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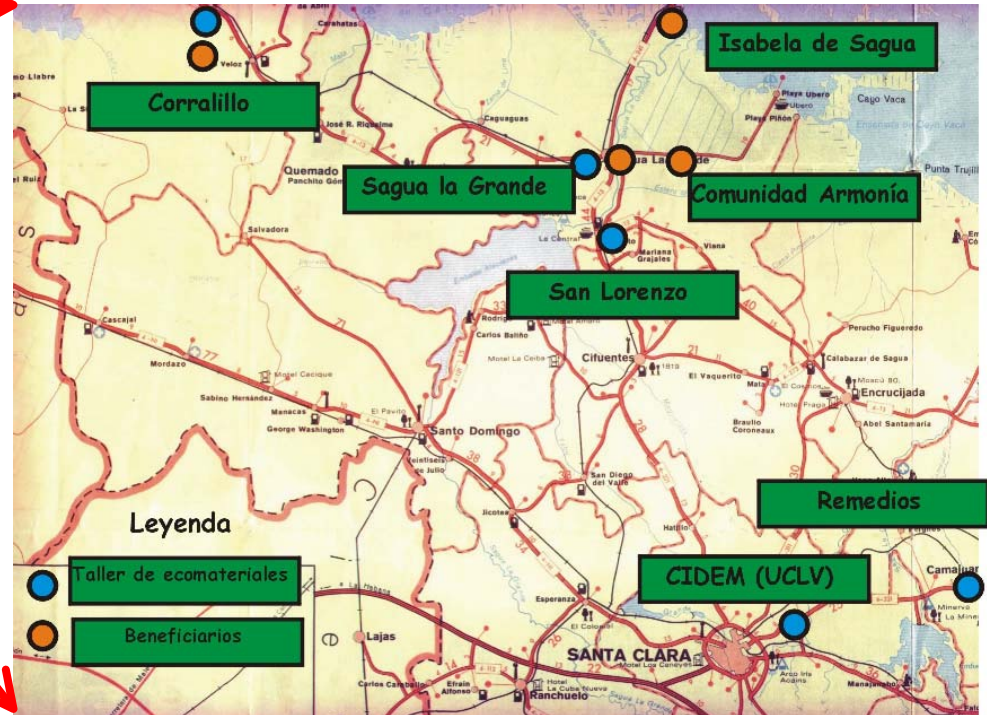
WASTE TO ENERGY TECHNOLOGIES TARGETING THE POOR. THE CUBA CASE STUDY



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PROJECT OBJECTIVES

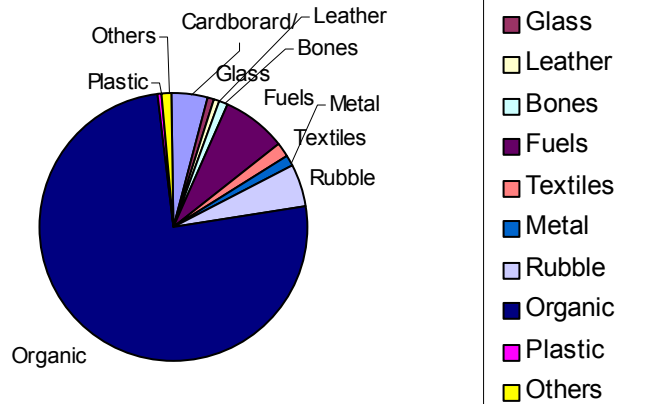


The project focuses on the recycling of wastes for the production of energy and building materials...

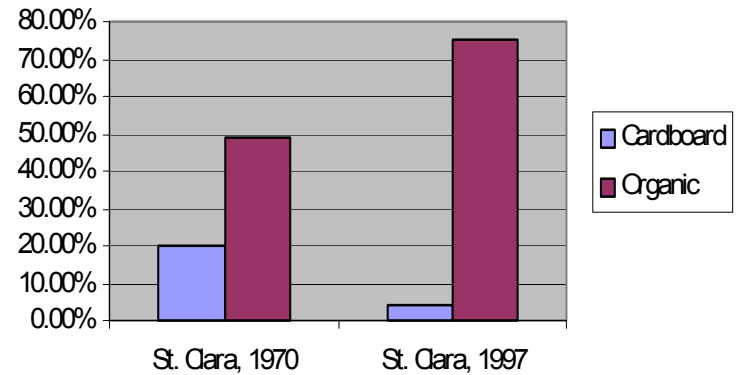
It is implemented in the northern part of the Villa Clara province, in the center of Cuba, where CIDEM undertakes social projects since 1996....

SOLID URBAN WASTES AS WASTE BIOMASS

Composition of SMW at Villa Clara province, 1997

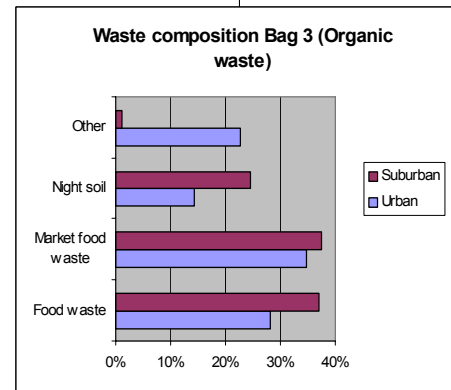
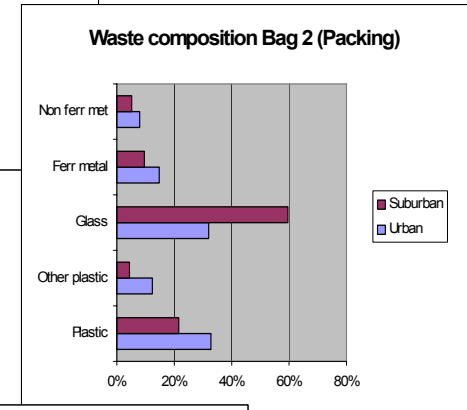
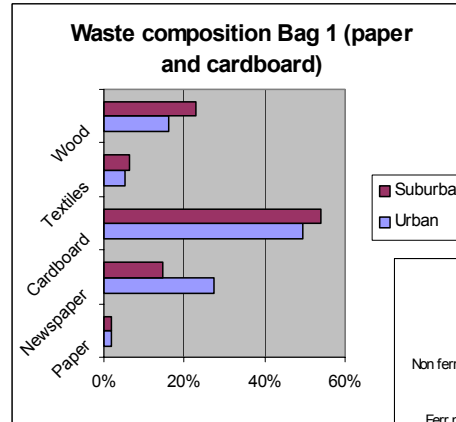
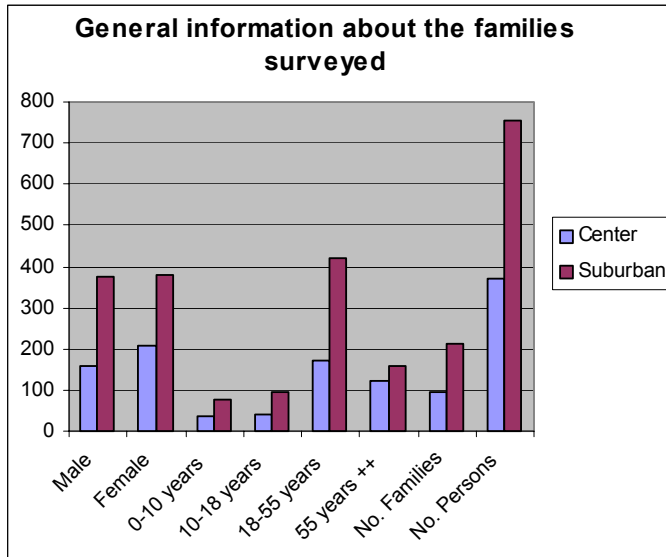


Composition of waste in St. Clara



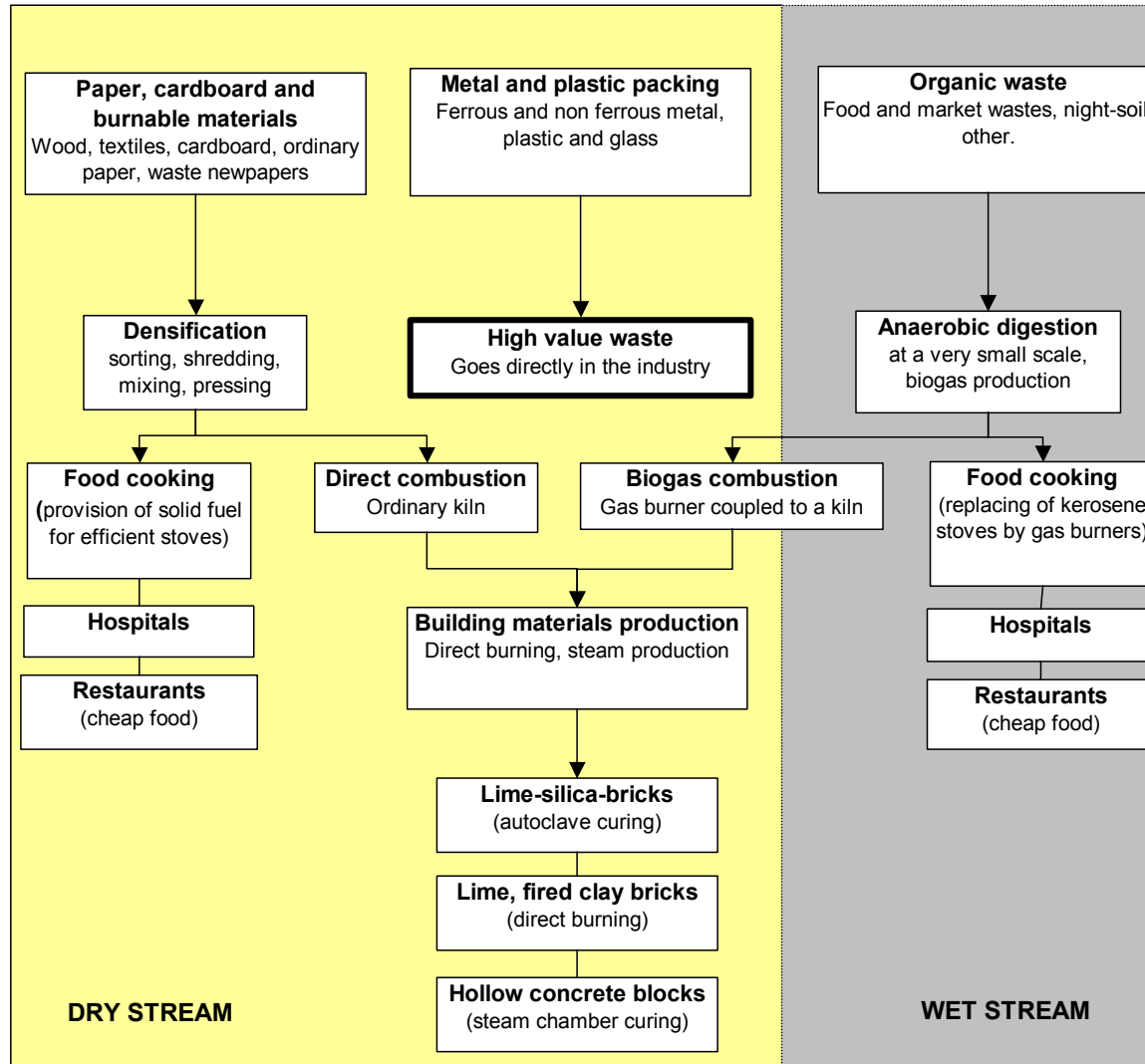
Solid Urban Waste (SUW) is one of the most interesting sources of waste biomass, especially in rural settlements where most of the SUW is organic...

SUW SURVEY IN SAGUA LA GRANDE



As a first step, a SUW full survey was implemented in Sagua la Grande, a 40,000 inhabitants city north of Santa Clara, to verify the figures on SUW generation...

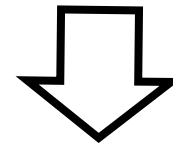
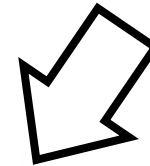
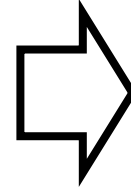
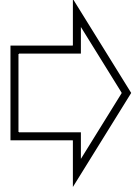
RECYCLING LOW-VALUE WASTE



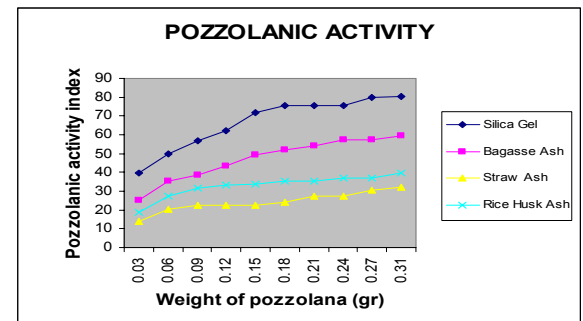
There is a great potential for recycling low-value wastes at small scale production...

...this does not conflict with the large recycling industry, since added-value waste is of little interest for this project...

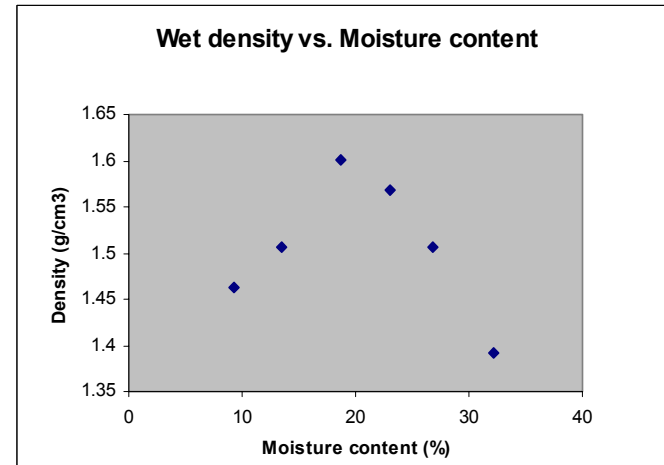
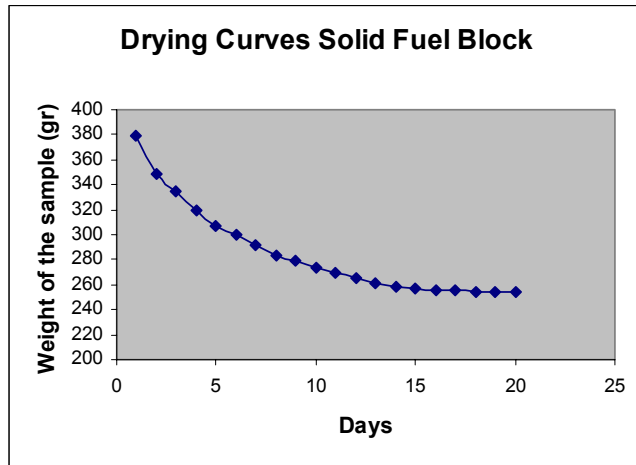
THE SOLID FUEL BLOCK (SFB)



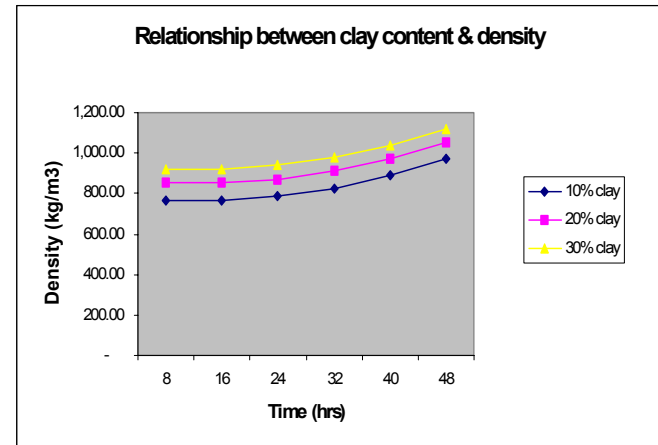
The SFB is the first step of the new technology developments... It is basically waste biomass and clay pressed into small briquettes... The ashes resulting from the combustion are highly pozzolanic...



THE SOLID FUEL BLOCK: TECHNICAL REQUIREMENTS



The waste biomass and the clay are wet mixed and pressed in a low pressure hand press...
...then the block is dried out under the sun...
...the normal proportion clay/biomass ranges from 15/85 (%) to 30/70 (%)...



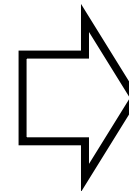
THE SOLID FUEL BLOCK: MANUFACTURE



Finely ground biomass is mixed with clay....



The wet mixture is pressed...



The resulting briquette is set to drying...

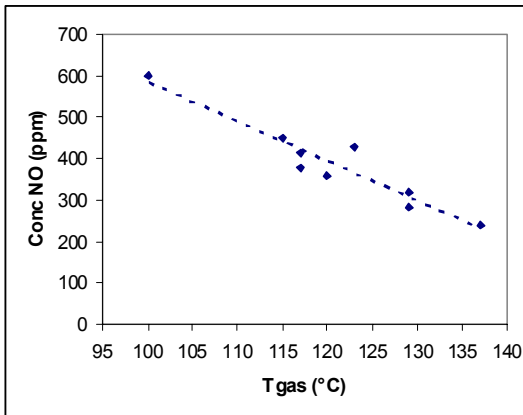
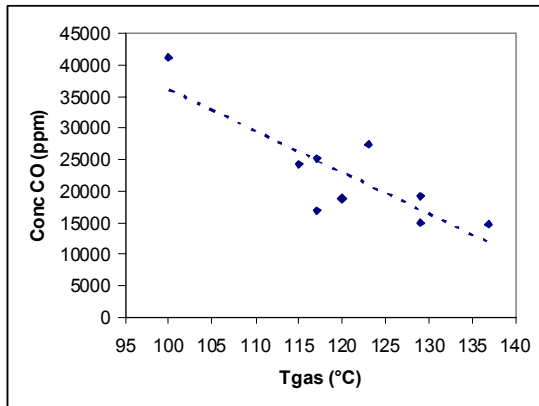
Firewood Price x m3	SFB optimal scenario			SFB minimal scenario		
	Price x m3	Price x unit	Days for BEP	Price x m3	Price x unit	Days for BEP
58.80	58.80	0.13	14	39.06	0.09	18

The SFB competes in price with ordinary firewood...

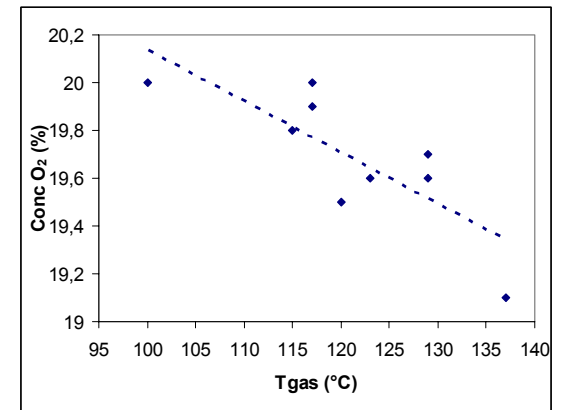
THE SOLID FUEL BLOCK

Biomass Used	% clay	Combustion Heat (H_0) (kJ/g)	Ratio Hg (SFB)/Hg (normal)
Rice Husks	28%	10.96	60%
SC Bagasse	20%	13.85	75%
SC straw	25%	17.87	Not available

In terms of Calorific Value, the SFB still qualifies as a suitable fuel...


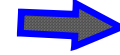



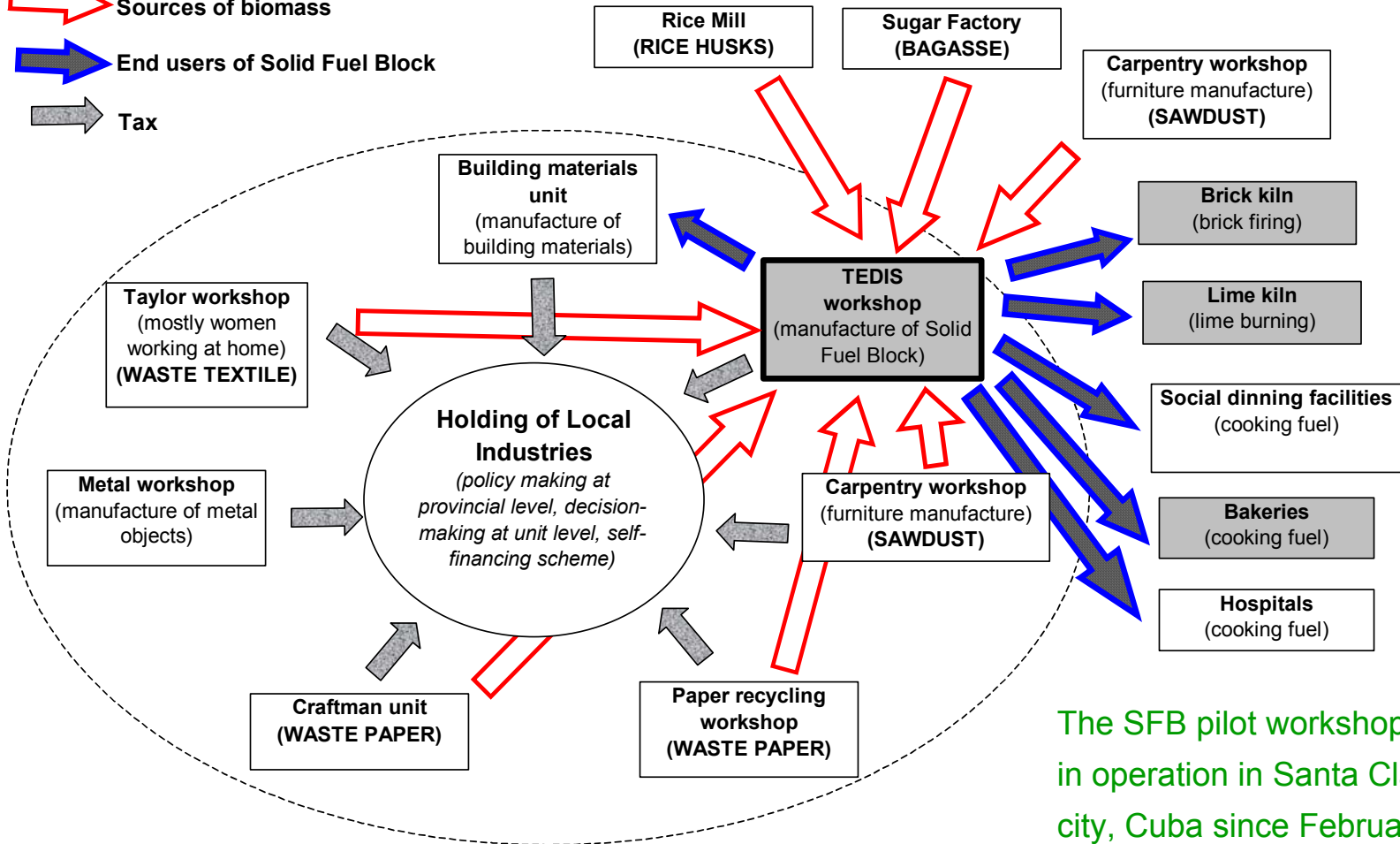
...also detailed smoke analysis were performed on the emissions of the SFB combustion at a popular kitchen in Santa Clara... the products is basically as harmless as ordinary firewood...



THE SOLID FUEL BLOCK

Legend

-  Sources of biomass
-  End users of Solid Fuel Block
-  Tax



The SFB pilot workshop is in operation in Santa Clara city, Cuba since February 2002

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