Note on IRESA and Bio PROM Enterprise

IRESA: *Integrated Renewable Energy and Sustainable Agriculture*

A Bio Gas model which connects the crop-livestock system with a social enterprise model delivers a sustainable solution to address the present agriculture crisis. It efficiently connects and addresses the disjointed yet highly relevant pain points in establishing access to renewable energy, organic production inputs, and generation of gainful self-employment and substantiates farmers' income by reducing the overall cost of production in long run.

BAIF has conceived the "*Integrated Renewable Energy and Sustainable Agriculture* (IRESA)" approach that presents a complete package comprising a portfolio of activities around the central theme of household-level biogas units. The IRESA approach can be a feasible solution for promoting sustainable farming and clean energy use practices. The IRESA approach focuses simultaneously on the optimal use of existing resources for sustainable energy generation for cooking, as well as value-added organic manure production for soil fertility.

IRESA units are multifunctional and deliver cost-effective integrated solutions to key challenges in underserved geographies.

(a) Provides an integrated model to address soil degradation and poor soil fertility, due to extensive chemical fertilizer usage.
(b) Produce value-added Organic manure and products which can help reduce the use of chemical fertilizers and thereby check the degrading soil health issues;
(c) Provides drip enable liquid slurry which helps in the growth of soil beneficial bacteria near the root zone of the plants
(d) Reduce dependency on LPG and kerosene for cooking and lighting purposes;
(e) Remove the need for the collection of firewood, which reduces the drudgery on rural women and children who undertake his task, as well as help preserve forests.
(f) Generate savings on India's foreign exchange by reducing the import bills associated with Phosphate based chemical fertilizers (31.54% P2O5 Beneficiated Rock Phosphate available in India) and LPG import.
(g) The model is a comprehensive model, providing a solution to household fuel needs as well as is socially, economically, and environmentally relevant.

These household-level IRESA units will be installed with small farmers fulfilling the following pre-requisites.

- Household-level availability of 3 milking cattle (2m3 unit shall generate organic cakes of 1 Ton per annum and the biogas generated shall be sufficient for a HH with 4-6 members for cooking)
- Installation area requirement of approximately 300 square feet. The area should be near the house or farm. Preference should be given to the location near the house. The distance between the unit and the kitchen should not be more than 150 meters.

The IRESA approach focuses simultaneously on the optimal use of existing resources for sustainable energy generation for cooking, as well as value-added organic manure production for soil fertility. By giving proper training and guidance to Farmer Producer Organizations, the IRESA approach can be made operational as a rural enterprise. Unique factors of the model are

- Pre-fabricated biogas unit (2 m3, family size) which is compact, standardized, failure-proof, and clean.
- Ergonomic & efficient slurry handling through an in-house developed low-cost filter (BAIF Slurry

Filter*).

- 90% solids recovery, about 1.5 tons (DM) slurry cake per annum. Up to 50% water recycling. Solids – liquids separation.
- Value addition of filtered slurry (residue and filtrate) for enhanced in-situ production of quality organic nutrients resulting in reduced chemical fertilizer use.
- Production of **drip-enabled filtered slurry (about 10,000 lit/year)** for enhanced production of quality products resulting in reduced chemical fertilizer use.
- About 4 CER per year generated with IRESA unit

Activity	Total GHG emissions	Abatement potential for 200 units		Reference from
IRESA with 5G filter – 200 Units	43.8 MtCO2e/year with no installation	43.8 MtCO2e/ year	100% by installing each unit of 2 m³ capacity	Calculated on the basis of replacement of 2920 kg firewood + 2 LPG, and capture of methane from dung (Per unit calculations Annual Dung per unit (40kg*365) =**14600,** Biogas production (.5% per kg)=7300, Ch4 % in biogas (75%)=**5475 kg,** Carbon equivalent (25 CH4 is 1 CO2) = **219 kg CO2e/per unit**)

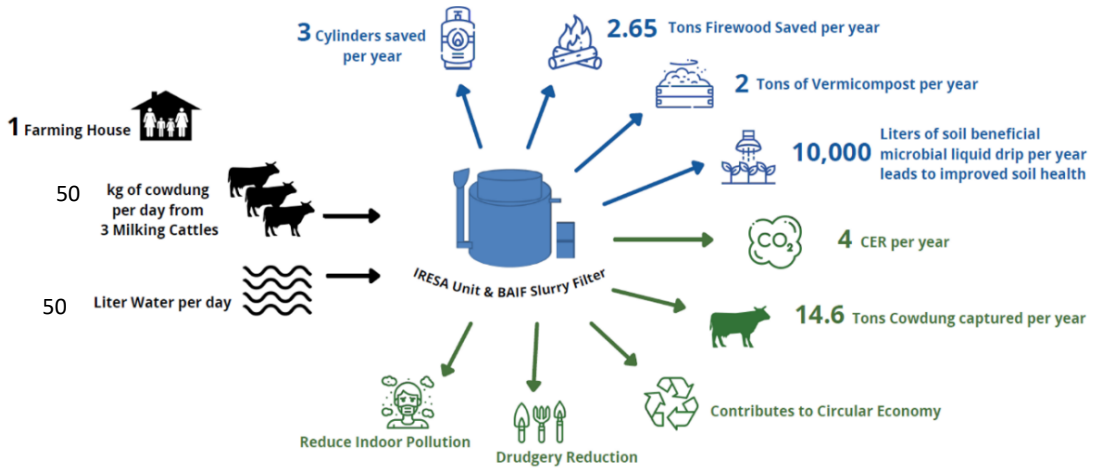

FIG1: IRESA INPUT AND OUTPUT

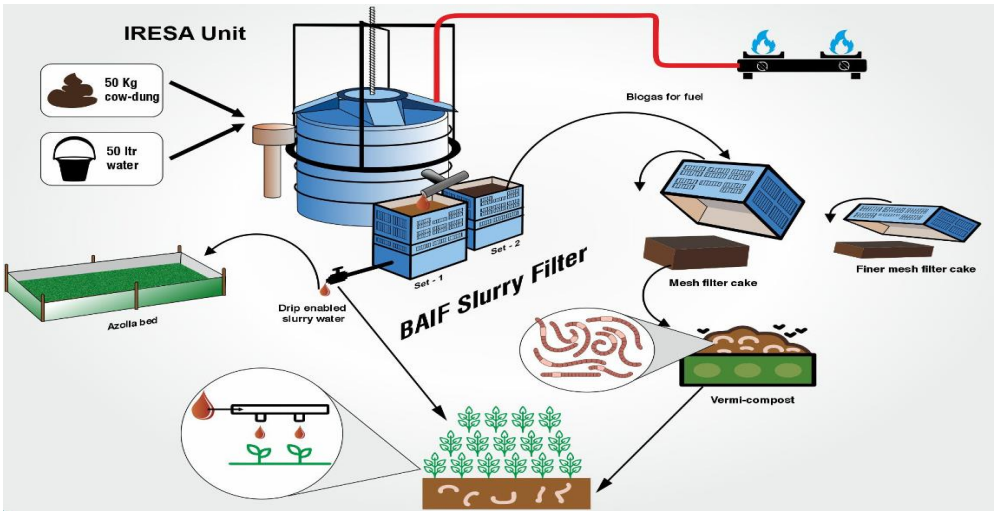

Figure 2: IRESA UNIT HH level usage and operations