



# ELQUI GLOBAL ENERGY

TABLE 3 COMPARATIVE OF BIOGAS PROCESS NOPAL MANURE OF PORK AND COW

	Nopal / cactus	Cow and pig
<b>Raw material</b>	Nopal cultivated, nourished and developed for high biomass production	Manure, waste product
<b>Applications</b>	As livestock feed, human, energy production	As an organic fertilizer, energy generator
<b>Holding time</b>	8 - 24 hours	15-20 days
<b>Process temperature</b>	37 ° C, temperature controlled	5 - 30 ° C environment, temperature not controlled
<b>Energy</b>	5% consumption of the energy delivered in the process, the heat is delivered by hot water from the cooling system of electric generators,	The energy required may be greater than that generated by the system. The heat is delivered by hot water from the cooling system of electric generators,
<b>Facilities</b>	The production of 1 MW of electricity requires 1 reactor of 1300 m3	The production of 1 MW of electricity requires the installation of 15 reactors of 1,300 m3
<b>Heating</b>	Electric generators generate more than 200% of the necessary heat from the process. Only a fraction is used for reactor heating	The heat is delivered by hot water from the cooling system of electric generators, but it is insufficient to maintain a stable mesophyte temperature. It will require 15 times more hot water to heat 15 reactors and produce the same energy
<b>materials</b>	Carbon steel is used, nopal does not produce hydrogen sulfide, equipment that uses natural gas is adequate.	Stainless steel must be used throughout the process line in contact with biogas, biodigesters, purifying blowers, electric generator
<b>Waste</b>	Approximately 1% of the nopal is not processed, it contains lignin or fibers digestible by bacteria, 99% is water or biomass that is transformed into water with nitrogen, nutrients and usable Biogas. This effluent has no odor and is used in the plantations, it is recycled	The material digested by bacteria depends on the diet of the animals and its composition. It usually has a strong rotten egg odor corresponding to hydrogen sulfide.



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<b>Production capacity</b>	The process is elastic and can be regulated from 10% to 100% of the installed capacity. Production is adjusted by feeding reactors, if more energy is required, more nopal is cut and reactors are fed, there is no accumulation of material, the nopal remains in plantations until it is necessary to cut it.	The process is adjusted to the amount of animals and excreta that are generated daily, the accumulation of excreta generates environmental problems, therefore everything produced must be processed. You cannot increase or decrease the number of animals daily. It is a more rigid process.
<b>Scalability</b>	If there are available areas, you can plant nopal and produce energy	Scalability is limited to the number of animals and their excreta.
<b>Systems stability</b>	Operating with nopal feeding, the systems are stable for years. The raw material is stable.	They are sensitive to the antibiotics used for the main activity of animal husbandry which can cause the total arrest of bacteria inside reactors. Likewise, temperature variations that affect energy production.
<b>Maintenance</b>	The equipment is similar to that used in natural gas, for this reason its maintenance is very low and they are of long duration. Reactors operate for years without stopping. The designs use locally available materials and equipment.	It requires more maintenance of the equipment in contact with the H <sub>2</sub> S from the biogas, the spare parts are more expensive when using stainless steel. Imported equipment with resistance to corrosive materials.
<b>Digesters</b>	They are specific for nopal considering its rheological characteristics and composition of biogas, bacterial catalysts and construction materials.	They are usually designed for different excreta, both cow and pig are the most common, there are multiple designs depending on the characteristics of the areas and especially process temperatures.