

BRASKEM'S ENVIRONMENTAL PROGRAMS AIMS TO PRESERVE NATURE AND IMPROVE LIFE QUALITY

Either through use reduction of natural resources or innovations that benefit environment and population, the company always seeks solutions aligned to the principles of sustainability

The commitment to sustainability in the creation of value is part of Braskem's business and growth strategy, which operates in accordance with the principles of sustainable development. Aligned to these principles, Braskem has been making the integrated management of its Health, Safety and Environment program, aiming to promote actions in a structured way to improve all of its environmental and social indicators.

The care with people, security, integrity of facilities and the environment protection are essential values to Braskem. For this purpose, it develops policies, programs and corporate norms spread among members and partners in order to ensure the fulfillment of priority values and consolidate company's commitment to sustainable development. The significant development of Braskem's eco-efficiency indicators since 2002, such as drops of 48% in volume of liquid effluents, 13% in water consumption, 1% in energy consumption and 66% of solid waste, prove the result of this effort.

In 2008, the company invested R\$ 161 million in health, safety and environment improvements. As fixed and variable expenses, approximately US\$ 179 million were disbursed, excluding Ipiranga's and Copesul's assets. Out of those, R\$ 99 million were destined exclusively for environmental-focused actions.

Developed in the states where Braskem's owns industrial plants - Alagoas, Bahia, Rio Grande do Sul and São Paulo -, all initiatives follow the same guidelines in relation to the proposal and to the goals, always trying to reduce use of natural resources and providing benefits for the overflowing communities of the factories.

The ongoing work of the teams involved in programs aimed at the preservation of natural resources, among other things, has allowed Braskem to expand their positive results year by year. Braskem has 73 valid environmental licenses and 30 licensing processes conducted in

environmental agencies: Ibama / Federal District, FEPAM / RS, Cetesb / SP, Ima / Ima and BA / LA.

Searching solutions to climate change resulting from global warming, the polymer production chain has been moving to produce resins from 100% renewable raw materials that capture CO₂ from the atmosphere. In Braskem, the Green Ethylene pilot-plant team has a decisive role in the research and production of these polymers, because through pilot-scale production we can show the efficiency of this process to produce a product with the same features produced by a non-renewable source (oil).

Here are some of Braskem's projects in the water, energy and liquid and organic effluents consumption reduction area.

Effluent Reduction

Seeking to reduce the generation of organic effluents in its ethylene production units - crackers, Braskem created in 2008 a multidisciplinary group to improve the drainage system, by opening up their passage boxes, identifying high flow points and looking for their sources. In April 2009, the effluent generation indicator met the proposed target, ranking first level among the world's best crackers. In the Green Ethylene pilot-plant, the effluent from the soda washing tower is reused for washing water + soda, which allows the recovery of 30t/h of effluents with a monthly total of approximately 20.700t after it starts operating.

In Alagoas, the PVC Unit generated about 85,000 m³/month of liquid effluent. However, there was a reduction, when there was a US\$ 256 thousand gain in 2008. And beyond financial return, this action promoted significant gains in reduction of impacts related to effluent generation and water consumption. At UNIB-BA, the spread of entrepreneurship culture in effluent management allowed the minimization of environmental impacts, besides the reduction in treatment costs, resulting in an over R\$ 230 thousand saving.

Water consumption reduction

Aiming to reduce water consumption and effluent generation, Braskem has created the EcoBraskem project. Initially developed to reduce water consumption and effluent generation, the project has the participation of UNIB-BA and UFBA, through the Clean Technology Network. From that project, Braskem has established a systematic methodology for water and energy

consumption saving in the industry. UFRJ, UNICAMP, Cetrel and Ima and Finep also contribute in the project, which aims a more rational use of natural resources.

The water consumption in the Soda/Chlorine plant, which has one of the big water consumers in the two cooling towers, is approximately 280m³/h. As a result, two reuse projects were prepared to minimize that consumption. The first project was initially based on the reuse of 40m³/h of water from the effluent, and was later raised to 60m³/h . The second project is based on the recovery of water disposal to go from Tower II to Tower I, as replacement water. With this project there was a reduction of chemicals and a volume of around 30m³/h.

The "Eco-Station" project developed a new purification method, different from existing processes. With the use of Moringa seed as vegetable organic coagulant, object of the proposed project, the use of other inputs is reduced or even extinguished, reducing costs and generating only a biodegradable mud. For this purpose, several tests with water, proving it's safe to drink after being treated with Moringa; with mud, that ensured its non-toxicity; and with soil, where Moringa is cultivated, were made.

Energy Saving and waste reduction encourages sustainable projects

Aiming to reduce electricity consumption, contributing to sustainable development through implementation of a pro-active policy to make electricity consumption more rational and efficient as possible, Braskem implemented the *Energy - Attitude and sustainability* project. This initiative promotes collaborative processes associated with the improvement of administrative efficiency and minimization of environmental impacts.

So, Braskem has managed to make the heat generated by the reaction of LDPE production in the tubular reactor useful, being transferred to hot water, which is then used to heat the reactor and start the reaction, thereby eliminating steam consumption, and thus making the reaction self-sustainable, improving system energy efficiency. Therefore, Braskem managed to reduce steam consumption from 61 to 21 kt/year, and the steam technical index from 0.48 to 0.31 t/LDPEt, consuming less than LDPE tubular plant benchmarking. The reduction in the energy eco-indicator of the PE-4 site went from 3.32 to 3.13 GJ/LDt.

Innovative and Sustainable Practices in Environment is a project developed with Braskem. Aiming to prevent fugitive emissions - undesirable losses of product - the purchase of devices (active load system) to be installed in valves castles were made to reduce / eliminate

this emission type. After these devices were installed, there was a reduction of about 90% of emissions from tanks, a considerable environmental benefit, due to the reduction of pollutants released into the environment.

To reduce steam consumption, 43 purgers were replaced in February 2008. Through its proper operation, there was a 2,000-ton steam consumption saving per year (R\$ 178 thousand), besides the reduction of the generate effluent.

Braskem acquired a new vegetable oil based isolated transformer. Until then, all UNIB's oil based transformers, used mineral oil for this purpose. The choice of a new oil type brought several kinds of benefits for safety, environment and to increase the equipment lifetime. when in safety, the new oil has a much higher point of combustion than the mineral oil. According to international norms, this avoids the need for construction of ceasefire walls and fire extinguishing system in the facility. About the benefits for the environment, the new oil is derived from natural and renewable products, 100% of the ingredients are edible, it is classified as biodegradable.

Braskem wins prizes for reusing wastes

In 2008, the PVC plant of Alagoas won the Return On Environment award, from General Electric Company, for the results obtained with the DHC (dry chlorinated hydrocarbons - usually incinerated waste) Solid Waste Reduction. As a result, Braskem stopped generating 2.4 thousand tons/year of DHC, volume equivalent to 70% of the total generated by the unit before the project. This was the third time a Braskem's industrial project was awarded by GE in its "Ecomagination" program, aimed at recognizing, among companies around the world, works of clients who show commitment to reducing the environmental impacts of their activities. A similar project allowed PVC-BA Unit to reduce 30% of DHC generation, a waste generated in the MVC production process, which was usually incinerated.

Within this concept, the Basic Petrochemicals-BA unit developed a project to make use of water treatment waste (sludge) to incorporate it to clay-based ceramic blocks making. With the project, 1,765 tons of waste ceased being sent to landfills. This work also enabled the development of a environmental education program with the pottery company, partner in the project development.