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# Biodigestor: Rural Power Plant

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Brazilian energetic source is based in electric energy 39%, oil 31% and 30% distributed in other sources. The main source of electric energy is hydro power 85%, that is considerate a clean source of energy, but we must be warned about its social and environment impacts due to large areas that will be flooded.

Although this high numbers there are about 4.2 million people living without access to electric power. When we split between urban and rural population we found that 99.1% of urban families have access to electric energy when compared to rural which is 89.7%. We can affirm that the problem of lack of energy is concerned on rural poor families that live in deep regions of Brazil, where the power grid is unable to reach due to its high cost.

When the electric power reach a rural community there is a lot of gains, the industrial sector receives a new demand for appliances and other machines. This also happens in the service sector, because of the need of professionals able to install and provide maintenance. Some data of the Word Bank shows that for each $1 vested there is a $3 return through the supply chain. There is also a raise in the quality of life and productivity of the community.

To provide energy to these communities it must be a source based in small independent units, economically viable that also account the environmental problems. One option that fits these concerns is the use of biodigestors, which provide biogas, a form of bioenergy.

A biodigestor is basically a tank that is fuelled with animal dejects, like pork or chicken excrements, and in a sealed anaerobic microenvironment these deject is digested by methanogen bacteria producing as final products biogas and biofertilizer. The biofertilizer can be used for plant production, reducing the need of external fertilizer, and consequently reducing the fossil fuels that would be used to produce these fertilizers as the budget that would be spent. The biogas can be used directly as thermal energy when burned, or it can be concentrated to produce electric energy through the use of generators.

The biodigestor is not a new invent, the first unit was built in India around 1908, and in 1992 India already count 160 thousand units installed, China is another example with more than 8 million units nowadays. Even Brazil at 80s has built around 8 thousand units, but it have not the expected success.

The motifs that made the biodigestor unsuccessful in Brazil were mostly by lack of financial resources, high cost of the biodigestor, lack of human knowledge for its implementation, maintenance and technology development. These factors still a challenge for the biodigestor application, but today we have the tools to solve the problem.

The financial problem has a practical solution; studies showed that the biodigestor pays itself around five years after its installation, and the initial capital could be provide by the government, through programs like Pronaf - National Program to Fortify Family Agriculture, which give credits to rural poor families at low taxes, allowing them to develop their farm and pay back, what would be impossible at regular banks taxes. Another point is the fact that the , the social benefits from biodigestor is higher than the benefits gained by the families, with that in mind it is possible to apply a subsidy to balance the economy, allowing more biodigestors to be built.

Now the issue becomes to the Human resource; it is still a problem, and it probably could only be solve by capacitation of personnel, what could also be done using the same subsidy approach, since we have social externalities happening from this action.

Today we can say that the biodigestor adoption is a possible solution to solve the electric problem of rural families, the animal dejects problem in a clean way, and also provide biofertilizers. It is economically viable if the government have policies to provide the money. The biggest challenge is to empower people with the knowledge to make this system Work, and for that we rely on a government that wants to do that change. Since this idea become concrete, it is the natural flow that other farms also adopt this system, helping to build a more sustainable agriculture concerned with social issues.

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References:

OLIVEIRA, l.C. (2000). *Perspectivas para a Eletrificação Rural no Novo Cenário Econômico-Institucional do Setor Elétrico Brasileiro* (Master's thesis). Universidade Federal do Rio de Janeiro.

WALTER, Arnaldo. Fomento à geração elétrica com fontes renováveis de energia no meio rural brasileiro: barreiras, ações e perspectivas. In *Proceedings of the 3. Encontro de Energia no Meio Rural,* 2000, Campinas (SP, Brazil) [online]. 2003 [cited 06 December 2014]. Available from: <http://www.proceedings.scielo.br/scielo.php?script=sci_arttext&pid=MSC0000000022000000100028&lng=en&nrm=iso> .

http://www.mda.gov.br/sitemda/seaf [cited 06 December 2014]

http://www.eletrobras.com/relatorio_sustentabilidade_2013/sobre-o-relatorio/de-onde-vem-e-para-onde-vai-a-nossa-energia/ [cited 06 December 2014]

http://www.mda.gov.br/sitemda/seaf [cited 06 December 2014]