

# Women's perceptions on the integration of solar powered home systems and biogas and its potential to improve gender disparities in energy.

M MURAMBADORO\* & H TAZVINGA

\* CSIR Natural Resources and the Environment PO Box 395, Pretoria, 0001 Email: mmurambadoro @csir.co.za

South Africa's Department of Energy seeks to deliver adequate and affordable energy to rural communities by providing a mix of alternative energy resources at a reasonable cost. The extension of the national grid to the rural areas has been hampered by several factors such as long distances, high cost of tension lines and the relatively low energy demand in rural areas which does not compensate the cost of long-range transmission lines from the national grid. Availability and access to commercial fuels is very low due to high costs of fuels which are exacerbated by high delivery costs to rural areas. Traditional energy sources such as firewood are becoming scarce and expensive. The current rate of collection and use of wood is not sustainable as woody biomass is harvested at a rate greater than trees are being planted and allowed to mature. Rural livelihoods depend on natural resources and their depletion coupled by the impacts of climate change makes the poor even more vulnerable. The government has rolled out thousands of solar home systems, but these can only cater for lighting and entertainment. This paper looked at women's perceptions on the feasibility of integrating of biogas in the rural energy mix to address their thermal needs in rural Limpopo. Women's health suffers from hauling heavy loads of wood for long distances and from cooking over smoky fires. Biogas has the potential to reduce women's workload which empowers them as they have more time to participate in educational, social, economic and political activities.

## Key words

Biogas, renewable energy, gender, women, solar home systems

## Introduction

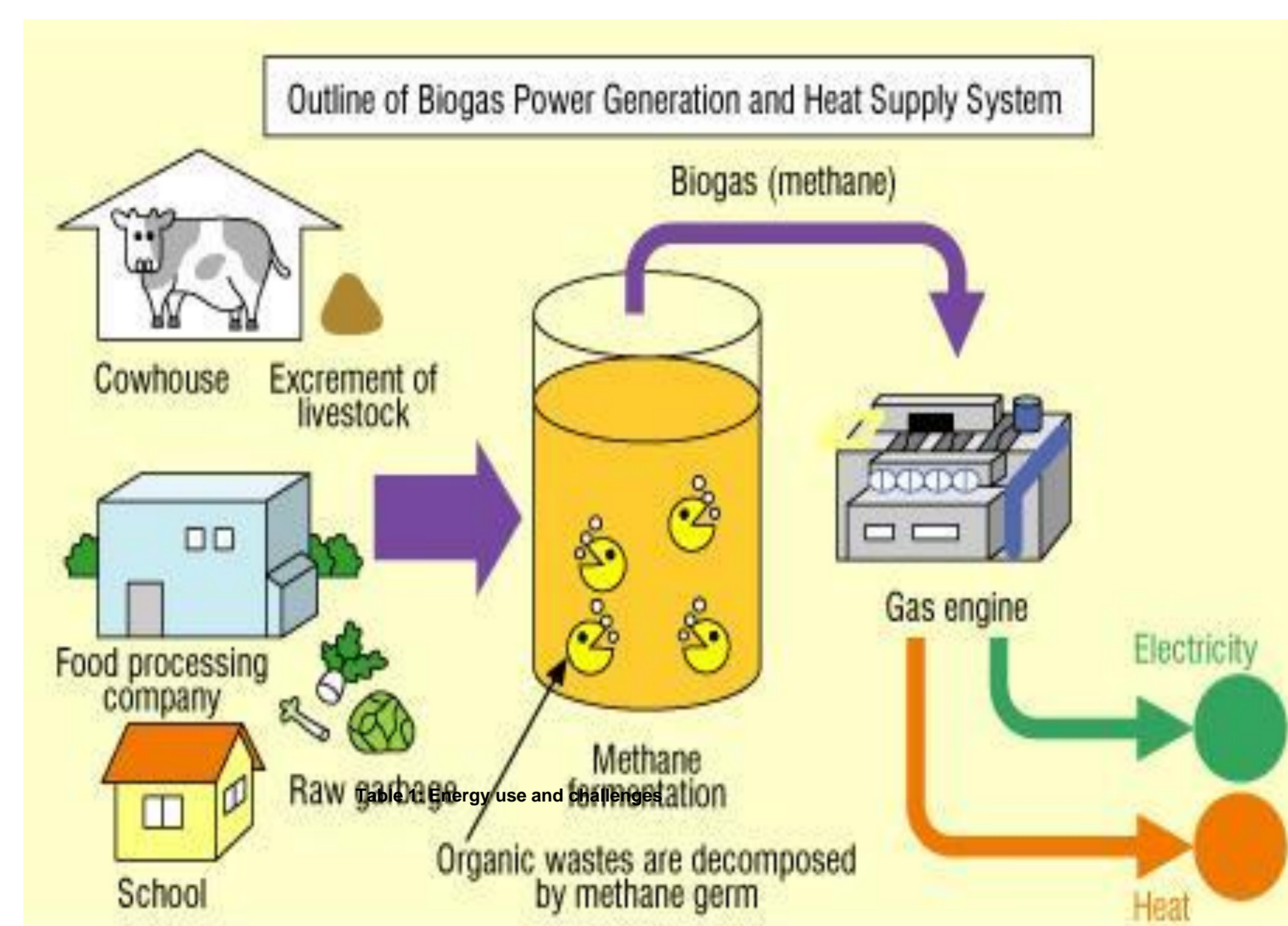
There are about three billion people who are unable to obtain clean, safe fuels and must rely on burning traditional biomass fuels such as wood, dung and crop residues (World Bank 2010 & 2011). Social advancement and economic development in these areas is constrained by limited access to efficient and affordable energy sources. Poor women in rural areas of developing countries generally have a more difficult time compared to men, due to their traditional socio-cultural roles. Women usually spend long hours collecting fire wood and carrying it back home over long distances. Their health suffers from carrying heavy loads of firewood and water and from cooking over smoky fires (FAO, 2006). The South African department of energy has initiated the solar home system project aimed at providing rural households with a basic lighting system for audio-visual purposes and 10 500 homes in Limpopo benefited from this project. Priority areas were those that would not get access to grid electricity in five years.

Women carrying heavy loads of firewood



## Biogas technology

Biogas typically refers to the gas produced by the anaerobic digestion of organic matter including manure, sewage sludge or any other biodegradable waste. Biogas technology is one of the mature renewable energy technologies to produce energy from bio-wastes [Rai, 2006]. The organic materials needed for producing biogas are readily available and often considered as waste or pollutants in most rural areas.



## Results

54 female participants were interviewed to get an understanding of their energy needs and perceptions on biogas. The table 1 below shows the current energy sources that women in the study area use and challenges with each energy source.

- Main sources of income were social grants and pension (43 households), a combination of the social grants and pension with remittances (19), self-employment (8) and formal employment (1).
- 31 of the 54 households were involved in agricultural activities i.e. maize production, cattle, goat, pig sheep and chicken rearing. Waste from pit latrines could also be used to produce biogas
- Cannot buy appliances such as fridges and stoves.
- All the women said they would use biogas
- 40% of the women said they will be more comfortable if they could get a model of a bio-digester first
- The unit cost of a 6m<sup>3</sup> biogas plant is about ZAR 23 575 (US\$ 3368) and this is comparatively more expensive than solar home systems program where you just pay R100 for installation and R28/month for maintenance.
- +80% of the participants prefer red having their own bio-digester than a communal bio-digester. However each household did not make enough waste to provide gas to meet their thermal needs but communal bio-digesters would be more feasible and ensure that even those households that do not have animal and agricultural feedstock also benefit. It is also cheaper as costs are shared among several households.

Energy source	Use	#of households using it	Problems
Solar PV	Lighting and Entertainment (TV & radio)	54	<ul style="list-style-type: none"> <li>• Does not meet thermal needs,</li> <li>• Cannot be used for cooking</li> <li>• Battery does not charge when its cloudy</li> </ul>
Firewood	Cooking and heating	45	<ul style="list-style-type: none"> <li>• Expensive to buy R300-450 per load</li> <li>• Walk long distances to get it.</li> <li>• Deforestation</li> <li>• Expensive</li> </ul>
Paraffin	Cooking and lighting	33	<ul style="list-style-type: none"> <li>• Travel long distance to buy it</li> <li>• Smoke that is harmful to health</li> <li>• Not safe around children</li> </ul>
Candles	Lighting	27	<ul style="list-style-type: none"> <li>• Expensive to buy</li> <li>• Does not last</li> <li>• Not safe around children</li> </ul>
Dried animal dung	Cooking, heating	12	<ul style="list-style-type: none"> <li>• Smoke that is harmful to health</li> <li>• Does not last</li> <li>• Not safe around children</li> </ul>
Dry Battery cell	Entertainment	3	<ul style="list-style-type: none"> <li>• Does not meet heating &amp; cooking needs</li> <li>• Does not last</li> </ul>
Car battery	TV and radio	2	<ul style="list-style-type: none"> <li>• Does not meet heating &amp; cooking needs</li> </ul>
Agricultural waste	Cooking and heating	1	<ul style="list-style-type: none"> <li>• Not reliable only available at certain times</li> <li>• Does not last</li> <li>• Smoke that is harmful to health</li> </ul>

## Discussion

It is technically feasible to combine solar powered home systems and community bio-digesters to meet community thermal needs with the biodegradable waste in these villages. Mainstreaming gender in energy for development is important because most of the world's poorest people are rural women. These women depend on subsistence agriculture to feed their families and are disproportionately affected by the lack of modern energy sources for farming, household maintenance and productive enterprises. Women could play a crucial role in climate change mitigation strategies by using biodegradable waste to produce energy, fertiliser while reducing greenhouse gas emissions. Biogas would also replace firewood saving women time and money however, more work needs to be done to see the best possible financial implementation model. South Africa, like other emerging economies wants to ensure economic growth and environmental protection. Integration of biogas in the energy mix has the potential to stimulate productive activities and economic growth in rural areas, improve the living standards of the poor and reduce rural urban migration. It also ensures the availability of affordable, reliable and sustainable energy service delivery which is the main driving force for policy on energy access

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