuel-based CO_2 Generation – the combustion of fossil fuel used to load and unload from alternative transportation mode (i.e., barges), producing CO_2 as an energy-related emission source

- Fuel-based CO_2 Generation – the combustion of fossil fuels used on alternative transportation mode to transport product/feedstock (i.e., wood transportation by barges from port 1 to port 2), producing CO_2 as an energy-related emission source

Emissions from this source were determined by the following formulae:

For energy consumption to transport product/feedstock to the plant (i.e., from plantations to port 1 and from port 2 to the plant):

> (Quantity of fuel consumed by the transport mode, i.e., trucks)*(Net Calorific Value of fuel)* (Specific Weight of fuel) * (Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

For energy consumption to load and unload from the alternative transportation mode (i.e., barges):

> (Quantity of fuel to load and unload from the alternative transport mode, i.e., barges)*(Net Calorific Value of fuel)* (Specific Weight of fuel)*(Carbon emission factor for fuel)*44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

For energy consumption to transport product/feedstock by alternative transportation mode (i.e., wood transportation by barges from port 1 to port 2):

> (Quantity of each fuel for product/feedstock transportation) * (Net Calorific Value of each fuel) * (Specific Weight of each fuel) * (Carbon emission factor for each fuel) *44/12, divided by 1000, to determine tons of carbon dioxide in metric tons.

It should be noted that the emission reduction credits from the project are based on the lower resource requirements for fuel combustion needed for transporting each year's quantity of feedstock (i.e., wood) to the plant, adjusted for the quantity of product/feedstock transported (i.e., wood) with these resource requirements. This adjustment is done to ensure that any emission reduction credits are based on the efficiency and environmental improvements at the new transportation system, not on year-to-year fluctuations in the amount of business (as measured by the quantity of product/feedstock transported).

For CH_4 and N_2O emissions due to fuel consumption, in the baseline and project emission calculation the following formulae will be used:

> (Quantity of each fuel consumed by existing or alternative transportation mode, i.e., trucks and barges) * (Net Calorific Value of each fuel) * (Methane emission factor of each fuel) * (GWP CH_4) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.

> (Quantity of each fuel consumed by existing or alternative transportation mode, i.e., trucks and barges) * (Net Calorific Value of each fuel) * (Nitrous oxide emission factor of each fuel) * (GWP N_2O) * 4.1868, divided by 10^6, to determine tons of carbon dioxide in metric tons.

According to the calculations, the average emissions due to CH_4 and N_2O will add less than 0.2% to the total baseline and project emissions, with these emissions expected to be lower in the project activity. So

compared to the total emissions in the baseline and in the project, they are not significant and they won't be quantified here as project benefits.

All the information related to fuel consumption was provided by the proponent. The following table presents all the information related to each fuel used in baseline and project calculation.

	Diesel Oil* (trucks and equips)		Oil MF180 (barges)		Maritime Diesel (barges)	
LHV	kJ/kg	42,287	kJ/kg	40,654	kJ/kg	42,521
Density	kg/m^3	840	kg/m^3	988	kg/m^3	850
Carbon Emission Factor	tC/TJ	20.2	tC/TJ	21.1	tC/TJ	20.2
Carbon content	tC/m^3	0.718	tC/m^3	0.848	tC/m^3	0.730
CH_4 Emission Factor	CH_4 kg/TJ	0.7	CH_4 kg/TJ	1.4	CH_4 kg/TJ	0.7
N_2O Emission Factor	N_2O kg/TJ	0.4	N_2O kg/TJ	0.3	N_2O kg/TJ	0.4

Sources: "IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual – Energy" and the Brazilian Energetic Balance (Ministry of Mines and Energy)

SECTION E. Data sources and assumptions:

E.1. Describe parameters and or assumptions (including emission factors and activity levels):

The fuel combustion equation is well known in the scientific literature.

Information related to CO_2, CH_4 and N_2O emission factors of each fuel used by each transportation mode was taken from Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual," Volume 3, OECD/IEA.

Heating Values and Specific Weight of each fuel were taken from the "2003 Brazilian Energetic Balance" (Ministry of Mines and Energy) and provided by the project participant based on each fuel quality characteristics at the plant.

The rest of the information related to product/feedstock transported, each fuel consumption and other chemical contents is provided by the project participant.

E.2. List of data used indicating sources (e.g. official statistics, expert judgement, proprietary data, IPCC, commercial and scientific literature) and precise references and justify the appropriateness of the choice of such data:

Equations for determining the amount of CO_2, CH_4 and N_2O emissions due to fuel combustion in transportation were taken from IPCC Guidelines for National Greenhouse Gas Inventories (1996).
For other relevant data, please see section E1.

E.3. Vintage of data (e.g. relative to starting date of the project activity):

In Aracruz' project, baseline data were taken from the baseline year of 2002 (last year before the start of implementation of the first phase of the project) and project data were taken from the year 2005. Data for 2003 and 2004 were not used because those years represent a mix of transport modes and the data cannot be clearly separated to determine the baseline and project activities. The monitoring and verification plan specifies that the actual emission reductions will be based on actual performance data for each year for which emission credits are to be claimed. Since any emission reductions are based on actual performance

conditions for the baseline and project activities using a metric that reflects emissions per quantity of product/feedstock transported, the selected vintage of data should not pose any problems.

E.4. Spatial level of data (local, regional, national):

All the data, except for the combustion reaction, will be local to plant conditions and plant management accountancy systems.

SECTION F. Assessment of uncertainties (sensitivity to key factors and assumptions):

Any significant uncertainties of the proposed methodology are related to data uncertainties contained in correctly specifying the key parameters/assumptions listed under item E above. As explained further in the Monitoring and Verification Plan, difficulties in collecting reliable data are not anticipated.

One of the main concerns when estimating the quantity of emission reduction credits that might be generated from the project is to ensure that credits are only recognized due to net environmental benefits, not to extraneous factors such as fluctuations in the business cycle (e.g., declines in emissions because the plant is operating less). To account for this potential factor, the methodology for estimating changes in emissions from the project includes an adjustment factor for the quantity of product/feedstock transported to the plant so that emission reductions are calculated between the baseline and project activity *assuming the same level of production* in the year reductions are calculated.

SECTION G. Explanation of how the baseline methodology allows for the development of baselines in a transparent and conservative manner:

The methodology relies on a basic change of transportation mode and consequent decrease in a CO_2 emitting reaction (combustion). The calculation of any emission reductions is based on one conventional, well-known activity: fuel combustion (and its associated emissions of CO_2, N_2O and CH_4).

The formulae used to calculate emissions rely on transparent, verifiable data, e.g., quantity of fuel used on the alternative transportation mode (i.e., barges); quantity of fuel on existing and alternative transportation modes (i.e., trucks and barges) for loading-unloading operations; and amount of feedstock transported to the considered plant This last factor is particularly important to ensure that any emission reductions are based on net environmental benefits and not spurious factors such as fluctuations in the business cycle.

In addition, as explained further in item D.5 and D.8 above, there are several minor emission pathways that have not been quantified in this methodology.

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