SCIENZA PER AMORE

BITS OF FUTURE: FOOD FOR ALL

A Project for an Integrated Facility for Food Security, Renewable Energy and Agricultural Improvement in Developing Countries

Objectives

The aim of this project is to optimize the use of agricultural resources in developing areas, creating an integration between industry, agriculture and livestock farming able to facilitate the promotion of economic and social growth. Food shortage and poverty can be overcome by the production of fodder, food, energy and fertilizers.
The industrial site, with Hyst technology at its center, is in fact able to meet food and energy needs and at the same time supply organic fertilizers that improve fertility and the structure of the land.

The main objectives of the project are:

- encourage the development of concrete industrial realities related to agricultural activities;
- create ample employment opportunities in rural areas;
- produce animal feed to improve animal production and promote semi-sedentary livestock farming practices, which are more profitable and have lower impacts on the land;
- provide electricity to the population in order to improve their living conditions;
- provide farmers with fertilizers suitable for enhancing production levels in order to counteract the phenomena of soil mineralization and desertification.

Instruments

The instrument to achieve these goals is Hyst technology. Hyst is able to make the best use of biomass with little nutritional value to obtain energy and food.
The raw material utilized derives from agricultural by-products of marginal value such as cereal straws and residues from agricultural activities that cannot be used (e.g. cotton straw and groundnut and date palm waste).
The plant unit is designed to be self-sufficient with respect to energy and water needs; it is therefore able to operate independently of the infrastructures existing in the destination area.

Functionality

The integrated system proposed here is based on a small industrial unit which uses Hyst technology and produces feed for ruminants and matrices suitable for generating energy via anaerobic digestion.
Alongside the Hyst unit there will be farms for cattle and camels, or other livestock characteristic to the installation areas concerned, as well as an anaerobic digestion unit for the production of electricity. There will also be wells to provide water. The Hyst plant will transform waste and residues from agricultural and livestock farming activities into matrices for the production of energy.
In fact, the matrices generated by the Hyst unit, together with the manure, will be treated in the digester. Approximately 1/3 of the electricity generated will be used to power the industrial plant and the water well pumps; the remaining 2/3 of the electricity generated will be fed into the local power grid.
The anaerobic digestion plant is equipped with suitable means to separate the solid fraction of the digestate from the liquid fraction. The latter is recycled to reduce water consumption to a minimum, while the digestate is transported to the fields, where it is conveniently used as organic fertilizer.
It should be noted that in order to function the integrated farm uses only 1/3 of the feed produced. The remaining 2/3 can be placed in the local market to supply or support the livestock sector throughout the year, particularly during the dry season.

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SOME PARAMETERS OF THE SITE

Raw material:

Waste and agricultural residues: 6.500 t/year

corn and groundnut cake: 800 t/year

Livestock: 500 beef cattle
Energy production: 400 kW_e

Production:
Feed for ruminants, 3.500 t/year
About 2.000 cattle per year (total live weight of about 650 tons)
About 2.800.000 kWh of electricity (of which 940.000 kWh to power the site and 1.860.000 kWh for the external power grid)
About 6.000 tons of organic fertilizers

Surface area: about 2,5 hectares
Workforce: about 20

INTEGRATE PROJECT

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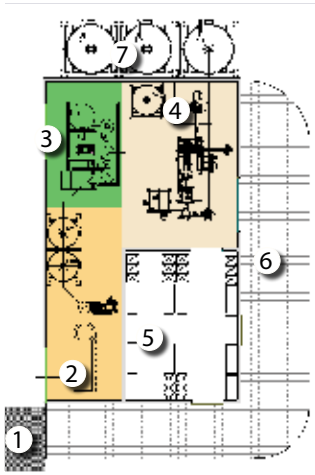
Biogas plant

BIOGAS PLANT LEGEND

1 Primary and secondary digesters
2 Pumping station
3 Digester feeder
4 Cogeneration equipment
5 Pre-load tank
6 Digester draining tank
7 Liquid storage drain
8 Solid-liquid separation
9 Separated solid storage
10 Final storage basins

Feedlot for beef cattle

Hyst plant



PLANT HYST LEGEND

1 Straw bales storage area
2 Loading Bins
3 Hyst plant
4 Pelletizing of animal feed
5 Feed pellet storehouse
6 Loading platform
7 Storage bins

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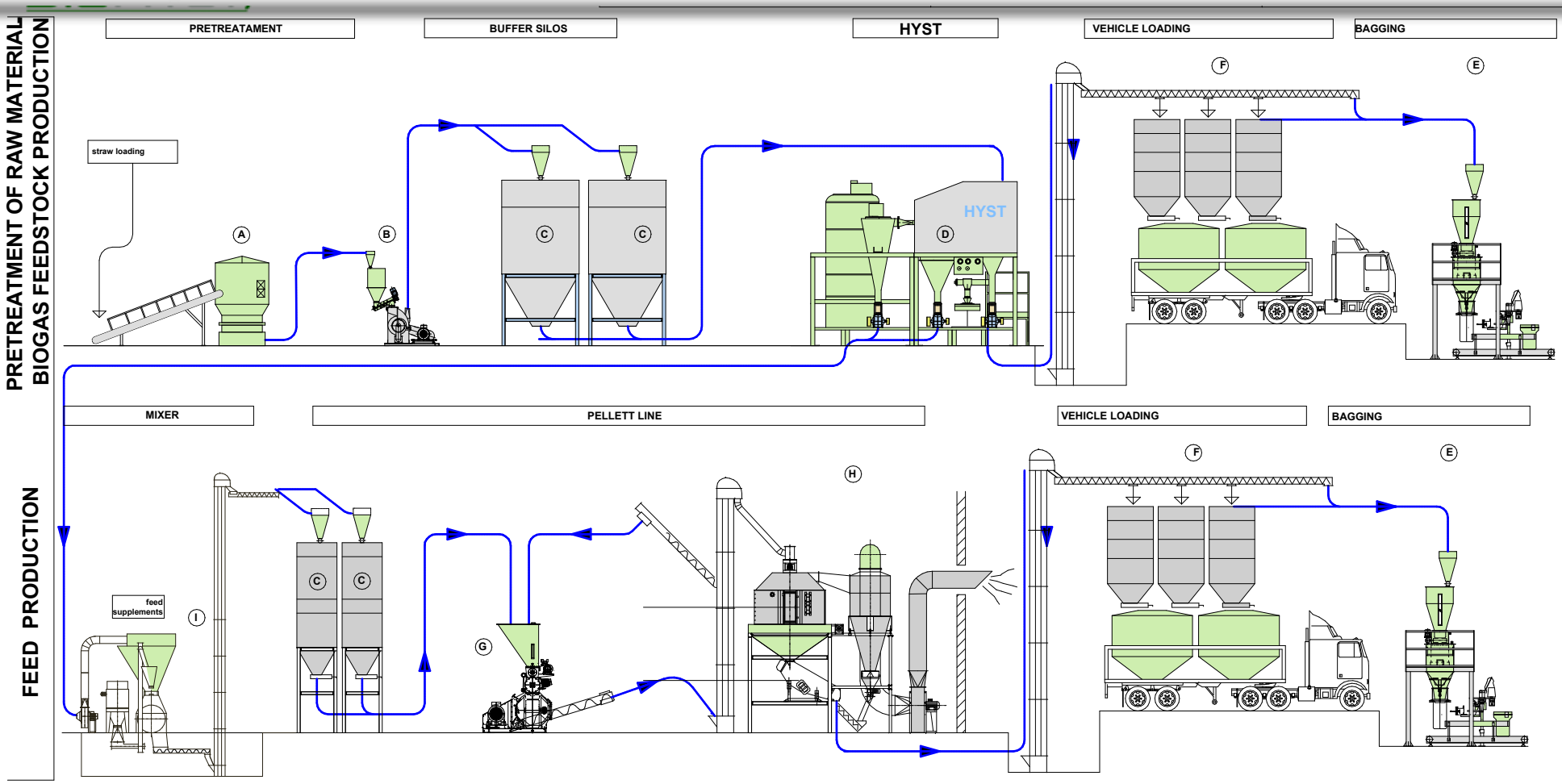
The pilot plant



LEGENDA

- (A) BALE BREAKER
- (B) HUMMER MILL
- (C) BUFFER SILOS
- (D) HYST PLANT
- (E) BAGGING MACHINE
- (F) STORAGE BINS AND VEHICLE LOADING
- (G) PELLETTING PRESS
- (H) COOLING AND SIEVING
- (I) MIXER (OPTIONAL)

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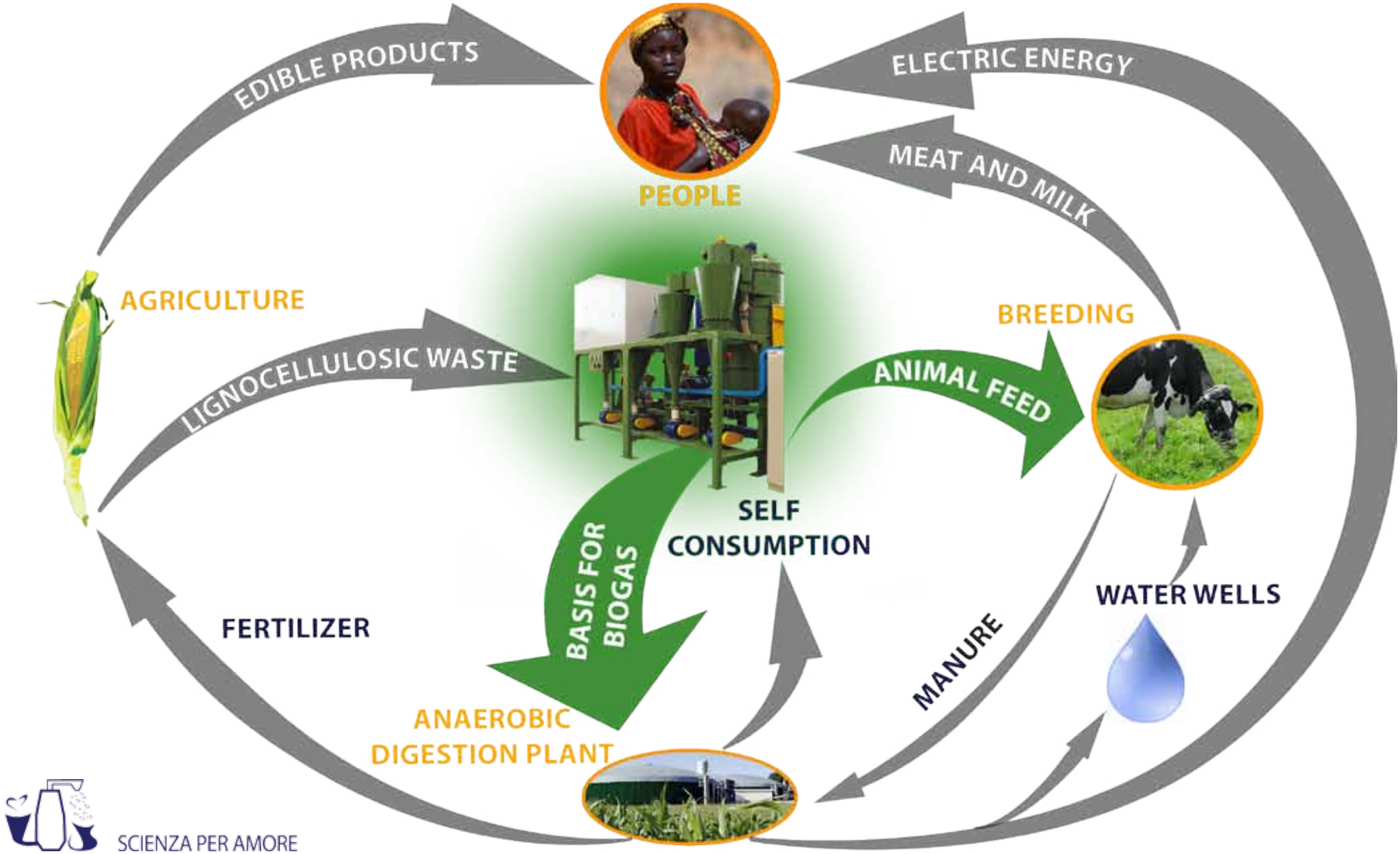
Schematic flow chart of the integrated production cycle



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