

BRAZIL

Energy End-user Activity

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ABSTRACT

It is amazing how the Brazilian energy sector has changed these last few years! End-users have a new perception about energy-related opportunities. Higher expectations, more demanding attitude and a mindset-oriented solution are transforming the way of doing business. This article will present a few actual cases in which I had the privilege to participate as a consultant.

THE ENERGY STRUGGLE IN BRAZIL

The energy sector in Brazil is highly regulated. Tariffs are defined by the regulators—not by supply and demand. The system would work pretty well if reliability and availability were the main parameters.

For many decades, generation, transmission and distribution companies were Government owned. They relied heavily on international loans to expand the supply. As of the 80's, these loans were not available to Brazil because, for political purposes, the Government kept the tariffs at an artificially low level. This situation ended up by undermining the payback capacity of the energy companies.

In the 90's, demand exceeded the supply and the Government did not have any other choice but privatizing. First, the distribution companies were privatized. Unfortunately, the generating and transmitting companies are still Government owned and no one knows for sure if and when they will be privatized. It has become a political issue.

In the meantime, energy consumption grew steadily, and rationing was the "final destination." Currently, most end-users have to reduce

their energy consumption by 20%; otherwise they will have to pay very heavy penalties.

This situation created a completely new business scenario. For many decades energy was abundant and cheap. Now we are facing different times! Good information, knowledge of the available options, and risks evaluation are aspects of higher importance. Energy has become an untamed animal!

As opposed to just paying the monthly bill, energy is now a business that involves technical, financial and management aspects. No doubt, energy has become much more complex.

REAL CASE OF A 5 MW DEMAND PACKAGING COMPANY

Dixie, a leading company in the packaging business in Brazil (cups for water, tea, yogurt and juice as well as tubs and lids for margarine) was connected at 13 kV and faced unplanned interruptions of about 50 hours/year, not to mention the voltage variations which were causing troubles associated with sensitive equipment. During the day the voltage was too low and at dawn too high, this with respect to the contractual voltage levels. The plant is in Votorantim, about 70 miles from São Paulo.

The proposed solution was a 138 kV connection. Our studies indicated that unplanned interruptions would be reduced by 90% and voltage variations by 50%.

Because of the rate structure in force in Brazil, this end-user would pay 30% less, which equated to US \$0.6 million/year at that time, if a 138 kV substation were constructed along with a 1/2-mile transmission line connecting the utility company to this new voltage level. The anticipated investment would be nearly US \$1.3 Million.

When this solution was proposed to the end-user, the reaction was: "it shows a real attractive pay back but this investment is not our top priority." "Go and find a solution in which a third party would invest." The third party would invest, operate and transfer the project after the contract term (that would be negotiated) in return of 90% of the savings (rate differential from 138 kV to 13 kV) actually generated in the monthly bill.

After 3 months, we were able to come up with investors that actu-

ally signed a 5-year (build, operate and transfer) contract. Nine months later, the substation was in commercial operation!

Dixie not only experienced a positive cash flow since the very beginning but also avoided losses that were associated with interruptions and voltage variations.

This case was so successful that other plants of the same group followed this business arrangement, which was presented in a paper at PowerGen '98 in Dallas, Texas.

REAL CASE OF A 0.5 MW INDUSTRIAL COMPANY

Quartzolit a leader in construction materials, belongs to the Lafarge group. The company was interested in reducing the energy bill of its plant in Jandira, 20 miles from São Paulo. After an energy audit, it became clear that one of the best options was using the existing diesel gen-set (reciprocating engine) during on-peak hours (3 hours each week-day).

The on-peak rates (13 kV voltage level) were in the range of US \$200/MWh. The variable costs (fuel, operation and maintenance) of the on-site generation was US \$100/MWh. The difference would result in an annual saving of US \$30,000 (derived from 300 MWh per year that was displaced from the utility company).

This case was special because it did not involve capital investments! The gen-set was already there and actually it was discovered later on that by using it a few hours on a daily basis better maintenance was achieved (as compared to the previous mode).

REAL CASE OF A 2.5 MW INDUSTRIAL COMPANY

Lalekla, a paper products company (disposable paper towels), located in São Paulo city, needed to reduce costs. Electric energy was among them.

The strategy included the following “inside-the-fence energy savings”:

1. Adjustable speed drives and soft starters associated with the electric motors—30 HP and above;
2. Replacement of electric resistance (used in a drying process) by ultra-violet lamps;
3. Setting up an energy management system to control on-peak and off-peak demands, which in Brazil are measured in 15-minute intervals;
4. Power factor. Nowadays a heavy penalty is incurred every hour, whenever it is under 92%.

The resulting savings were so important that Lalekla received an award from FIESP (Industry Federation of the State of São Paulo).

REAL CASES - STUDIES IN DEVELOPMENT

Cogeneration has become a new and interesting opportunity especially for end-users that need steam and electricity. There is a wide range of options to be discussed, mainly:

- (a) **Steam turbine driven thermal power plants.** Typically wood chips, sugar cane bagasse and fuel oil are the fuels of choice. The advantages of these power plants are that they can be locally designed and produced, they are very reliable, and their capital investment is under US \$1000/kW. Ideal projects are those which would produce all the steam and generate electricity in that condition. Usually, the electricity generated is not enough, therefore, the balance should be purchased from the local utility company. This arrangement provides the best payback when compared with other turbine sizes, which would enable the end-user to become independent from external supply of electricity.
- (b) **Natural gas driven power plants.** With the new Bolivia-Brazil gas pipeline, gas is a real possibility. It is clean and an excellent choice for applications involving prepackaged, factory assembled units. There are two modes that could be explored in most cases: with or

without supplemental firing. Depending on the interest and convenience to export excess electricity to the grid, the configuration will be defined considering, of course, the expected price for the excess electricity, contractual arrangements, and risks involved, not mentioning permitting.

Potentially, cogeneration is a new opportunity for end-users in search of solutions demanding more than a few MW and a minimum steam requirement of tens of metric tons per hour.

REAL CASE: THE ENERGY PORTAL www.guiaenergia.com.br

As already indicated, energy has become a very sensitive issue in Brazil. The need to access accurate information and analysis has created a new opportunity: the development of an Internet-based service.

Our company created and developed an energy portal centered in the end user. The first step was developing an audience. The portal was inaugurated in March 2000. Today, there are more than 5,000 visits per month and the weekly newsletter is delivered via e-mail to more than 10,000 people.

Now that an audience has been consolidated, the next step is the development of energy related services, such as consulting, search engines (used equipment) and a lot more.

The concept behind the portal is helping people to make well informed decisions in the energy arena.

It is great to be an energy engineer at these challenging times in Brazil!

ABOUT THE AUTHOR

Rafael Herzberg, P.E., is an electrical engineer (1976). He started his career at Construções Elétricas Eltec S/A, in Brazil, a leader in electric power connectors, in 1976. In 1987 he became its CEO until 1992. In 1982 he co-founded Interact Ltd., an energy consulting company in São Paulo. As its managing director Rafael is mainly involved with strategic consulting for industrial and commercial energy users including inside the fence energy savings and to the fence projects. He is a AEE member

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