

## CONCEPT NOTE

<b>COVER PAGE</b>	
<b>Project Title:</b> CO <sub>2</sub> separation from biogas produced by the biomethanation of agricultural waste and livestock manure in village-based communities in West Bengal, India	
<b>Location:</b> Village Ullon, 24 Parganas (S), West Bengal.	<b>Date:</b> 4 <sup>th</sup> April, 2010
<b>Project partners:</b>	
<i>Project Holder:</i> South Asia Voluntary Enterprise (SAVE), Glasgow, UK	
<i>Lead Partner:</i> Society for Appropriate Rural Technology for Sustainability (ARTS), Kolkata, India (A member of the Sankalpa Trust Group)	
<i>Local Partner:</i> Vivekananda Sevakendra-O-Sishu Uddyan (VSSU), Village Ullon, India	
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<b>Themes addressed in the Project Proposal:</b>	
<p>In response to MDG Goal 7: “Ensure environmental sustainability”, the <b>goal</b> of this project is to establish a technologically appropriate and commercially viable model for the separation of CO<sub>2</sub> from biogas that has been produced by the biomethanation of waste biomass, for the benefit of the poor people living in Village Ullon, and village-based communities in India in general, by indirectly providing both energy and food security to beneficiaries from one, multi-faceted appropriate technology intervention, as well as meeting the nutritional requirements of especially the children, and empowering the women by providing gainful self-employment opportunities</p> <p>The <b>primary objective</b> of this project is to establish a cost-effective and viable model for sustainable livelihoods and rural development, based on (a) biomethanation of human, livestock and agricultural biomass waste into ‘biogas’ to provide for energy security (see Annex-2 for details); (b) separation of CO<sub>2</sub> from the biogas using an appropriate technology that will be developed in this project, and to store CO<sub>2</sub> for future use, and (c) to enhance the productivity and growth of Spirulina as a Micronutrient ‘Super Food’ (see Annex-3 for details) to meet the nutritional requirements of children and empower women living in poor, village-based communities by providing sustainable livelihood options.</p> <p>A <b>secondary objective</b> of this innovative project is to clean up the environment and minimize dumping of waste by-products into open spaces and pollution of water bodies, by integrating the biomethanation and spirulina processes into a mutually supporting waste management and recycling system, such that a substantial portion of the waste output of (a) the biomethanation processes become the input raw materials for the spirulina growing and aquaculture processes; and (b) the spirulina and aquaculture processes provide a significant amount of the biomass inputs required for biomethanation.</p>	
<b>Funding requested:</b> Rs. 1,296,703 [~ £ 19,069 @ Rs 68 to £1]	
<b>Proposed project start date:</b> 1 <sup>st</sup> October 2010	<b>Duration of Project:</b> One year

## Concept Note:

CO<sub>2</sub> separation from biogas produced by the biomethanation of agricultural waste and livestock manure in village-based communities in West Bengal, India.

Submitted to: **South Asia Voluntary Enterprise (SAVE), Glasgow, UK**

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### 1 Preamble

Biomethanation of biomass waste results in biogas in which the fraction of CO<sub>2</sub> is comparable in quantity with the flue gas itself. Depending on the feedstock and the production process, this biogas contains between 35 and 45% of CO<sub>2</sub>. The remainder is Methane (CH<sub>4</sub>), with some trace gases and elements. This large CO<sub>2</sub> fraction makes pre-combustion CO<sub>2</sub> capture technologies commercially viable. The separation of CO<sub>2</sub> from biogas has the following advantages:

- After removal of CO<sub>2</sub>, The high quality of methane can now be used as an ultra-clean and *carbon-negative* biofuel, for use in (a) electrical 'gensets' to produce electricity; (b) in biogas lamps for domestic illumination/home use or street lighting; or (c) bottled for use in home lighting, cooking or automotive applications.
- The stored CO<sub>2</sub> can be used in a wide range of industrial applications, but more importantly in our village-based context, it can improve the productivity and cultivation of Spirulina micronutrient—the 'Super Food'; this innovative approach<sup>1</sup> for an integrated health, waste management and energy generation program for rural communities is discussed in greater detail in Annex-1.

#### 1.1 Goals and objectives

In response to MDG Goal 7: "*Ensure environmental sustainability*", the *goal* of this project is to establish a technologically appropriate and commercially viable model for the separation of CO<sub>2</sub> from biogas that has been produced by the biomethanation of waste biomass, for the benefit of the poor people living in Village Ullon, and village-based communities in India in general, by indirectly providing both energy and food security to beneficiaries from one, multi-faceted appropriate technology intervention, as well as meeting the nutritional requirements of especially the children, and empowering the women by providing gainful self-employment opportunities.

The *primary objective* of this project is to establish a cost-effective and viable model for sustainable livelihoods and rural development, based on (a) biomethanation of human, livestock and agricultural biomass waste into 'biogas' to provide for energy security (see Annex-2 for details); (b) separation of CO<sub>2</sub> from the biogas using an appropriate technology that will be developed in this project, and to store CO<sub>2</sub> for future use, and (c) to enhance the productivity and growth of Spirulina as a Micronutrient 'Super Food' (see Annex-3 for details) to meet the nutritional requirements of children and empower women living in poor, village-based communities by providing sustainable livelihood options.

A *secondary objective* of this innovative project is to clean up the environment and minimize dumping of waste by-products into open spaces and pollution of water bodies, by integrating the biomethanation and spirulina processes into a mutually supporting waste management and recycling system, such that a substantial portion of the waste output of (a) the biomethanation processes become the input raw materials for the spirulina growing and aquaculture processes; and (b) the spirulina and aquaculture processes provide a significant amount of the biomass inputs required for biomethanation.

<sup>1</sup> This project has the potential of becoming the centerpiece of sustainable village and rural development, as it has important links and synergies with other sustainable and appropriate technologies that have already been demonstrated and implemented elsewhere, most notably, at the Sankalpa Research Center at Village Baidyapur, Nadia—which promotes appropriate technologies and participatory practices for sustainable rural development<sup>[1]</sup>.

