



## Annex III – “Contributions to sustainable development”

### **Introduction:**

The main objective of this report is to expose aspects of the “ETE Monjolinho” project activity to sustainable development, in agreement with Resolution n. 01 of “Comissão Interministerial de Mudança do Clima”, dated at September, 11, 2003. The content of this document is presented in a more succinct and short form than described in the PDD, and is restricted only to the project activity and its related processes.

### **Summary:**

The Clean Development Mechanism (CDM) project activity (PA) of ETE Monjolinho is located at the city of Sao Carlos, Brazil. The prime objective of this PA is to reduce emissions of the greenhouse gas (GHG) methane to the atmosphere through the implementation of a wastewater treatment system. The system consists of a pre-treatment stage followed by an Upflow Anaerobic Sludge Blanket (UASB) reactor, and an enclosed flare system coupled to a dedicated system to sludge drying. Differently of the PA, in the baseline scenario methane was continuously released to the atmosphere from the anaerobic lagoon system where organic matter degradation takes place. Besides this benefit, the PA will also contribute to sustainable development, to local integration, articulation of different sectors, net increase in employment rates, professional training and capacity, and technological development. For the correct operation and maintenance of chosen technologies, the technicians that will deal with equipments incorporated in this PA have to receive specialized professional training. Part of this technicians already belong to ETE Monjolinho staff. The remaining labor will be contracted and trained specially for the PA, which represents a direct contribution for net employment rate. All these actions represent a significant contribution to technology transfer since both monitoring, operation and maintenance procedures will be conducted within PA boundary. The technology applied to this PA is not usual, and it was never used in any previous system of SAAE – São Carlos. Further, since equipments that compose the system are originated from different regions of Brazil, and they have to be locally linked to make the integrated system, it will

contribute either to the economy of different regions of the country (an integration contribution) as well as be an example for other regions that could be interested in similar solutions for the same problem.

### **Previous conceptions of the CDM Project**

The wastewater treatment plant of Sao Carlos was subject to structural reformulation in its project concept since the first attempts to implement the wastewater treatment plant. Two scenarios were planned. In 1992, the project of the plant consisted in a set of three aerobic and three sedimentation lagoons. In 1995, another scenario was planned, and included a larger set of lagoons: two anaerobic, one anaerobic, two for sedimentation and one for sludge drying. However, none of scenarios were able to be implemented due to legal environmental restrictions that did not exist in the moment of conception of these scenarios. The new restrictions include the proximity to the slaughterhouse, a not allowed situation, and the fact that the area designated for construction of the plant had been reforested (formerly it was not vegetated). This reforestation reduced significantly the available area for implementation of the lagoon system since it is not allowed to remove riparian forests, which is the case. The alternative to overcome the new restrictions was the implementation of new technologies.

#### **a) Contribution to local sustainability**

The proposed CDM project activity will contribute significantly to environment conservancy and sustainability through the correct disposal of domestic wastewater of the city of Sao Carlos.

In fact, wastewater disposal is a critical environmental problem. The effluent contributes significantly for the spread of pathogenic microorganisms, intense odors, and high amounts of organic matter that may contaminate both groundwater and rivers.

In the baseline scenario, the effluent is conducted through a sequence of tanks and shakers, and then to the stabilization tank. Next, it flows to the anaerobic lagoon system where degradation of organic matter takes place. Indeed, the lagoon system is the critical issue.

Since degradation is made in open air condition, several environmental problems take place. First, it spreads strong odors in the surrounding region. Second, it is a condition that favors the presence of pathogenic microorganisms much more than in the PA

condition. Last but not less important, the large organic load in lagoons could contaminate rivers and groundwater through soil infiltration.

The PA reduces or eliminates all this impacts. Moreover, it contributes to reduce the necessary area for the wastewater treatment, which otherwise would enhance the pressure for new areas, and consequently for deforestation.

The final sludge, after the anaerobic treatment, is dried at high temperatures. In this drying process, whose energy is partially supplied methane combustion of the methane contained in the biogas, will sterilize the sludge very efficiently allowing its future utilization as fertilizer. Further, the vaporizer water is recycled and reinserted in the ETE system, thus avoiding excessive water consumption.

All these benefits contribute significantly for local sustainability.

**b) Contribution for the improvement of labor condition and net increase in employment**

The technology applied to the PA requires specific capacity for its correct operation, maintenance and monitoring. New job positions will be opened for such functions, which will be occupied both by Monjolinho employees and new contracted people, thus increasing employment rates during the PA period as well as for the whole lifetime of the equipment. All these new employees will be subject to specific professional training, an action that will enhance the regional average level of technical knowledge. Moreover, during the implementation phase there will open temporary job positions for the installation of equipments, which is another opportunity for local labor.

**c) Contribution for professional capacity and technological development:**

The technology of the project activity is not usual. Hence, it represents a new technology in its category and contributes for technological development in this segment. Once the new equipment is installed, it is expected a training phase for both ETE Monjolinho employees and partners for system handling and maintenance purposes. It is important to highlight that this professional training and the associated enhancement of capacity is an important component of technological development. Further, since it is a not usual technology, the plant will be open for visitation of students and researchers serving as an example for other companies and/or educational

institutions aiming to expand their technical and scientific expertise in a myriad of integrated technologies systems that make up the CDM project activity.

**d) Contribution for regional integration and articulation with other sectors**

The nature of the applied technology in this PA is interdisciplinary. This feature will require the adequate integration of teams, each one with different backgrounds respect to the chosen equipments and technological systems. In order to manage adequately the operation and maintenance components of the PA, the responsible company will establish a local representation to coordinate all the operations. In this coordination it is included the professional training of outsourced groups, which will be hired in the regional surroundings. This is an important contribution to local integration, both for employees from Monjolinho and new contracted people.

Beyond the improvement in capacity, the chosen equipments that compose the whole system are originated from different suppliers from different regions, a stimulus for distinct economical and technological sectors from a regional viewpoint. Moreover, sub-products of the PA, e.g. produced sludge, may be subsequently recycled for the startup of new biodigestors or fertilization in regions close to the PA boundary.

**Illustrative flowchart of the CDM sustainability implemented at Monjolinho wastewater treatment plant:**

In the following diagram it is illustrated the sustainability flowchart. The drying of sludge will be partially fuelled by thermal energy of CH<sub>4</sub> combustion at the flare, thus reducing the time required for the total drying in open air condition

