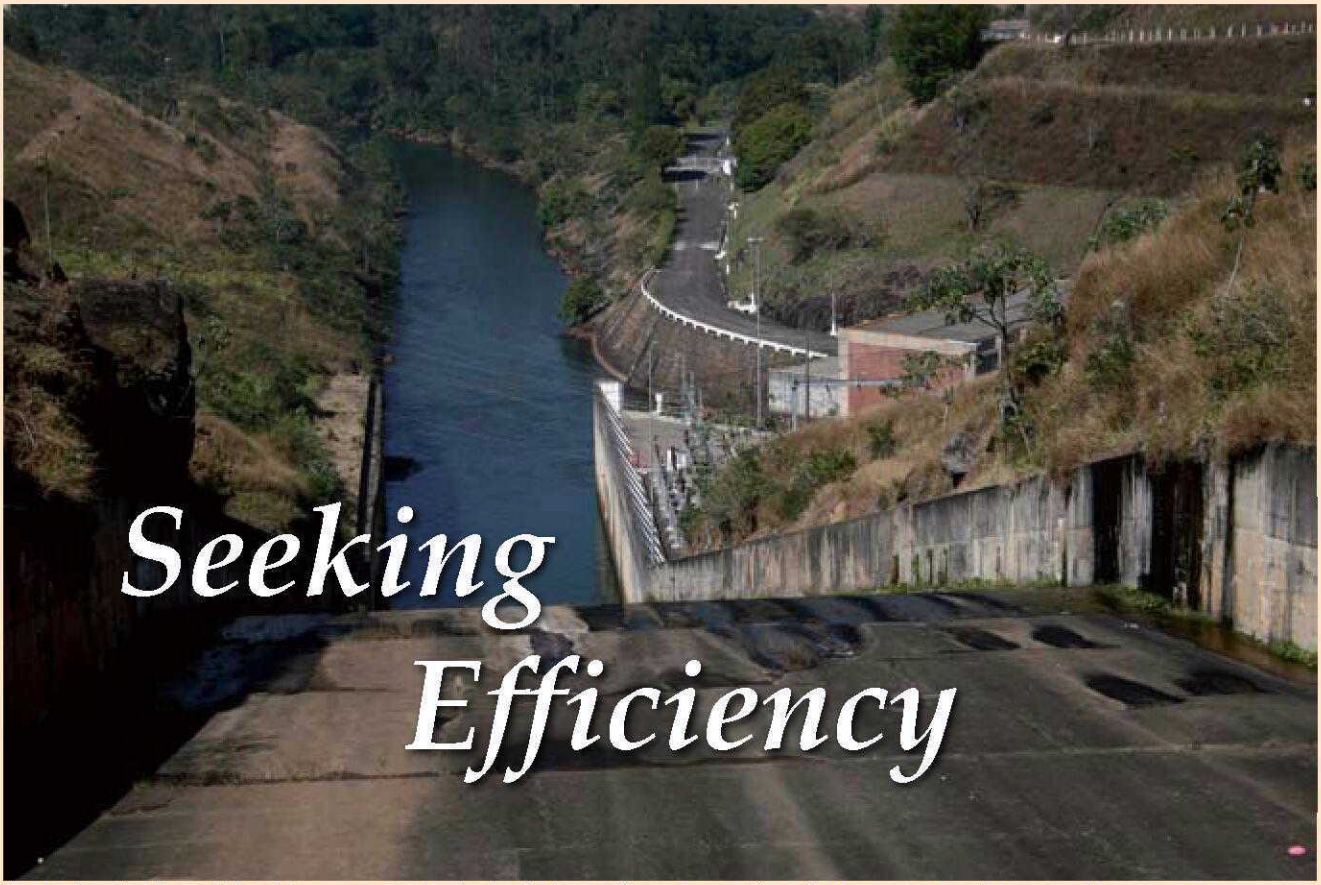
IMAGE BANK ABTCP/CAIO KENJI



Seeking Efficiency

In the beginning of the 21st century, both the industrial sector and society came together to reduce waste

Changes in behavior have shown a commitment towards reducing energy consumption in the country as of 2001, when the country was on the verge of experiencing the highly feared "power blackout". Having incorporated new social values, industries today seek energy efficiency and technological innovations in energy cogeneration systems, on behalf of reducing waste and for the true sustainability of economic growth

By Rodrigo Moraes

It is impossible to talk about economic development without mentioning infrastructure for power generation. As such, this subject matter has aroused significant attention, interest and concern in Brazil on the part of the government and private initiative these past few years. It seems that the awareness lights were suddenly turned on, more specifically, as of 2001, the year of energy rationing –, and everyone woke up to the importance to what they had ignored in Brazil until then: energy efficiency! Nothing like a good scare, such as the risk of a power blackout, for human beings to abandon their state of self-indulgence in the comfort of certainties or leave aside their habit of throwing all the responsibility on the Government.

The opposite of this individualistic behavior would be for everyone to assume their status of joint responsibility by contributing with ideas that favor solutions, each one within their consumption possibilities and proportions, in order to avoid configuring the sad paradox of what everyone uses not being anyone's concern. "Prior to 2001, the main perception trend treated energy as an infinite resource, which could be used however seen fit", believes Jayme Buarque de Hollanda, Managing Director of INEE (National Institute for Energy Efficiency) in Brazil.

Since the beginning of the 21st century, things changed a bit, and both the industrial sector and society came together to reduce waste. Just ask any family head how he or she feels seeing their house all lit up, without anybody in half of the house to justify all those lights being turned on. According to a study conducted by the Energy Nucleus of FGV/Projetos regarding the variation in energy consumption in the country, the reduction has amounted to roughly 20%. "This

gain helped avoid somewhat the risk of a blackout, or "apagão energético", as it is commonly coined in Brazil", explains Goret Pereira Paulo, coordinator of the FGV/Projetos' Energy Nucleus.

Data from the National Energy Report, prepared by the Power Research Company, shows that in 2006 the internal supply of energy amounted to 226.1 OETs (oil equivalent tons). For the year 2030, the National Energy Plan, prepared by EPE for the Ministry of Mines and Energy, foresees a supply of 555.8 OETs.

In order for this to take place, one of the main challenges at present in the energy sector is to increase the country's power generation capacity, so as to satisfy the energy demand based on Gross Domestic Product (GDP) growth in upcoming years. "To have a better idea of this, for example, the GDP result for this year is expected to exceed the average growth foreseen for the current scenario. The reason for this celebrated development is therefore accompanied by increased pressure over the need to expand Brazil's energy capacity, in order to guarantee the supply of this resource to the market and industrial sector ", says Goret. According to the coordinator of the FGV/Projetos' Energy Nucleus, a true "energy blackout", if it were to happen in the country, would result in various losses, such as of jobs and industrial production, which could ultimately become paralyzed and consequently affect the country's economy as a whole.

Given this risk scenario, the Managing Director of INEE (National Institute for Energy Efficiency) in Brazil, Jayme Buarque de Hollanda, emphasizes that energy efficiency should be a government commitment, regardless of energy supply/demand circumstances in the country. "That is, it doesn't matter what the present scenario is or what the future perspectives are. Consuming less energy translates into competitive gains in the industrial sector". According to Hollanda, people talk more than practice energy efficiency in Brazil. "It is an expression that's become politically correct, however, I do not see a sufficient number of concrete government actions to justify this reality", he criticizes. Some of the reasons that explain such behavior include "state engine" slowness in defining strategic issues for accelerating the approval of projects aimed at expanding power generation capacity. "Particularly with regards to infrastructure projects that truly make a difference when it comes to satisfying the consumption demand necessary to grow consumption, for example, in the paper industry from 4.5% to 5.0% per year, among other industrial sectors", says José Oscival dos Santos, Klabin's Environment and Energy Consultant. Furthermore, Oscival points out the cost of energy that is passed on to the end price of products and services for consumers. "One notices a considerable increase in power utility fees in the last five years", concludes the executive.

Internal Supply of Energy in Brazil 2005/2006			
Energetic	**2005**	**2006**	**06/05**
Total supply	218,7	226,1	3,40%
Non-renewable energy	121,3	124,4	2,60%
Oil and byproducts	84,6	85,5	1,10%
Natural gas	20,5	21,6	5,30%
Mineral coal and byproducts	13,7	13,6	-0,50%
Uranium (U3O8) and byproducts	2,5	3,7	44,10%
Renewable Energy	**97,3**	**101,6**	**4,40%**
Hydraulic energy and electricity	32,4	33,6	3,70%
Wood and charcoal	28,5	28,6	8,70%
Sugarcane products	30,1	32,8	8,70%
Other renewable energies	6,3	6,7	5,40%

Unit: in million OETs
Source: National Energy Report / Power Research Company

SECTOR IN ACTION

The Brazilian business community's concern as to the possibility of seeing its results compromised due to lack of electric power had no alternative other than to unite its management potential with that of the government in order to arrive at solutions for problems brought about by the lack of investment in infrastructure and power generation. Fully aware of the advantages of reducing industrial waste in order to improve sector competitiveness, in a joint effort the government and private initiative planned more efficient consumption policies.

Furthermore, alternative means of generation, co-generation and forms of optimizing energy sources were launched by the industrial sector, which now enjoys greater investment capacity in this type of project in light of improved accounting and savings generated by reducing energy waste during production. These advantages have further challenged administrators and managers to find ways of optimizing energy consumption in order to gain efficiency, in other words, use energy rationally and focus on continuously improving processes.

"Optimization is not an attitude to be laid aside over time. Production and processes can always be "increasingly" optimized in the pursuit of more efficient management solutions", highlights Goret. In a world where the only certainty is change, the FGV/Projetos executive remembers that a solution considered efficient today for a specific company, may, due to future business growth, awaken the entrepreneur's focus on new and even more efficient alternatives for the future.

IMAGE BANK ABTCP/CAIO KENJI

Consuming less energy translates into competitive gains in the industrial sector

It is similar to the transformation process in nature, in which nothing is created and nothing is lost!

An example of this type of efficiency is the pulp and paper industry itself. In 2006, for example, VCP was recognized by the Federation of Industries of the State of São Paulo (FIESP), due to the highly successful results of the company's commitment towards energy efficiency policies. The reduction of electricity consumption in the VCP-Jacareí (SP) supply grid was 82%. Energy cost savings equivalent to R$ 12 million/year for the Grupo Votorantim organization.

"The company's achievement is due to a power co-generation system based on gas turbines that operate in an integrated manner with the previous power co-generation based on three steam turbines", stated Wanderlei David Pereira, coordinator of the Utilities Team – VCP Utilities Production Cell. Besides this technology, Pereira indicated other investments in thermal energy re-usage undertaken by VCP, which have also contributed to the drop in steam consumption and, consequently, consumption of fuel oil.

This year, VCP is aiming for even more! "Coupled with Grupo Votorantim's strategies, our target is to reduce specific global energy consumption by 3%", stated Pereira. In general, the national paper industry as a whole intends to maintain its focus on business competitiveness and sustainability, with emphasis on its energy efficiency, which has been nationally recognized in the industrial scenario (see comparative energy consumption chart for the various industrial sectors).

It is estimated that pulp and paper production is at least 50% self-sufficient in power generation, with co-generation projects standing out as features of this industrial segment. Based on forest waste, power generation projects within the pulp and paper sector are the most efficient within management of energy resources for production. "Together with technology, the paper industry demonstrates its significant capability of reducing consumption of electric power and water vapor in its current endeavor for efficiency", underlines Oscival, Klabin executive responsible for the Power and Environment areas.

Currently, Klabin purchases an average of 90 MW of power per month, which represents approximately 50% of the total of its power consumption. The pursuit of pulp and paper sector efficiency goes beyond energetic limits, in light of the fact that competitiveness is the value achieved through the total optimization of production chain costs. "Another significant challenge presented to our partners and suppliers is the search for a solution to reduce the amount of water consumed by the process. Today, this amount is approximately 30 m³ per ton of pulp produced and it is hoped that over the next few decades this amount will drop to less than 20 m³ per ton of commodity production", calculates Oscival.

"HOMEMADE" POWER!

According to the coordinator of the Utilities Team – VCP Utilities Production Cell, the energy sustainability path for the country's paper industry is headed in the same direction as investment in co-generation systems. "Internal generation costs less and is more competitive than that purchased on the market. Our sector has the advantage of being able to use organic wood composites, which are a byproduct of pulp production, as biofuel for power co-generation at the industrial plant", adds José Marcos Vettorato, Suzano Papel e Celulose's Industrial Director.

Wood waste discarded during the initial production stages is readily available as primary biofuel sources for power co-generation in pulp and paper companies. "Furthermore, these are available at practically zero cost", highlights Vettorato. According to Vettorato, Suzano's energy policy is to continuously improve the cost/benefit ratio, taking advantage of energy generation opportunities based on more attractive fuels within the thermal matrix, including black liquor, oil, natural gas and biomass.

"These results, obtained through the practice of our energy management policy, also originate from the hydroelectric generation matrix, through partnerships between public and private initiative, as, for example, agreements with the Amador

Technological Bases of Co-Generation	
Rankine Cycle	**Brayton Cycle**
• Steam production boiler + steam turbine and electric generator or steam turbogenerator + condenser + water feed boiler pump.	• Combustion chamber + compressor + gas turbine and gas generator or gas turbo-generator.

Aguiar I and II Power Plants", adds Vettorato. Of the total average of 153 MW of power consumed by Suzano in its production units, 65% is generated internally; 25% originates from generation outside the site; and the remaining 10% is purchased from the market.

In general, a co-generation system consists of the usage of a primary energy source supplied to suitable equipment that burns this energy source (power steam boiler or waste recuperation or, yet, gas turbine), with the result of this burn of producing, through other equipment (steam turbine or heat recovery boiler respectively), other sources of energy, such as mechanical, thermal and/or electric.

Within the pulp and paper sector, as well as the sugar/ethanol, steel, chemical and petrochemical sectors, the most used co-generation technologies according to Marcelo Figueiredo, Siemens Sales Projects consultant, are based on the Rankine or Brayton cycles (see chart). "The Brayton cycle is not widely used in the pulp and paper industry. It was installed in some companies in the sector as a complementary system for peak energy demand periods, when concessionaire power becomes too expensive to purchase", stated Figueiredo.

The Siemens consultant also states that technological development in the innovation of power generation and co-generation systems has been seen by the market and the offer of new alternative solutions are available to companies, according to data assessment undertaken by the National Institute For Energy Efficiency (INEE). Firstly, says Hollanda, General Director of the Institute, managers should direct their attention in search of a more efficient energy policy in the country seeking to reduce waste, being that optimization the most basic way of gaining capacity.

"When asked today if excessive amounts of energy are being 'wasted', I guarantee that they are and go even further and say, in significant quantities", underlines the executive. Therefore, as can be seen, still there is a lot of energy capacity added value to be found based on effective optimization actions. Today, in light of social awareness campaigns regarding the need and advantages of saving power, global commitment will really revert into new achievements for companies and society. After all, economic development will only be beneficial for Man if it is accompanied by actions to preserve the environment and its resources. "It is industry's obligation to endeavor for energetic efficiency through new technologies that minimize our need to consume natural resources, especially water and power. This is really synonymous with sustainability", summarizes the Environment and Energy consultant for Klabin, the largest paper production company in volume in Brazil.

Brazil: Total Energy Consumption According to Sector (10^3 oil equivalent tonnes - OET)

Sector	1970	1980	1990	2000	2005
Total consumption	62.106	104.382	127.596	171.949	195.909
Total consumption non-energetic	1.471	5.641	10.014	14.293	13.222
Total consumption energetic	60.635	98.741	117.582	157.657	182.687
Energy sector	1.551	5.873	12.042	12.847	17.643
Residential	22.076	20.957	18.048	20.688	21.827
Commercial	850	1.794	2.936	4.968	5.452
Government	417	1.158	1.732	3.242	3.451
Agribusiness	5.351	5.752	6.027	7.322	8.358
Transport – Total	13.192	25.715	32.964	47.385	52.459
Highway transport	11.361	21.611	29.276	42.766	48.073
Others	1.831	4.105	3.688	4.618	4.386
Industrial - total	17.198	37.491	43.523	61.204	73.496
Cast iron and steel	3.284	8.694	12.225	15.285	17.459
Non-ferrous and other metals	455	1.718	3.344	4.365	5.430
Chemical	1.166	3.741	4.234	6.421	7.168
Food and beverage	5.710	8.132	8.346	12.514	17.926
Pulp and paper	934	2.664	3.612	6.206	7.684
Others	5.650	12.542	11.763	16.413	17.829
Consumption not identified	0	0	311	0	0

Source: National Energy Report / Power Research Company