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MANGOES IN THE REPUBLIC OF GUINEA

An Investment Analysis

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I. EXECUTIVE SUMMARY

The Republic of Guinea was once the privileged colony of French West Africa as regards horticultural production. Following independence and a series of wedge positions adopted by President Sekou Toure during his initial mandate, the French expatriates who fueled the country's horticultural sector exited Guinea in favor of the Côte d'Ivoire, Cameroon, and Senegal, leaving Guinea to embark on a long period of decline in terms of horticultural exports. Over the past 45 years, there have been many attempts, undertaken by many companies and organizations, to reverse this downward trend and regain the country's position of horticultural leadership. Sadly, most of these attempts have failed, and none has achieved any sustainable or material degree of success.

The prospects for Guinean mangoes in the global fresh market are discouraging. There is little to be excited about in the European or American fresh markets. Guinea possesses no exploitable advantage – in terms of varieties, seasonality, geography, critical mass, financial resources, infrastructure, reputation, costs, or quality –when compared to its neighbors in Mali, Côte d'Ivoire, or Ghana, not to mention the major players in Mexico, Brazil, Peru and Ecuador. There is no break-out strategy for varietal diversification whose risk/reward ratio would be palatable to any rational investor. In consequence, this study has seen no choice but to explore the prospects in Guinea for mango processing. This concept was particularly driven by the plight of the mango growers in Haute Guinee, most of whom seem to have entered the business on the promise of the Usine de Kankan, and who have been searching for a "Plan B" ever since that factory ceased operations.

The Scope of Work for this project called for development of an investment proposal for the export of fresh mangoes by air and sea. For the reasons summarized here, and discussed in greater detail within the body of this report, I do not believe that what Guinea can offer in terms of fresh export opportunities would represent adequate value to any international investor.

Based on this conclusion regarding the unpromising prospects in Guinea for a resurgent fresh mango export activity, this report has instead focused on a proposal for the establishment of a large-scale commercial dehydration activity in Guinea. In general terms, this investment proposal envisions a total of six industrial facilities, deployed initially in the Siguiri/Kankan/Mandiana region, with possible expansion into Guinee Maritime. This configuration would be sufficient to process 25 percent of Guinea's 30,000 MT annual production of grafted mangoes. Since mangoes would provide the drying operation with product for only 20 weeks per year, the plan calls for each plant to dry pineapple for the remaining 30 weeks of the year. Other products, including banana, papaya, jackfruit, and passion fruit, could be added to this product line with only minimal adjustments in the process flow.

At full capacity, this project should generate more than US$7,000,000 annually in export earnings, while providing employment to hundreds of workers, and a market outlet for thousands of smallholder mango growers. Its reliance on biofuels for the

energy and heat required by the drying process will circumvent one of the most troublesome barriers to agribusiness success in Guinea, while providing incremental electricity to the communities surrounding each of these drying facilities. Of no less significance, the internal rate of return (IRR) for this project exceeds 55 percent over its 10-year life, assuming that organic certification can be maintained for all dried products the facilities produce. In the event that a more economical bio-waste/biofuel furnace can be found, the project IRR can be pushed past 70 percent .

In order to attract a qualified investor for this project, there is a need for a more detailed prospectus, including verification of all assumptions regarding costs, markets, equipment configurations and organic certification, as well as a clearer understanding of the concessions and incentives which the Guinean government would be prepared to put in place to attract such a promising source of rural employment and export earnings.

II. HISTORICAL PERSPECTIVE

During the period preceding West African independence in the latter half of the 1950s, Guinean horticulture played a privileged role among France's West African colonies. By the middle of the 20th century, Conakry had established itself as the leading source for French West African bananas, where most production was in the hands of second- and third-generation French planters. All this changed within a few short years following independence in 1958. Unlike Senegal, Côte d'Ivoire, Cameroon, and most other former French colonies in West Africa, the Republic of Guinea declined France's invitation to become part of the nascent French Community, and severed its links to the CFA Franc. These actions, coupled with initial signs of the government's affinity for a centrally-planned economic model, quickly led to a wholesale exodus on the part of the French expatriate community. Many of these experienced and well-connected planters migrated to Côte d'Ivoire, where they introduced the banana, pineapple, and mango cultivations which have continued to prosper through the turn of the century. Meanwhile, the horticultural economy of Guinea has witnessed a gradual disappearance of the success and prosperity that banana and pineapple production once afforded it.

The Sekou Toure regime undertook several measures to stimulate the fresh fruit and vegetable sector within the context of its state-owned and operated economic model, as evidenced in particular by the construction of two major processing facilities, the Salguidia plant in Kindia, and the Usine de Kankan in Haute Guinee. Deficient infrastructure, particularly as regards the ability to supply affordable electrical power to these facilities, forced them out of operation for most of the past 25 years, and has left them in a state of disrepair and obsolescence that make their rehabilitation unlikely. The death of Sekou Toure in 1984 led to the assumption of the presidency by Lt. Col. Lansana Conte at the head of his Military Committee of National Recovery. President Conte has remained in office through several elections, and he remains president of the Republic of Guinea through the time of this writing. Some efforts have been made during the 22 years of the Conte administration to discontinue the central-planning approach to the economy, in favor of liberalizing the economy, promoting private enterprise, and encouraging foreign investment. While this approach has yielded some favorable results in the extraction sector – Guinea possesses more than 25 billion metric tons of bauxite, 4 billion tons of high-grade iron ore, significant diamond and gold deposits, and an undetermined quantity of uranium – little positive result has been captured in the horticultural sector.

The lack of access to affordable electrical power, together with the poor water delivery system throughout the country, remain cardinal factors limiting the attractiveness of Guinea as a site for major external investment in horticultural ventures. With only 2-3 hours of publicly-supplied electricity per day, and a like number of hours of publicly-furnished water supplies, Guinea is not an appropriate venue for water- or energy-intensive agricultural projects. While there are a multitude of plans which could be contemplated in the absence of these two constraints, there is no reasonable prospect at this time for any material improvement in either area. As a

result, the investment proposal outlined here with regard to mango, and that which will be made in the pineapple study which accompanies this report, will concentrate on approaches that are consistent with these constraints, rather than on schemes which assume these constraints away.

III. GLOBAL MARKET TRENDS – FRESH MANGO

Over the past 40 years, the rate of growth in mango export volumes has been remarkable. From 1966 through 2004, world mango exports have grown from 7,200 MT to 907,800 MT, an annualized growth rate over this 38-year period of 13.5 percent per annum. Growth in gross export values has also been impressive. Export revenues over the same period rose from US$1.1 million in 1966, to US$583.8 million in 2004, an annualized growth rate of 18 percent . Concealed behind these positive growth numbers, however, are some negative trends over the past 10 years, which have stripped much of the fun and profit from the export mango business.

Exhibit 1 shows the volume growth trends over the past 38 years, decade by decade. Exhibit 2 shows gross value increases in the global mango trade over the same period. Exhibit 3 displays the trends in unit selling prices, which have accompanied this growth in the worldwide mango trade. The decade from 1966-1975 saw compound annual growth of 15 percent in volume, and of 25 percent in revenues, leading to a 9 percent annual increase in unit revenues received. While volume growth during the decade from 1976-1985 continued to accelerate, reaching 17 percent per annum, gross value and unit revenue growth slowed to 23 percent and 5 percent, respectively. From 1986-1995, the rate of volume growth decelerated, declining to 12 percent per annum from 17 percent during the previous decade. Gross value growth similarly declined, but at a pace (18 percent) that permitted unit sales revenue growth to remain steady at a positive 5 percent . During the most recent decade, however, supply and demand appear to have fallen out of balance. From 1996-2004, world mango export volume continued to grow at an annualized 11 percent rate. Gross revenues, however, were unable to keep pace, increasing only 6 percent a year. These uneven rates of growth led to an annualized decline in unit selling price of 4 percent over this period. As seen in Exhibit 3, this downward trend in selling prices dates back to 1997 when, after a 6-year period when prices per kilo peaked in the US$0.86-US$0.91 level, prices per kilo fell off dramatically, settling into the US$0.60-US$0.65/kg range for the past five years.

EXHIBIT 1: WORLD MANGO EXPORT VOLUMES (MT) + ANNUALIZED RATES OF GROWTH

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	
7,190.00	6,944.00	8,113.00	12,342.00	15,115.00	13,754.00	15,541.00	17,562.00	21,955.00	24,587.00	**15%**

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	
28,675.00	31,717.00	42,732.00	33,693.00	50,948.00	52,342.00	74,167.00	74,884.00	96,997.00	114,034.00	**17%**

1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	
120,700.00	137,611.00	105,784.00	156,232.00	158,030.00	224,063.00	231,347.00	292,385.00	300,697.94	335,766.43	**12%**

1996	1997	1998	1999	2000	2001	2002	2003	2004	
406,802.00	484,002.12	539,832.10	567,561.66	622,196.50	654,376.00	663,167.00	921,097.00	907,782.00	**11%**

FAOSTAT

EXHIBIT 2: WORLD MANGO EXPORT VALUES (USD '000) + ANNUALIZED RATES OF GROWTH

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	
1,125.00	1,225.00	1,379.00	2,164.00	2,077.00	2,096.00	3,133.00	3,946.00	5,936.00	8,255.00	**25%**
1976	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	
10,279.00	12,037.00	16,673.00	22,556.00	30,672.00	31,492.00	48,709.71	46,720.92	55,054.87	64,438.47	**23%**
1986	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	
67,121.58	79,193.28	74,691.93	92,174.00	108,301.00	191,766.00	210,979.00	264,114.00	267,421.08	291,474.93	**18%**
1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**		**6%**
352,647.01	358,537.78	381,301.73	378,826.80	385,887.20	415,745.00	390,024.00	558,383.00	583,763.00		

FAOSTAT

EXHIBIT 3: WORLD UNIT MANGO SELLING PRICES (USD/KG) + ANNUALIZED RATES OF GROWTH

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	
0.16	0.18	0.17	0.18	0.14	0.15	0.2	0.22	0.27	0.34	**9%**
1976	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	
0.36	0.38	0.39	0.67	0.6	0.6	0.66	0.62	0.57	0.57	**5%**
1986	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	
0.56	0.58	0.71	0.59	0.69	0.86	0.91	0.9	0.89	0.87	**5%**
1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**		
0.87	0.74	0.71	0.67	0.62	0.64	0.59	0.61	0.64		**-4%**

FAOSTAT

This phenomenon of declining unit prices appears to have affected all major western markets, as can be seen in Exhibit 4. In France, Germany, Great Britain, and the United States, prices have fallen steadily from 1997 through 2001 (2000 in the case of France). Nowhere has this decline been more dramatic than in the United States, where the 5-year average annual rate of price decline ran at 7 percent , despite a brief spurt upward in 1998.

EXHIBIT 4: WHOLESALE PRICE TRENDS, FRESH MANGO – MAJOR WESTERN MARKETS

	France (FF/Kg)	Germany (DM/Kg)	U.K. (£/Kg)	U.S.A. (US$/Kg)
1997	11.21	3.22	1.16	1.70
1998	12.04	2.42	1.15	1.97
1999	11.50	2.85	0.96	1.44
2000	10.83	3.30	0.95	1.51
2001	11.03	3.06	0.93	1.27
5-year Rate of Change	**-0.4 percent**	**-1.3 percent**	**-5.4 percent**	**-7.0 percent**

FAO-Tropical Fruit Statistics, 2003

As global export volumes have expanded, the market for mangoes has progressively moved beyond its ethnic roots into the mainstream consumer markets. In the process, mangoes have come to be seen as less of an exotic specialty item and more of an everyday commodity. This commoditization of the fresh mango market has led it to lose the protection it enjoyed in its period as an ethnic commodity, supported by core consumers whose demand was highly inelastic. Instead, it is now fully subject to the same challenges of product loyalty and price competition as any other everyday commodity in the produce arena. Within this context, as with any other commodities, success is largely dependent upon large scale, low cost of operation, and product differentiation.

Within this commoditized environment, there are still variety/origin combinations which have been able to sustain a differentiated identity. The Ataulfo from Chiapas (Mexico) and the Francique from Haiti into the United States market, the Carabao from the Philippines into Japan, the Chaunsa from Pakistan, as well as several of the Indian varieties (Alfonso and Banganapalli, among others) into the United Kingdom, still trade in limited volumes to an audience of ethnic connoisseurs who are prepared to recognize a premium value for a premium organoleptic experience. Unfortunately, this type of intra-sectoral product differentiation does not operate with respect to the "mass-market" Florida mango varieties, such as the Tommy Atkins, Haden, Kent, and Keitt varieties, which dominate the markets of the Western Hemisphere. These are the varieties which constitute the majority of exports from Mexico, Brazil, Peru, Ecuador, and South Africa, as well as from the exporting countries of West Africa. Here the scale of export production, as shown in Exhibit 5, clearly favors the "Big Four" of Latin America, who together accounted for 48 percent of world mango exports in 2003.

EXHIBIT 5: PRINCIPAL MANGO EXPORTING COUNTRIES (2003)

Origin	Volume Share	Volume (MT)	Value USD (000)	Value Share	Value/Kg (USD)
Mexico	28 percent	216,316	US$117,200	24 percent	US$0.54
Brazil	18 percent	138,189	US$75,744	15 percent	US$0.55
Pakistan	8 percent	60,441	US$18,007	4 percent	US$0.30
Peru	5 percent	39,924	US$31,109	6 percent	US$0.78
Philippines	5 percent	38,436	US$45,000	9 percent	US$1.17
India	5 percent	38,003	US$17,911	4 percent	US$0.47
Ecuador	5 percent	37,621	US$16,335	3 percent	US$0.43
RSA	3 percent	20,751	US$11,804	2 percent	US$0.57
China	2 percent	12,623	US$3,695	1 percent	US$0.29
Israel	1 percent	10,024	US$7,608	2 percent	US$0.76
Thailand	1 percent	8,098	US$4,550	1 percent	US$0.56
Rest of World	20 percent	157,397	US$144,003	29 percent	US$0.91
TOTAL	100 percent	777,823	US$492,966	100 percent	US$0.63

Faostat (APEDA for Indian statistics)

While counter-seasonality frequently offers an option to smaller producers as a way to avoid head-to-head confrontation with giant competitors, such is not the case in competing with the Latin American producers. Mexico ships from February through August, Brazil from September through November, and Peru and Ecuador from November through February, before handing the baton back to Mexico. Even with the overlapping supply calendars of the Latin American origins, there are occasional openings in Europe and North America when events delay the start or accelerate the end of a given country's seasons. While these events can create sharp run-ups in spot prices, they are not predictable, nor do they form the basis for a sustainable market strategy.

EXHIBIT 6: GUINEA FRESH MANGO EXPORTS (000 MT)

Year	1990	1995	2000	2004
Volume	0.2	0.64	0.51	0.63
Share of World Exports	0.1 percent	0.2 percent	0.08 percent	0.07 percent

Faostat

If this world view depicts a rather grim outlook for the mango exporting countries of West Africa, it is especially so in the case of Guinea. Unlike Côte d'Ivoire (even under partition), Mali, Senegal, and Ghana, which all enjoy a regular flow of fresh

tropical fruits and vegetables to European markets, Guinea's involvement is limited to less than 1,000 MT total of fresh mango exports, and a like volume of fresh pineapple exports, even in the best of years. There is no "brand" (i.e:, country of origin) recognition, there are no importers whose handling of Guinean product is their call signal, there is little continuity of volume from one season to the next, and – as we shall see in the next section – little apparent success or profitability among Guinean exporters. If this is true for the pineapple and mango growers operating near the port of Conakry in Guinee Maritime, it is doubly true of the mango growers of Siguiri, Kankan, and Mandiana on the far eastern edge of Haute Guinee. While SIPEF and the Groupe Malick Conde have offered at least some small fresh export opportunities to mango growers in the Dubreka/Kindia/Forecariah triangle, fresh opportunities for the growers in Haute Guinee generally come in the form of ground buyers from Mali or Côte d'Ivoire, searching for late-season supplies once their own crops have been exhausted. Since late-season mangoes from Guinea are highly susceptible to fruit fly infestation, the quality purchased by these foreign ground buyers often represents Guinea at its worst, and adversely affects buyer interest in subsequent years.

Recently, with support from government agencies and NGOs, leaders of the Haute Guinee mango grower associations have grouped together to travel to Mali and Côte d'Ivoire in pursuit of more formal links with packer/exporter organizations there, and to identify obstacles to expansion of these trade lanes. Progress has been made over the past 24 months. Moreover, given the lack of alternative commercial opportunities for these growers, any sale appears to be considered a good sale. Still, cross-border transactions generally come too late in the crop year, and too unpredictably in terms of both volume and price, for this channel to represent a definitive solution to the Haute Guinee mango problem.

IV. COMPANIES CURRENTLY/RECENTLY ACTIVE IN THE EXPORT MANGO SECTOR

A. COMPANIES IN GUINEA

If there has been limited success in establishing Guinea as a player on the world mango stage, it has apparently not been for lack of effort. Indeed, there have been quite a few enterprises that have undertaken to export fresh or dried mango through Conakry to Europe. Only two companies in Guinea remain involved in these efforts.

SIPEF: SIPEF Guinee was established in Guinea in 2000 by SIPEF N.V. (Société Internationale de Plantations et de Finance), a Belgian mercantile group. It works closely with its parent company in Belgium, which is responsible for the import and marketing of the Guinean company's production. The local team was given the use of a modern packing line which had originally been introduced into the country as part of the World Bank's PCPEA (Projet Cadre de Promotion des Exportations Agricoles) project. In addition to its own investments in the country, SIPEF has also made use of governmental, donor, and NGO programs to procure equipment and develop traceability and quality control programs, which correspond to requirements in the major European markets. Mango exports, essentially sourced from the Dubreka/Kindia/Forecariah triangle in Guinee Maritime, have constituted the majority of SIPEF's horticultural activities over the past seven years, resulting in the following export volumes:

EXHIBIT 7: SIPEF MANGO EXPORTS FROM GUINEA (2000-2006)

Year	2000	2001	2002	2003	2004	2005	2006
Volume (MT)	126	187	405	310	506	85	387

The packing shed which SIPEF operates in Daboya is sized to handle upwards of 1,000 MT per season. Despite their best efforts, however, they have yet to exploit even half of that capacity. Much of the problem this season seems to have arisen as a result of the sophisticated computer technology employed on the sizers and graders in the shed. Calibration of this equipment was reportedly difficult. More importantly, when breakdowns occurred, there were no spare parts available, and no trained technicians to perform the work.

Within the context of fresh mango operators in Guinea, SIPEF stands head and shoulders above the rest. Rather than serve as a beacon for other Guinean enterprises along the path to export success, however, SIPEF appears to highlight the difficulties that even a serious, integrated, and well-funded company must confront in attempting to develop a fresh mango export activity in Guinea. After six years of operation, with a harvesting crew of 192 people and a packing shed crew numbering 64, SIPEF has still been unable to generate consistent or significant volumes of production. When quizzed on this point, the Belgian team leader for SIPEF acknowledged that the company's efforts in mangoes were designed more to explore the capacities of the country's horticultural sectors than to maximize profitability on any particular product

line within the sector. Based on his six years of practical experience, he expressed misgivings about the viability of fresh mango exports from Guinea.

First Produce: This subsidiary of a British produce importer/wholesaler made an initial sample shipment of fresh mango during the 2005 season, and then returned in 2006 to export mangoes in earnest. Its management succeeded in obtaining one of the PCPEA mango packing lines, which they installed in an out-building of the Usine de Kankan. Their plans called for a volume of 3 FEU (forty-foot equivalent units) per week throughout the season. Their packing operations began in May and continued through June. In the final analysis, they were able to pack only about 150 cartons, and were unable to load even one container during the course of the season. Their intentions for the 2006-2007 season are unclear.

SALGUIDIA: Built in Kindia in 1977 and rehabilitated in 1982, with funding from the governments of Guinea and Libya, the Societe Arabo-Libyenne-Guineene pour le Développement Industriel et Agricole reportedly provided a considerable boost to the pineapple industry in Guinee Maritime in its initial years of operation. SALGUIDIA, at its peak, grew 80 percent of its own supplies of pineapple on 300 irrigated hectares (out of its total controlled acreage of 2,000 ha). The factory operated 4 separate lines to manufacture juice, pulp, and concentrate products based principally on pineapple, citrus, and mango. The plant was designed to rely on the national energy grid for 70 percent of its electricity requirements, and operated an onsite 500 kW/h generator for the remaining 30 percent . Sales were directed to the Guinean market, with some limited exports to Libya. A series of managerial and ownership re-structurings led finally to the privatization of the plant, and its 2002 sale to Societe Nouvelle Tropicale, owned 50 percent by a Guinean investor, and 50 percent by the governments of Guinea and Libya. During our visit in early May 2006, the plant was relatively clean, but had clearly not been in full-scale operation for years. While management indicated that there had been some processing activity as recently as July 2005, this activity appeared to have been neither large in scale, nor long in term. Management enumerated a number of problems that had led to SALGUIDIA's disuse. Principal among these were the government's failure to allow the plant to buy its fuel requirements free of VAT, the unreliable nature of electricity supplies from the national grid, and the adverse effects of devaluation on product costs, due to reliance on imports for parts, equipment, cans, and other packaging materials.

USINE de KANKAN: This factory, inaugurated in 1967, was built as a collaboration between the governments of Guinea and Italy, and operated as a state enterprise under the Sekou Toure regime. It features three production lines to convert citrus fruits into juice, to produce mango, pineapple, banana, and tomato purees, and to produce concentrates. The construction of this plant led to a surge in mango plantings within a 40-km radius of Kankan. With the end of the central-planning system following the death of Sekou Toure, this plant was deeded over to a group of private Guinean investors in the early 1980s, but ceased operations in 1991. During our visit to the facility in May 2006, the plant showed every sign of having been out of operation over the past 15 years. Meanwhile, the extensive small-holder mango plantings in the

Siguiri/Kankan/Mandiana region continue to produce, and growers there struggle to find markets which will provide them with any value for this production.

SAIG: The Societe Agro-Industriel de Guinee, located in Mamou in Guinee Maritime, was born out of the rehabilitation of the former Mamou cannery. Ownership was in the hands of private French investors (51 percent), private Guinean investors (19 percent), and the Guinean government (30 percent). Installed capacity was designed to produce 20,000 MT of product per year, including 4,000 MT of mango pulp. SAIG's strategy was based on drawing its raw material from the abundant fruit production in the surrounding area, with the idea that success in this first stage would eventually permit the production, under contract with private growers, of new varieties of fruits. The remodeled plant was inaugurated in 1989 and completed its initial trials successfully. Shortly thereafter, however, the French partners withdrew from the venture, taking with them the access to finances and to export markets which were key to the success of the project. Their exit led, shortly thereafter, to the closure of the factory and the loss of the plantings that had been made one year prior to rehabilitation of the plant.

Groupe Malick Conde: This group, under the direction of Mr. Malick Conde and Mr. Kourouma Aboubacar Sidiki, acts as a producer and exporter of a range of local fruits and vegetables, including pineapple, mango, peppers, eggplant, and okra. Their mango program is geared to the ethnic market in Paris, where they are represented by Orkos Diffusion. In good years and bad, they maintain a steady volume of 50 MT of fresh mangoes to France. All shipments are made by air.

Nabekam-Bio: Nabekam-Bio was created in 1998, and ceased operations after the 1999-2000 season. In its final year of activity, it exported 2 MT of dried mango, and 4 MT of dried pineapple. As its name implies, Nabekam-Bio based its strategy on servicing the lucrative organic market for dried fruits in Europe. Discontinuation of operations stemmed primarily from a modification in the EU organic rules governing the use of synthetic ethylene for floral induction in pineapples. In the absence of floral induction, pineapple plants tend to differentiate naturally and simultaneously, leading to a single unmanageable peak in harvest maturity, rather than a steady flow of fruit to market throughout the course of the year. Although the use of synthetic ethylene was subsequently re-instated by EU organic authorities, this reversal did not come in time for Nabekam-Bio to remain in operation. Even without the suspension in Nabekam-Bio's organic certification status, reports indicate that it would not have been able to remain in operation much longer on account of its power requirements. Its drying plant was designed to generate heat through an inefficient electrical heating system. Given the erratic delivery of electricity from public sources in Guinea, and the prohibitive expense of generating electricity with diesel generators, Nabekam-Bio's demise was probably a foregone conclusion, even in the absence of any disruption related to organic certification

B. COMPANIES IN THE SURROUNDING REGION

In addition to the numerous companies in nearby countries (Côte d'Ivoire, Mali, Senegal, and Ghana) which appear to have met with some success in their efforts to sustain fresh programs in Europe, there have been several companies in the sub-Sahara which have experienced notable success in the establishment and commercialization of dried mango ventures. Three of these companies have been included in this list of possible models.

Fruits of the Nile: This company was founded in Uganda in 1993 and specializes in naturally dried agricultural commodities, including banana, mango, pineapple, papaya, mushrooms, chiles, and tomatoes. All products are solar dried and certified organic. This group sells solar drying equipment and training to small growers, then buys back the dried product and re-sells it to their exclusive receiver in the United Kingdom. There are 60 separate solar dryer sites affiliated with Fruits of the Nile. Currently, Fruits of the Nile ships 60-70 MT of processed dried products to Europe

Amfri Farms: This group, also based in Uganda, has been in operation since 2000, and currently exports 20 MT of pineapple, banana, papaya, mango, and jackfruit per year. This volume is expected to double on the strength of an agreement concluded with the Jacob Fruitfield group in Ireland. Amfri has also expanded its distribution into the Seattle market, and looks for further expansion into the United States once production constraints have been overcome.

Cercle de Secheurs: Formed in 1992 in Burkina Faso, this group functions as a "cooperative of cooperatives," providing its membership with raw material, training and marketing services. Initially, CDS was dependent upon the Centre Ecologique Albert Schweitzer (CEAS), a Swiss NGO, for almost all of its activities. Since 1997, CDS has grown progressively more autonomous. The drying technology employed by CDS members includes both solar dryers and fuel powered dryers, especially the butane powered dryer developed by CEAS. The butane powered dryer provides increased control over drying conditions, and produces a higher quality product. It is operational all year round, and produces a higher rate of drying than solar dryers. The first and main product of CDS is dried organic mango. In 2003, CDS exported 68 MT of dried mango, along with 10 MT of mango juice and 8 MT of mango syrup. Its principal customers are Tropical Wholefoods in England, and Claro in Switzerland.

C. DRIED MANGOES

The prospects for Guinean mangoes in the global fresh market are discouraging. There is little to be excited about in the European or American fresh markets. Guinea possesses no exploitable advantage – in terms of varieties, seasonality, geography, critical mass, financial resources, infrastructure, reputation, costs, or quality –when compared to its neighbors in Mali, Côte d'Ivoire, or Ghana, not to mention the major players in Mexico, Brazil, Peru, and Ecuador. There is no break-out strategy for varietal diversification whose risk/reward ratio would be palatable to any rational investor. In consequence, this study has seen no choice but to explore the prospects in

Guinea for mango processing. This concept was particularly driven by the plight of the mango growers in Haute Guinee, most of whom seem to have entered the business on the promise of the Usine de Kankan, and who have been searching for a "Plan B" ever since that factory ceased operations.

Though much smaller than the market for fresh mangoes, the market for dried mangoes appears to be somewhat less volatile, and certainly less downward-trending, than the fresh mango markets in Europe or the United States. Import statistics specific to dried mango are virtually unavailable for most importing markets, including Europe. In most instances, all dried fruits are grouped together. In such cases, the major components – raisins, apricots, plums, currants – make it impossible to derive any meaningful conclusions about mangoes.

In the United States, fortunately, the Foreign Agricultural Service of the U.S. Department of Agriculture (FAS/USDA) provides a specific breakdown on imports of dried mango, grouped with dried guava and dried mangoesteen. For the purposes of this analysis, this study has assumed that these statistics are made up entirely of dried mango.

U.S. imports of dried mango represent only 2 percent of total mango import volumes, although dried mango represent some 13 percent of the total value of mango imports. This statistic should not be surprising, since the ratio of gross fresh weight to dried weight is 11:1 (that is, one must start with 11 kg of whole fresh mango to end up with 1 kg of dried mango).

EXHIBIT 8: U.S. DRIED MANGO IMPORTS, VOLUME & VALUE (2001-2005)

	2001	2002	2003	2004	2005	Rate of Change
Volume (MT)	2,235	2,870	3,876	5,265	6,151	29 percent
Value (US$000)	US$5,793	US$10,348	US$15,434	US$21,536	US$26,114	46 percent
Unit Value (US$/kg)	US$2.59	US$3.61	US$3.98	US$4.09	US$4.25	13 percent

FAS/USDA

Unlike the grim picture seen earlier in the fresh market trends, Exhibit 8 shows a market that appears to be growing in healthy fashion, with gross sales revenue growth easily outstripping growth in volume, leaving the growth in unit values comfortably in positive territory. If the multiple technical challenges can be met, this appears to be a market segment where Guinea might be able to compete, both in Europe and in the United States. Moreover, this is a product without most of the burdensome sanitary and phytosanitary barriers to entry faced by fresh mangoes, and whose shelf life will easily permit ocean shipment to any market in the world without fear of deterioration of quality in transit.

In general terms, this investment proposal envisions a total of six industrial facilities, with initial deployment in the Siguiri/Kankan/Mandiana region, and eventual expansion into Guinee Maritime. This configuration would be sufficient to process 25 percent of Guinea's 30,000 MT annual production of grafted mangoes. Since mangoes would provide the drying operation with product for only 20 weeks per year, the plan calls for each plant to dry pineapple for the remaining 30 weeks of the year. Other products, including banana, papaya, jackfruit and passion fruit, could be added to this product line with only minimal adjustments in the process flow.

The project would start in the Kankan area with one facility, to field-test the equipment and the distribution systems in Europe and the United States. If the first year's operations prove successful, then Year 2 would see two more facilities deployed in Siguiri and Mandiana. If all goes well, an additional three units could then be deployed either in Haute Guinee or in Guinee Maritime, depending upon utilization and cost studies to be conducted during the first two years of operation.

The list of technical challenges facing the design of this project is long, and includes:

- No reliable electrical grid
- Scarce, expensive diesel
- Shortage of qualified technical managers
- Poor transportation infrastructure

The approach taken here attempts, where possible, to minimize the adverse impact of these constraints, while providing sustainable and affordable solutions. The design concept is as follows:

1. An efficient biofuel-based drying chamber with a capacity to convert 2,500 kg of wet fruit (that is, 4,400 kg of whole fruit) into 400 kg of dried fruit during each 10-hour cycle.

2. A combination of biofuels, readily available and easily renewable, to provide the electrical power and heat the drying chamber will require.

3. A mechanical crusher that can be used to extract useable biofuel oil from organic materials and meet the facility's limited electrical power needs.

4. A furnace which can convert the available bio-mass and biofuel into the 2,500 kW/h (8.5 million BTU) needed to operate the drying chamber.

While it was not possible at this stage of the analysis to negotiate firm and optimal proposals for each of these four elements, I believe the information at hand is sufficient to provide the grounds for a favorable preliminary verdict on the economical feasibility of the project.

The biofuel-based drying chamber will be supplied by Innotech Engineering of Germany. A full description of the drying chamber can be found in Appendix II to this report, and a quotation for its purchase can be found in Appendix III. Innotech has designed and installed its dryers all over the world, including Benin, Burkina Faso, Cameroon, Ghana, Ethiopia, and Rwanda. Innotech understands the challenges of mechanical operations in sub-Saharan Africa, and has a reputation for designing its equipment accordingly.

Fuel will be derived from two basic sources:

1. **Bio-Waste Material**: Each drying cycle will involve the conversion of 4,400 kg of whole fresh fruit into 2,500 kg of wet fruit. In the case of mango, each cycle would begin with an average of 8,800 mangoes (500 gm each), which would be manually peeled, de-seeded and sliced into slabs or chunks. In the case of pineapple, each cycle would begin with an average of 2,000 pineapples (2.2 kg each), which would be manually de-crowned, peeled and cut into rings, spears or chunks. In the case of both mangoes and pineapples, the weight of the non-useable material (peel, seed, crown) represents 43 percent of gross fruit weight. These 1,900 kilos of peel, seed and/or crown generated prior to each drying cycle would then be combusted in a bio-mass boiler to generate a portion (20-30 percent) of the drying chamber's heat requirement. The residual material which remains after burn-off of this bio-waste is an excellent soil amendment, and could be returned or sold to the growers who supply the whole product from which it is derived.

2. **Jatropha curcus**: Earlier this year, the GAMLA project developed a study entitled "Guinea Agricultural Market Linkages Activity: Market Opportunities for Biofuel Production in Guinea." This report spoke at considerable length about the potential for commercial production of biofuel derived from the seed of the Jatropha curcus plant (also known as the pourgher plant). This plant propagates easily, and begins to produce its oilseeds almost immediately. It thrives in poor soils, requires little moisture or attention, and can thus be grown where no other commercial crops would survive. It will continue to produce oilseeds for decades after initial planting. According to the ATTRA, the National Sustainable Agricultural Information Service, in a 2006 paper titled "Biodiesel: The Sustainability Dimensions," Jatropha curcus ranks tenth among all oil producing crops in yield, with up to194 gallons of oil per acre. This compares with sunflowers at 98 gallons, soybeans at 46, and corn at only 18. Most important, as the Chemonics report confirms, Jatropha curcus is ideally suited to all regions of Guinea, making it a natural source for the remaining biofuel requirements of the drying chamber. Based on the volume of biofuel which would be consumed by each facility, and the conversion rates between pourgher seed and pourgher oil, each facility will need a production area of some 675 ha of pourgher plants.

The project will need a biofuel-friendly machine to crush the oilseeds of the Jatropha curcus. It would also be helpful if this machine could then convert a portion of this

biofuel into electrical energy to provide the drying chamber with the limited electricity it requires to support its circuits, thermostat, and other controls. The multi-functional platform (see Appendix IV, or visit http://www.ptfm. for full details and costs) should serve both these needs, while providing a highly useful piece of equipment for nearby villages as well. In an hour, using only one liter of Jatropha oil, the platform (see picture below) can crush enough oilseed to produce 21 liters of the oil. Additionally, its 10-hp engine, running on Jatropha oil, can provide all the energy the drying chamber's electrical system needs. Since each drying plant will require 4,000 liters of pourgher oil per day, and each multi-functional platform can generate 400 liters of pourgher oil each 20-hour day (matching the two cycles of the drying machine), it is assumed that each drying facility will require a complement of 12 multi-functional platforms.

EXHIBIT 9: MULTI-FUNCTIONAL PLATFORM IN OPERATION

An appropriate biomass boiler has been more difficult to identify, since it must be able to combust both the solid biomass produced in the form of mango and pineapple waste and the liquid biofuel generated by the Jatropha curcus seeds. The description and quotation from Hurst Boiler (see Appendix V) provides a starting point, and a cost that can be employed in the investment analysis. This boiler is designed to operate on biomass (such as the vegetative mango and pineapple waste), although the manufacturer insists that it could also successfully burn the liquid pourgher oil once combustion temperature had been achieved. In the course of conversations with suppliers of other boiler systems and oil atomizing burners, it is now believed that other technical solutions exist for this dual-input challenge, and that such solutions will, almost certainly, be significantly less expensive than the US$225,000 quotation received from Hurst. Indeed, indications have been received from the Advanced Alternative Energy Corp in the United States that a burner could be designed in the United States and built in Guinea, which would cost roughly US$1,000 for each 1,000

MT of solid throughput per day. Since the usage calls for 24,000 MT equivalent of biomass and biofuel, this would equate to a cost of US$25,000. Innotech has also pursued discussions with vendors in Europe whose furnaces could convert the pourgher oil, but not bio-waste, into heat for the dryers. This would lead to possible problems with waste removal, and would require the production of 225 additional ha of pourgher plants, and the purchase of three additional multi-functional platforms per facility. While the incremental capital investment for platforms would amount to US$15,000, the savings on the furnaces would amount to US$175,000, yielding a net reduction in capital costs of US$160,000. A full schedule of capital investment requirements appears as Exhibit 10.

V. INVESTMENT ANALYSIS

The investment proposal put forth in this report envisions a series of six drying chambers arrayed across the principal fruit producing areas of the country. The first facility would be installed in the vicinity of Kankan, due to its central location in the Haute Guinee mango belt. This facility, as with the five other facilities, would operate for two 10-hour drying cycles per day, six days per week. The facility would concentrate on dehydrating mango for that fruit's five-month harvest season, after which it would switch over to dehydrating pineapple for the remainder of the year. While other tropical fruits could also eventually be incorporated into the facility's production mix, no such provision has been made for this initial analysis. Each cycle would begin with 4,400 kg of raw product. Once peel and seed had been removed from the mango, or peel and crown from the pineapple, we would be left with 2,500 kg of whole wet product to be introduced into the drying chamber. At the end of the ten-hour cycle, we would be left with a total of 400 kg of dried mango or pineapple, which would then be packed in bags (18 kg each). These bags would then be placed in individual cartons for shipment to markets in Europe or the United States.

For simplicity's sake, it is assumed that the entire drying facility will be owned and operated by a single company, which would purchase the raw product from smallholders, and assume responsibility for the processing, transportation, and marketing functions. Given that the smallholders who will provide the facility with its raw product, as well as the pourgher seeds which will provide the dryer with most of the biofuel needed for heat generation, are already organized into grower associations, the possibility of forming joint ventures with these groups has considerable appeal. The antagonism that often prevails in pure buy-sell relationships would be thereby eliminated, the sense of ownership in the enterprise would be shared across all involved segments of the value chain, and a portion of the ultimate profitability of the venture would be returned to the communities where the product is grown.

The investment analysis begins with a consideration of the capital investment in drying equipment and rolling stock required for the project. Both the Hurst boiler and the Innotech boiler options are included in the investment cost schedule, which appears as Exhibit 10. Both investment cost options are later reviewed in calculating the internal rates of return which this project can be expected to generate. Since the economics should be identical in each of the six facilities contemplated for Haute Guinee and Guinee Maritime, only the first of the six facilities has been subjected to review in this investment analysis. With respect to the additional costs of transportation and nationalization, it was assumed that import duties for this export-oriented activity will be waived, and that the 10 percent contingency will be adequate to cover the 2-3 forty-foot container (FEU) voyages that will be required to move the equipment from Europe and/or the United States to Guinea.

EXHIBIT 10: INVESTMENT COSTS

I. DRYING EQUIPMENT

		PER UNIT	UNITS REQUIRED	TOTAL INVESTMENT
A, WITH HURST FURNACE				
DRYING CHAMBER	171,900 €	$209,634	1	$209,634
FOUNDATIONS/BASE	20,000 €	$24,390	1	$24,390
MULTIPURPOSE PLATFORM		$5,000	12	$60,000
BIOMASS FURNACE (HURST)		$205,000	1	$205,000
PRE-CONTINGENCY TOTAL				$499,024
10% CONTINGENCY				$49,902
INITIAL INVESTMENT				$548,927
B. WITH INNOTECH FURNACE				
DRYING CHAMBER	171,900 €	$209,634	1	$209,634
FOUNDATIONS/BASE	20,000 €	$24,390	1	$24,390
MULTIPURPOSE PLATFORM		$5,000	15	$75,000
BIOMASS FURNACE (EUROPEAN)		$25,000	1	$25,000
PRE-CONTINGENCY TOTAL				$334,024
10% CONTINGENCY				$33,402
INITIAL INVESTMENT				$367,427

II. ROLLING STOCK

4WD SUV	$50,000	1	$50,000
PICK-UP TRUCKS	$32,000	2	$64,000
MOTORCYCLES	$3,000	4	$12,000
TRACTORS	$31,500	2	$63,000
CARTS	$6,000	4	$24,000
TOTAL-ROLLING STOCK			$213,000

INVESTMENT REQUIREMENTS

A.	WITH HURST FURNACE	$761,927
B.	WITH EUROPEAN FURNACE	$580,427

Exhibits 11 and 12 outline mango and pineapple production costs in Guinea. Although fruit procurement is predicated on a delivered purchase basis, it is important to confirm that the budgeted costs for fruit procurement are sufficient to allow smallholders to recover their costs. The project is designed to provide an economically viable outlet for existing production, and does not anticipate bringing any new acreage into production.

Figures for mangoes cover costs during the 10-year period of establishment, as well as over the subsequent years once full maturity has been attained. In the case of mangoes, the vast majority of the production is, de facto, organic, since growers are

unable to afford synthetic inputs as part of their cultural practices. While the full-production estimate in Exhibit 11 shows a cost of US$0.05/kg, this assumes an intensive cultivation regime involving considerable application of agricultural chemicals and synthetic fertilizers. In reality, mango growers in Haute Guinee do not apply any such chemicals or synthetic fertilizers. While their yields are less than the 15,000 kg/ha shown here, their costs are far below the US$1,130/ha shown in this exhibit, making the assumption of a US$0.05/kg procurement cost, for a full range of qualities and sizes, a realistic one.

In the case of pineapples, the costs of sustained production, excluding the cost of planting material purchase, are only US$ 0.09/kg. This study has assumed that a procurement of US$0.13, described as the typical local transactional price for fresh pineapple, will be sufficient to attract budgeted tonnage of 1,580 MT of whole fruit, even taking into consideration any additional costs that may be required to force flowering using organic materials. In the cases of pineapple and mango, the budget calls for the project to absorb the costs associated with organic certification for both commodities.

Exhibit 13 outlines the costs that will be incurred in preparing the product for the dryer. This assessment's assumtion is that the fruit will be received, washed, peeled, de-seeded or de-crowned, then cut into different formats according to buyers. It will then be loaded onto trays and made ready for the next 10-hour drying cycle. Each shift will require 46 laborers, divided into peelers (20), soakers (6), carriers (6), tray fillers (4), and sanitation workers (10). There will be one prep supervisor and one drying supervisor per 10-hour cycle; costs for these and other supervisors are covered in Exhibit 15.

EXHIBIT 11: MANGO PRODUCTION COSTS

AA.ANNUAL AMORTIZATION OF INVESTMENT PER HA

	UNIT COST FRG	SEASONS OF USE	COST/UNIT/SEASON FRG	UNITS/HA	COST/SEASON/HA	COST PER SEASON USD
HAND TOOLS/SUPPLIES	75,000	2	37,500	2	18,750	$3
SPRAYER	30,000	2	15,000	2	7,500	$1
BARROW	150,000	3	50,000	2	25,000	$4
IRRIGATION PUMP	2,500,000	10	250,000	1	250,000	$44
SUB-TOTAL			352,500		301,250	$53

BB. OPERATING COSTS

LAND PREP		
SAW RENTAL	500,000	$88
PRUNING	80,000	$14
CLEARING	100,000	$18
ROOT CLEARING	400,000	$70
STAKING	100,000	$23
FERTILIZER	100,000	$18
PLANTING	20,000	$4
PLANT PURCHASE	400,000	$70
PLANT TRANSPORT	520,000	$91
SUB-TOTAL	2,220,000	$395
PRE-HARVEST		
SOIL AMENDMENTS	800,000	$140
FERTILIZERS	125,000	$22
NEMATICIDE	300,000	$53
HERBICIDE	100,000	$18
APPLICATION LABOR	24,000	$4
FIRE BREAK	100,000	$18
FUEL, IRRIGATION PUMP	1,320,000	$232
PUMP MAINTENANCE	66,000	$12
SUPERVISION	720,000	$126
MISC LABOR	96,000	$17
SUB-TOTAL	3,651,000	$641
HARVEST		
SUB-TOTAL	400,000	$70
GRAND TOTAL -- START-UP PHASE/INTENSIVE	6,572,250	$1,153
FARMGATE COST/KG @ YIELD = 6750/HA (YR 1-YR 10)	974	$0.17
GRAND TOTAL -- MATURE PRODUCTION/INTENSIVE	4,669,250	$1,130
FARMGATE COST/KG @ YIELD = 15000 KG/HA (FULL PRODUCTION)	311	$0.05

EXHIBIT 12: PINEAPPLE PRODUCTION COSTS

AA.ANNUAL AMORTIZATION OF INVESTMENT PER HA

	UNIT COST FRG	SEASONS OF USE	COST/UNIT/SEASON FRG	UNITS/HA	COST/SEASON/HA	COST PER SEASON USD
HAND TOOLS/SUPPLIES	690,000	2	345,000	2	668,500	$117
MOTORIZED SOLO	1,000,000	3	333,333	1	333,333	$58
MANUAL SPRAYER	200,000	3	66,667	1	66,667	$12
SCALE	3,000,000	10	300,000	1	300,000	$53
SUB-TOTAL	4,890,000		1,045,000		1,368,500	$240

BB. OPERATING COSTS

LAND PREP				
CULTIVATION		200,000	$35	
PLOWING		400,000	$70	
SPRAYING		200,000	$35	
BILLONAGE		200,000	$35	
SUCKERS,BUY		45,084,000	$10,200	YR 2-ONWARD = 0
SUCKERS, PREP		2,400,000	$421	
FIELD LABOR		276,000	$48	
STAKING/PLANTING		1,800,000	$316	
RESETS		12,000	$2	
SUB-TOTAL		50,572,000	$11,163	
PRE-HARVEST				
SOIL AMENDMENTS		1,250,000	$219	
FERTILIZERS		7,500,000	$1,316	
NEMATICIDE		450,000	$79	
HERBICIDE		400,000	$70	
INSECTICIDE		300,000	$53	
APPLICATION LABOR		808,000	$142	
FUEL, IRRIGATION PUMP		3,300,000	$579	
PUMP MAINTENANCE		165,000	$29	
FUEL, TIF		150,000	$26	
SUPERVISION		7,920,000	$1,389	
MISC LABOR		308,000	$54	
SUB-TOTAL		22,551,000	$3,956	
HARVEST				
SUB-TOTAL		400,000	$70	
GRAND TOTAL	FARMGATE COST/HA	74,891,500	$13,139	SEASON 1
	FARMGATE COST/KG @ YIELD = 60MT/HA	1,248	$0.22	SEASON 1
GRAND TOTAL	FARMGATE COST/HA	29,807,500	$2,939	SEASON 2 & BEYOND
	FARMGATE COST/KG @ YIELD = 60MT/HA	497	$0.09	SEASON 2 & BEYOND

EXHIBIT 13: PREPARATION COSTS

ALL VALUES IN USD

ASSUMPTIONS

EACH DRYING CYCLE INVOLVES 2500 KG OF WET WEIGHT
GROSS WEIGHT TO WET WEIGHT (NET OF SEED/CROWN & PEEL) = 57%
AVERAGE MANGO WEIGHT = 500 GMS
AVERAGE PINEAPPLE WEIGHT = 2200 GMS
2500 KG WET WEIGHT = 4400 KG GROSS WEIGHT = 8,800 MANGOS = 2000 PINEAPPLES
ASSUME 1 MINUTES PER MANGO, 4.5 MINUTES PER PINEAPPLE, FOR PEELING & DE-SEEDING
9000 MAN-MINUTES PER SHIFT FOR PEELING/DEE-SEEDING
AT 8 HOURS (480 MINUTES) PER SHIFT, NEED 20 PEELER/SEEDERS PER SHIFT
6 SOAKERS (CHLORINE SOLUTION), 6 WET FRUIT CARRIERS, AND 4 TRAY FILLERS CAN BALANCE 20 PEELERS
10 PEOPLE WILL BE RSPONSIBLE FOR CLEANING AND REMOVAL OF BIO-WASTE TO THE FURNACE AREA
EACH CYCLE YIELDS 396 KG OF DRIED PRODUCT

				UNIT COST	UNITS	TOTAL COST
EQUIPMENT:	ROOF TARPAULIN, 12m x 7m		$0.60/SQ M	$ 50.00	1	$ 50.00
	TABLE	STEEL,	3m x 1m	$ 150.00	6	$ 900.00
	WATER TROUGHS	ALUMINUM	3m x 1m	$ 600.00	6	$ 3,600.00
	SCALE			$ 530.00	3	$ 1,590.00
	WATER PUMP			$5,260.00	1	$ 5,260.00
	KNIVES			$ 1.00	240	$ 240.00
	BARROWS			$ 26.00	18	$ 468.00
	MISCELLANEOUS/OVERAGES			10%		$ 1,164.00
	TOTAL, EQUIPMENT					$ 13,272.00
					BY	237,000
	TOTAL EQUIPMENT PER DRIED KG					$0.06
MATERIAL	CHLORINE	NaOCl SUFFICIENT TO CHLORINATE UP TO 20, 000 GALLONS OF WATER PER DAY -- ALTHOUGH PREP AREA WILL USE ONLY 10,000 GALLONS/DAY (6 TROUGHS x 400 GALLONS x 2 CHANGES PER SHIFT x 2 SHIFTS/DAY)				$ 8,100.00
		DRIED KG PER LOCATION PER YEAR			BY	237,000
	TOTAL MATERIAL					$ 0.03
LABOR	ASSUME	46 MAN-DAYS PER 8-HOUR SHIFT TO PREPARE 2500 WET KG OF FRUIT YIELDING 396 KG OF DRIED FRUIT EACH MAN/DAY = $0.71		0.71	46	$ 32.66
	TOTAL LABOR PER DRIED KG					$ 0.08
			EQUIPMENT			$ 0.06
			MATERIAL			$ 0.03
			LABOR			$ 0.08
		TOTAL PREP COST				$ 0.17

Exhibit 14 begins with a description of the investment project's objective – to dehydrate 25 percent of Guinea's annual production of grafted mangoes – and then proceeds with the conversion calculations that lead to the conclusion that six facilities will be necessary to achieve this goal. It then spells out the product flow both for mangoes and for pineapples. In the case of mangoes, each of the six facilities will be designed to receive 1,050 MT of whole product during the 20-week mango season, generating an output of 95 MT of dried organic mango per year, at an aggregate annual value of US$475,000. In the case of pineapple, receipts of whole product per facility will amount to 1,580 MT during the 30-week pineapple season, yielding 142 MT of dried organic pineapple. The value for this dried pineapple should reach US$710,000. Annual operations, all commodities included, should produce 237 MT of export product, with an aggregate value of US$1,185,000 per year.

Exhibit 15 specifies assumptions relating to the supervisory structure which will operate at each facility. The expatriate general manager should be able to oversee the operation of all six facilities. The complement of two local managers and four field supervisors, divided into one manager and two supervisors per shift, will be needed for each facility. Responsibilities for this three-person team will include coordination of receipts from smallholders, workflow management, sanitation, and quality control in both the prep and dryer activities.

Exhibit 16 provides a breakdown of ocean freight costs per 20-foot container (TEU) via Maersk Line from the port of Conakry to ports in Western Europe and the East Coast of the United States. Given the eventual magnitude – 1,422 MT of organic product – of the six-facility operation, it was thought wise to distribute the product evenly between Europe and the United States. In the first full year of operation, the Kankan facility will generate 18 TEU of product or one TEU of product to each of the two destination markets every six weeks. At full capacity, with six facilities operating, shipping volumes will reach a rate of one TEU per week to each of these two market destinations.

EXHIBIT 14: DRYING OPERATIONS – CAPACITY & PRODUCT FLOW ASSUMPTIONS

EXHIBIT 14: DRYING OPERATIONS -- CAPACITY & PRODUCT FLOW ASSUMPTIONS

A. DETERMINATION OF CAPACITY REQUIREMENTS

30,000 MT OF GRAFTED MANGO PRODUCED IN GUINEA
TARGET CAPACITY = 25% OF PRODUCTION ==> DEHYDRATED

	7,500	MT GROSS WEIGHT
LESS	43%	PEEL & SEED
	3225	MT WET WEIGHT
BY	20	WEEKS
	161.25	MT PER WEEK
BY	6	DAYS PER WEEK
	26.875	MT/DAY
BY	2	SHIFTS PER DAY
	13.4375	MT/SHIFT
BY	2.5	MT CAPACITY PER SHIFT. DRYING CHAMBER
	5.375	DRYING CHAMBERS REQUIRED

B PRODUCT FLOW ASSUMPTIONS

MANGO	1	9% YIELD (9 KG DRIED PER 100 KG OF FRESH)
		(1 KG DRIED REQUIRES 11 KG GROSS)
	2	91% SHRINK CONSISTS OF TWO FACTORS
		1) 43% LOSS FROM SEED AND PEEL
		2) 48 % LOSS DUE TO MOISTURE
	3	$0.05/KG PURCHASE PRICE IMPLIES RAW MATERIAL PRICE OF $0.55/KG
	4	20 WEEKS OPERATION; 12 SHIFTS PER WEEK,
	5	4400 GROSS KG, 2500 WET KG, 400 DRIED KG PER SHIFT
	6	1050 GROSS MT PER STATION PER SEASON
	7	95 MT OF FINISHED PRODUCT PER STATION PER SEASON
PINEAPPLE	1	9% YIELD (9 KG DRIED PER 100 KG OF FRESH)
		(1 KG DRIED REQUIRES 11 KG GROSS)
	2	91% SHRINK CONSISTS OF TWO FACTORS
		1) 43% LOSS FROM SEED AND PEEL
		2) 48 % LOSS DUE TO MOISTURE
	3	$0.13/KG PURCHASE PRICE IMPLIES RAW MATERIAL PRICE OF $1.44/KG
	4	30 WEEKS OPERATION; 12 SHIFTS PER WEEK
	5	4400 GROSS KG, 2500 WET KG, 400 DRIED KG PER SHIFT
	6	1,580 GROSS MT PER STATION PER SEASON
	7	142 MT OF FINISHED PRODUCT PER STATION PER SEASON

EXHIBIT 15: COSTS OF SUPERVISION

EXHIBIT 15: COSTS OF SUPERVISION

PERSONNEL COSTS		QUANTITY	PER UNIT PER MONTH	PER YEAR	
1 GENERAL MANAGER (EXPATRIATE)		1	$2,000	$24,000	
2 LOCAL MANAGERS		2	$1,000	$24,000	
3 FIELD SUPERVISORS		4	$150	$7,200	
4 OFFICE STAFF		10	$70	$8,400	
					$63,600
MATERIALS					
1 FUEL FOR VEHICLES (5500 GNF/LITER)	LITERS/MONTH				
4WD SUV	300	1	$290	$3,474	
PICK-UPS	300	2	$290	$6,948	
MOTORCYCLES	250	4	$241	$11,580	
					$22,002
2 VEHICLE MAINTENANCE					
4WD SUV		1	$70	$840	
PICK-UPS		2	$70	$1,680	
MOTORCYCLES		4	$16	$768	
					$3,288
TOTAL - SUPERVISION					$88,890

HEAD COUNT SUMMARY	LOCAL MANAGERS	FIELD SUPERVISORS	
DAY SHIFT	1	2	COORDINATION OF RECEIPTS, WORKFLOW, SANITATION AND QC
NIGHT SHIFT	1	2	COORDINATION OF RECEIPTS, WORKFLOW, SANITATION AND QC
	2	4	

EXHIBIT 16: OCEAN FREIGHT & ANCILLARY CHARGES

EXHIBIT 16: OCEAN FREIGHT & ANCILLARY CHARGES

AA.	RATE TO BASE PORTS	AA WESTERN EUROPE EUR/TEU	AA WESTERN EUROPE USD/TEU	BB NEW YORK USD/TEU
	BASE OCEAN FREIGHT RATE	1,500.00 €	$1,829.27	$2,475.00
	BUNKER SURCHARGE	192.00 €	$234.15	$275.00
	SECURITY FEE	6.00 €	$7.32	$6.00
	TOTAL FREIGHT CHARGE	1,698.00 €	$2,070.73	$2,756.00
BB.	OCEAN FREIGHT COMPONENT	ALL-IN CHARGE	$2,070.73	$2,756.00
	DIVIDED BY	KG PER TEU	13,000	13,000
		OCEAN FREIGHT/KG	$0.16	$0.21

Exhibit 18 consists of a projection of revenues, costs, and margins for the initial drying facility in Kankan. Revenues were derived through conversations with several members of the National Dried Fruit Association UK Ltd, and with the management of Innotech, who are also involved in the distribution of organic dried fruits throughout Europe. The general tenor of these conversations revealed that there are three product tiers in the European and the U.S. markets:

1. Unsweetened organic product, which typically commands revenues in the range of US$5.00-6.00/kg.

2. Unsweetened conventional product, which typically trades at prices in the range of US$3.00-4.00/kg.

3. Sugared product – predominantly from Thailand – which defines the bottom end of the market, selling for US$2.00-3.00/kg.

These ranges are reflected in the individual country breakdowns of imports into the United States as well. Although there were no statistical records for organic vs. conventional imports, volumes and values for major origins of dried mango into the United States displayed a comparable range of pricing:

EXHIBIT 17: 2005 DRIED MANGO IMPORTS INTO THE US BY MAJOR ORIGIN

Origin	Volume (MT)	Value (US$ '000)	Unit Value (US$/kg)
Philippines	3591.6	US$16,608	US$4.62
Thailand	1485.7	US$ 4,289	US$2.89
Mexico	559.7	US$ 4,005	US$7.16
Other	514.7	US$ 1,212	US$2.36
TOTAL	6151.7	US$26,114	US$4.24

USDA/Foreign Agricultural Service

Based on these verbal indications and statistics, the gross revenues for both dried mango and dried pineapple were set at US$3.00/kg for conventional product, and at US$5.00/kg for organic product. While fair trade certification could reportedly add an additional 20-30 percent premium to these values, this fair trade premium was not incorporated into this analysis.

EXHIBIT 18: AGGREGATE MARGINS

EXHIBIT 18: AGGREGATE MARGINS

	CONVENTIONAL						ORGANIC					
	MANGO		PINEAPPLE		TOTAL		MANGO		PINEAPPLE		TOTAL	
ALL VALUES IN USD	PER KG	TOTAL	PER KG	TOTAL	PER KG	TOTAL	PER KG	TOTAL	PER KG	TOTAL	PER KG	TOTAL
# OF KG HARVESTED		1050000		1580000		2630000		1050000		1580000		2630000
# OF KG EXPORTED		95000		142000		237000		95000		142000		237000
# OF CTNS EXPORTED												
# OF KG LOCAL												
REVENUES												
TOTAL REVENUES	$ 3.00	$285,000	$ 3.00	$426,000		$711,000	$ 5.00	$475,000	$ 5.00	$710,000		$1,185,000
COSTS:												
FRUIT PROCUREMENT	$ 0.05	$52,500	$ 0.13	$205,400		$257,900	$ 0.05	$52,500	$ 0.13	$205,400		$257,900
ORGANIC CERTIFICATION	$ -	$0	$ -	$0		$0	$ 0.06	$6,000	$ 0.04	$6,000		$12,000
PREP COSTS	$ 0.17	$16,150	$ 0.17	$24,140		$40,290	$ 0.17	$16,150	$ 0.17	$24,140		$40,290
BIOFUEL	$ 0.27	$25,650	$ 0.27	$38,340		$63,990	$ 0.27	$25,650	$ 0.27	$38,340		$63,990
DRYING COSTS	$ 0.02	$1,900	$ 0.02	$2,840		$4,740	$ 0.02	$1,900	$ 0.02	$2,840		$4,740
CARTON	$ 0.18	$16,625	$ 0.18	$24,850		$41,475	$ 0.18	$16,625	$ 0.18	$24,850		$41,475
PACKAGING MATERIAL	$ 0.01	$570	$ 0.01	$852		$1,422	$ 0.01	$570	$ 0.01	$852		$1,422
OVERLAND TRANSPORT	$ 0.08	$7,600	$ 0.08	$11,360		$18,960	$ 0.08	$7,600	$ 0.08	$11,360		$18,960
SUPERVISION	$ 0.38	$35,625	$ 0.38	$53,250		$88,875	$ 0.38	$35,625	$ 0.38	$53,250		$88,875
OCEAN FREIGHT	$ 0.19	$17,575	$ 0.19	$26,270		$43,845	$ 0.19	$17,575	$ 0.19	$26,270		$43,845
SALES & MKTG (15%)	$ 0.45	$42,750	$ 0.45	$63,900		$106,650	$ 0.75	$71,250	$ 0.75	$106,500		$177,750
TOTAL COSTS		$216,945		$451,202		$668,147		$251,445		$499,802		$751,247
ANNUAL NET MARGIN		$68,055		-$25,202		$42,853		$223,555		$210,198		$433,753
CUMULATIVE NET MARGIN		$68,055		-$25,202		$42,853		$223,555		$210,198		$433,753

NOTES:

1	FRUIT PROCUREMENT	ASSUMES THAT MANGO GROWERS WILL BE PREPARED TO DELIVER RAW PRODUCT TO THE FACILITIES AT A COST OF US$ 0.05 PER KILO, WHILE PINEAPPLE WILL BE DELIVERED AT A COST OF US$0.13 PER KILO
2	ORGANIC CERTIFICATION	US$ 6,000 PER COMMODITY PER YEAR
3	PREP COSTS	PER EXHIBIT 12
4	BIOFUEL	ASSUMES THAT POURGHER SEEDS WILL BE DELIVERED TO THE FACILITY AT 150% OF HARVEST COST (IE: US$ 17.00x675 HAx150%), AND THAT PLATFORM LABOR TO CRUSH SEED WILL AMOUNT TO US$ 0.20/KG OF DRIED PRODUCT
5	DRYING	10 MEN PER SHIFT AT FRG 4500/HOUR/MAN
6	CARTON	IMPORTED FROM EUROPE AT A UNIT COST OF EUR 2.25/19.5 KG CTN, PLUS EUR 0.55 PER UNIT FOR TAXES AND CUSTOMS CLEARANCE.
7	PACKAGING MATERIAL	12" x 18" 1.5 MIL POLYETHYLENE BAG FOR EACH 19.5 KG CARTON OF DRIED FRUIT AT A COST OF US$ 0.10/BAG
8	OVERLAND TRANSPORT	620 KM (KANKAN-CONAKRY) + 200 KM (LE HAVRE-PARIS) @ $ 1.20/KM ($2.00/MILE) PER FEU = $984/FEU = US$ 0.08/KG
9	SUPERVISION	PER EXHIBIT 15
10	OCEAN FREIGHT	PER EXHIBIT 16
11	SALES & MARKETING	ASSUMES A COST OF 15% OF THE GROSS SALES PRICE AT DESTINATION

Costs in Exhibit 18 are derived, for the most part, from the exhibits and discussions presented earlier in this report, and are re-capitulated in the notes at the foot of the exhibit. The only differences in costs between the organic and the conventional products come in certification and in sales and marketing. Since this latter expense equates to 15 percent of the gross sales price at destination, and organic product sells at a 65 percent premium, selling costs for the organic mangoes and pineapples are, logically enough, 65 percent higher than for their conventional counterparts.

As the margin analysis makes clear, this project can proceed only if its production can be certified and sold as organic. The small margins on conventional dried mango are insufficient to cover the losses generated by the high procurement costs of the conventional dried pineapple. The margins on organic product, however, appear to be reasonably interesting. As long as this premium continues to operate in Europe and the United States, and certifiably organic whole product can be procured at the indicated costs from local smallholders, then the project can expect to capture a positive gross margin of some 37 percent on sales.

These conventional and organic net margins were then applied to the original investment assumptions in Exhibit 10 in order to calculate Internal Rates of Return (IRR). The IRR is defined as that rate at which the future inflows from operations would need to be discounted, in order to equal the initial capital investment. In other terms, it represents the implicit interest rate which future cash flows will yield against the project's initial investment. Exhibit 19 shows four sets of calculations, each with two additional sensitivities. The first pair of calculations are based on the Hurst furnace as part of the equipment configuration, as per assumption I-A in Exhibit 10. The second pair assume that the Hurst furnace could be replaced by a less expensive furnace sourced from Europe, as per assumption I-B in Exhibit 10. Each of these two assumptions was then applied to the cash flows for both conventional and organic dried mangoes and pineapples as derived in Exhibit 17. These streams of investment and margins were then tested for sensitivity to changes in revenue and cost assumptions. In each of these sensitivity tests, costs were increased by 25 percent , and then revenues were decreased by 25 percent . The results show an understandable improvement under the European furnace assumption, given that the aggregate capital investment is US$181,500 less than under the Hurst furnace assumption. More significantly, the imperative of organic certification is once again reinforced. All returns under the conventional hypotheses yielded negative returns on investment. Under the organic model, however, the base case with the Hurst furnace reached 58 percent , while the base case with the European furnace rose to 77 percent. Each of these cases proved highly sensitive to changes in revenues, with a 25 percent reduction in revenue producing a 75 percent decline in IRR. Sensitivity to increases in cost under these two organic cases is somewhat less, with 25 percent increases in costs driving down IRR's by 45 percent in each of the two cases.

EXHIBIT 19: IRR CALCULATIONS & SENSITIVITIES

I. HURST FURNACE

A CONVENTIONAL

YEAR	MARGIN	IF COSTS 25% >	IF REVENUES 25% <
0	-$761,927	-$761,927	-$761,927
1	$42,853	-$73,257	-$134,814
2	$42,853	-$73,257	-$134,814
3	$42,853	-$73,257	-$134,814
4	$42,853	-$73,257	-$134,814
5	$42,853	-$73,257	-$134,814
6	$42,853	-$73,257	-$134,814
7	$42,853	-$73,257	-$134,814
8	$42,853	-$73,257	-$134,814
9	$42,853	-$73,257	-$134,814
10	$42,853	-$73,257	-$134,814
IRR =	-9%	N/A	N/A

B. ORGANIC

YEAR	MARGIN	IF COSTS 25% >	IF REVENUES 25% <
0	-$761,927	-$761,927	-$761,927
1	$433,753	$260,941	$149,503
2	$433,753	$260,941	$149,503
3	$433,753	$260,941	$149,503
4	$433,753	$260,941	$149,503
5	$433,753	$260,941	$149,503
6	$433,753	$260,941	$149,503
7	$433,753	$260,941	$149,503
8	$433,753	$260,941	$149,503
9	$433,753	$260,941	$149,503
10	$433,753	$260,941	$149,503
IRR =	56%	32%	15%

II. EUROPEAN FURNACE

A CONVENTIONAL

YEAR	MARGIN	IF COSTS 25% >	IF REVENUES 25% <
0	-$580,427	-$580,427	-$580,427
1	$42,853	-$73,257	-$134,814
2	$42,853	-$73,257	-$134,814
3	$42,853	-$73,257	-$134,814
4	$42,853	-$73,257	-$134,814
5	$42,853	-$73,257	-$134,814
6	$42,853	-$73,257	-$134,814
7	$42,853	-$73,257	-$134,814
8	$42,853	-$73,257	-$134,814
9	$42,853	-$73,257	-$134,814
10	$42,853	-$73,257	-$134,814
IRR =	-5%	N/A	N/A

B. ORGANIC

YEAR	MARGIN	IF COSTS 25% >	IF REVENUES 25% <
0	-$580,427	-$580,427	-$580,427
1	$433,753	$260,941	$149,503
2	$433,753	$260,941	$149,503
3	$433,753	$260,941	$149,503
4	$433,753	$260,941	$149,503
5	$433,753	$260,941	$149,503
6	$433,753	$260,941	$149,503
7	$433,753	$260,941	$149,503
8	$433,753	$260,941	$149,503
9	$433,753	$260,941	$149,503
10	$433,753	$260,941	$149,503
IRR =	74%	44%	22%

VI. SUMMARY AND RECOMMENDATIONS

The markets of Western Europe do not appear to have any need – or place – for yet another undifferentiated supplier of fresh Florida-variety mangoes. To the contrary, recent price trends in these markets would lead to the conclusion that the markets are already over-supplied, and that price will become increasingly important in the placement of these products. While the same case is probably true in the markets of North America as well, it is of less importance for this analysis, since phytosanitary barriers and transportation disadvantages are already enough to make the hurdles obstructing Guinea's participation in this market insurmountable.

Guinea's prospects for successful participation in the organic dried mango and pineapple business, both in Western Europe and in North America, appear far more promising. Availability and costs of raw materials and labor represent competitive advantages for the country. The markets appear to be in expansion, with higher volumes and selling prices year-on-year. The financial analysis reveals returns which, while not spectacular, should be sufficient to attract serious interest on the part of international investors. There remain several steps which must be taken before the merits of this proposal can be accurately assessed.

First, the project must find an investor. Given the relatively low cost of entry, and the modular nature of the expansion phases, the project should be accessible to a wide range of companies engaged either in tropical agriculture or in dried fruit import and distribution in either of the two target markets. The campaign to identify and secure a qualified investor for the project would be the first order of business.

While fruit drying operations are commonplace in the sub-Sahara, a project of this scope and sophistication is virtually without precedent. In order to confirm the assumptions which underpin this analysis, the project should proceed to develop a detailed feasibility review and business plan. This document should include at least the following elements:

- Verification of markets, both as regards capacities and price potential
- Identification of specific customers in the target markets, and confirmation from them of their interest in the output of this project
- Agreement with grower associations on a structure and price level for fruit procurement
- Definition of a final configuration for the drying equipment, to insure that components are properly sized and compatible, and that acquisition prices are fully and fairly negotiated
- Confirmation from appropriate certification bodies that mangoes and pineapples delivered to the project's facilities can be certified as organic

- Determination of the ownership structure – sole proprietorship, joint venture, cooperative – which will enhance the long-term prospects for sustainable and profitable outcomes for investors, growers and affiliated parties.

Finally, the project would be strengthened significantly by the active involvement of the Guinean government, including an outline of the specific incentives which the government would be prepared to grant an investor in return for taking on a project of this magnitude. While we were unable to uncover any such incentive scheme during our visits with government officials, our discussions were hypothetical in nature. It remains to be seen what the government's response would be, in terms of incentives and concessions, in the event that a serious investor were to table a concrete proposal involving hundreds of jobs and millions of dollars in export earnings.

APPENDIX I: SCOPE OF WORK

INVESTMENT ANALYSES – FRESH PINEAPPLES AND FRESH MANGOES

INTRODUCTION

The GAMLA project has targeted fresh pineapples and fresh mangoes as two export agribusinesses to be supported and strengthened by the project. Our main objective is to increase exports of these commodities and to demonstrate that export agribusiness is a viable model for Guinea's economic development.

We work along the value chain of each commodity to solve problems and remove constraints. Furthermore, we have compiled a considerable amount of background information on each of these agro-industries in Guinea. This information includes a pre-feasibility study for each commodity, and a value chain analysis of the costs incurred at each point along the chain.

The next activity will be to perform an investment analysis to determine the amount of financial return an investor could expect from an investment in each of these two agribusinesses.

WORK TO BE CARRIED OUT

The activities to be carried out under this scope of work are centered on analyzing the investment potential of fresh pineapples and fresh mangoes exported from Guinea by container ship, as well as by air freight, to European markets. A separate analysis must be carried out for each commodity. The analyses will consider exports by container ship as the "core" business, while air freight shipments will be made to take advantage of niche markets or of seasonal increases in market prices. Since both these commodities have a seasonal production calendar, the consultant will develop investment models composed of the sequential production of additional commodities that complement the core businesses of exporting fresh pineapples and fresh mangoes. In this manner, each export operation will be carried out on a year-round basis. It will be up to the consultant to decide which crops could be

Comment on the year-round production of pineapples

L'ananas peut très bien être produit en Guinée pendant toute l'année. On en trouve d'ailleurs toujours un peu à Maferinyah, même en pleine saison des pluies. D'après Claude Py, un grand chercheur sur l'ananas, il n'y a aucune impossibilité d'obtenir des ananas en saison des pluies. Tout simplement, les grands producteurs d'ananas n'exportent plus à partir de mi-mai, car le marché européen de l'ananas frais s'effondre avec l'arrivée des fruits rouges français sur le marché (Cerises, fraises, etc.).

On m'a dit qu'il peut y avoir un problème de qualité gustative, car avec les grandes pluies, l'ananas serait gorgé d'eau et perdrait de sa saveur... Il serait également plus acide, car le manque de soleil ne permettrait pas une bonne montée du taux de sucre dans les dernières semaines. La couleur "jaune" serait plus difficile à homogénéiser par manque de soleil. Je ne suis moi-même pas persuadé de toutes ces remarques, car les quelques ananas que j'ai trouvés à Maferinyah en saison des pluies étaient délicieux...!!!

En tous cas, j'ai une demande de quelques clients en France pour avoir des ananas frais toute l'année; j'ai donc décidé de faire un essai dès cet été 2006 sur notre plantation.

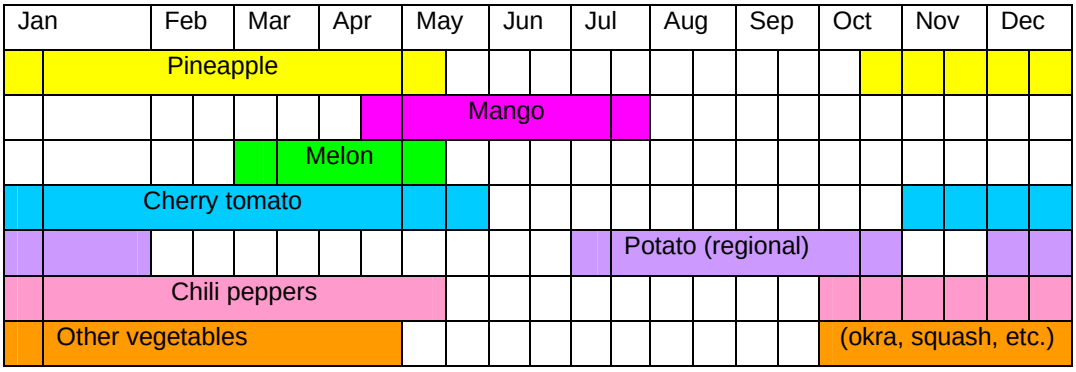
— Jean-Luc Burquier, pineapple exporter

produced to complement the core businesses of exporting fresh mangoes and fresh pineapples.

In the case of fresh pineapples, the normal practice in Guinea is to harvest only from mid-October until mid-May, thereby avoiding harvesting during the rainy season. This appears to be a custom in Guinea, and is apparently based on neither production nor market analysis. One of the tasks of the consultant while carrying out the pineapple analysis will be to analyze the possibility of year-round production and to make recommendations on the possibility of exporting pineapples during the entire year.

The following production calendar is presented as an illustrative example of how year-round exports could take place by the process of shipping different products at different seasons of the year. For example, seasonal mango exports could be phased with the export of potatoes, along with the production and export of winter vegetables. Similarly, seasonal pineapple exports could be combined with the seasonal export of mangoes and potatoes.

ILLUSTRATIVE PRODUCTION CALENDAR FOR GUINEA



PINEAPPLE INVESTMENT ANALYSIS

The consultant will conduct a 10-year investment analysis from the point of view of an international investor who develops a fresh pineapple production and shipping operation in Guinea of a sufficient size to serve a targeted market on a continuing basis (e.g., an average of one container load of pineapples exported every day during the production season). The investor will produce pineapples in Guinea for sale to markets in Europe, North Africa, and the Middle East. Fruit that is too small or otherwise does not meet export quality standards will be sold into local or regional markets. Fruit produced by the investor will be supplemented as needed by out-grower contracts with small-scale pineapple farmers.

The investment scenario must be based on the reality of actual pineapple production in Guinea, not a generic production model. In other words, the investment should be site-specific and must consider any assets (buildings; equipment) that could be made available to a foreign investor by agencies within the Government of Guinea. Furthermore, in view of the limited resources available to small farmers in Guinea, all

chemical products and irrigation equipment used by out-growers must be financed by the exporter.

The analytical method used must determine the internal rate of return. This method computes the interest rate that makes the net present value of all cash flows related to the investment equal to zero.

A sensitivity analysis must also be conducted, under the assumption that the market price for the final product sold, as well as the cost of raw materials, would increase and also decrease by 15 percent.

All assumptions in the investment analysis should be clearly stated.

As stated earlier, the consultant should make recommendations on the year-round production of pineapples in Guinea.

The analysis should address the following elements:

- Plant varieties
- Sources of planting material
- Land preparation
- Treatment of planting material
- Plant density
- Planting
- Irrigation
- Fertilizers
- Crop culture; plant protection
- De-suckering ratoon crop
- Flower inducement
- Crop cycle
- Harvesting
- Post harvest handling
- Marketing and export

- Prices
- Production/Export yield
- Out-grower production
- Economic life of plantation
- Financing
- Management structure
- Land rental
- Asset requirements; asset purchases

The investment analysis will be carried out by an international consultant with the assistance of a local consultant who is a specialist in pineapple production.

MANGO INVESTMENT ANALYSIS

The mango investment analysis should consider the export of fresh mangoes by sea container as the core business, with additional exports based on the production of crops that complement the mango production season. The business model for mango exports will be based on the purchase of fruit from independent growers; however, it should be assumed that the exporter will finance the cost of orchard maintenance by its affiliated growers during the growing season. The cost of orchard maintenance will be recovered from the payments for fruit purchased from the affiliated growers.

The investment required for the core business of mango exports will include cold rooms, grading and selecting equipment, a standby generator, passenger vehicles, communications equipment, and product handling equipment such as forklifts. To the extent possible, this equipment would be used for the export of additional commodities as well. However, should specialized facilities and equipment be required for the additional commodities, these investments must also be considered in the analysis.

The mango investment model must consider the production and export of additional commodities such as those shown in the above calendar that will complement the core business of mango exports. The analysis of the investment required for each additional commodity, along with their income and expense projections, should be presented separately. However, a consolidated analysis must be presented that incorporates the financial results of the investment in mangoes combined with those of all other seasonal commodities. The international consultant will recommend for consideration by GAMLA the mix of commodities to be included in the consolidated investment analysis.

Depending on their production complexity, the additional crops considered in the analysis may be produced either by the exporter or by out-growers working under the close supervision of the exporter, or some combination of these two alternatives. The crop production mix used in the analysis will be recommended by the consultant for approval by GAMLA. In the case of some crops, such as potatoes, the model may well assume that the packaging and storage facility will be used merely for sorting, packaging, and cold storage of the commodity as a service provided under contract to third parties.

Similar to that indicated for the pineapple investment analysis, the analytical method used for the mango analysis must determine the internal rate of return. A sensitivity analysis must also be conducted, under the assumption that the market price for the final product sold, as well as the cost of raw materials, would increase and also decrease by 15 percent.

As is the case for pineapples, all assumptions in the mango investment analysis must be clearly stated.

The investment analysis will be carried out by an international consultant with the assistance of a local consultant who is a specialist in horticulture production.

Separately, a specialist from the Fulaya Agricultural Research Center has been hired to develop crop budgets for each of the possible additional crops. This information will be provided to the consultants for their use in these analyses.

REPORTS

An illustrative description of the contents of each report is the following:

- Title page
- Abbreviations used
- Table of contents
- Executive summary
- Introduction
- Background
- Investment analysis
- Conclusions and recommendations
- Annex:

— - Consultant’s scope of work

- - List of documents reviewed
- - Names and contact information of people met

A Times New Roman font, size 12 should be used for the text of the report. The report should be written in French.

The two reports (the Pineapple Investment Analysis and the Mango Investment Analysis) should be submitted separately.

All cost and revenue numbers should be converted into U.S. dollars (US$) and the exchange rates specified for the different national currencies.

LEVEL OF EFFORT:

A level of effort (LOE) of 33 working days (including three travel days) is authorized for this work by the international consultant. A level of effort of 30 working days is authorized for this work by the local consultant.

COMPLETION DATE:

The final completion date for both reports is June 1, 2006

APPENDIX II: INNOTECH DRYING CHAMBER SPECIFICATIONS

INNOTECH
Ingenieursgesellschaft mbH

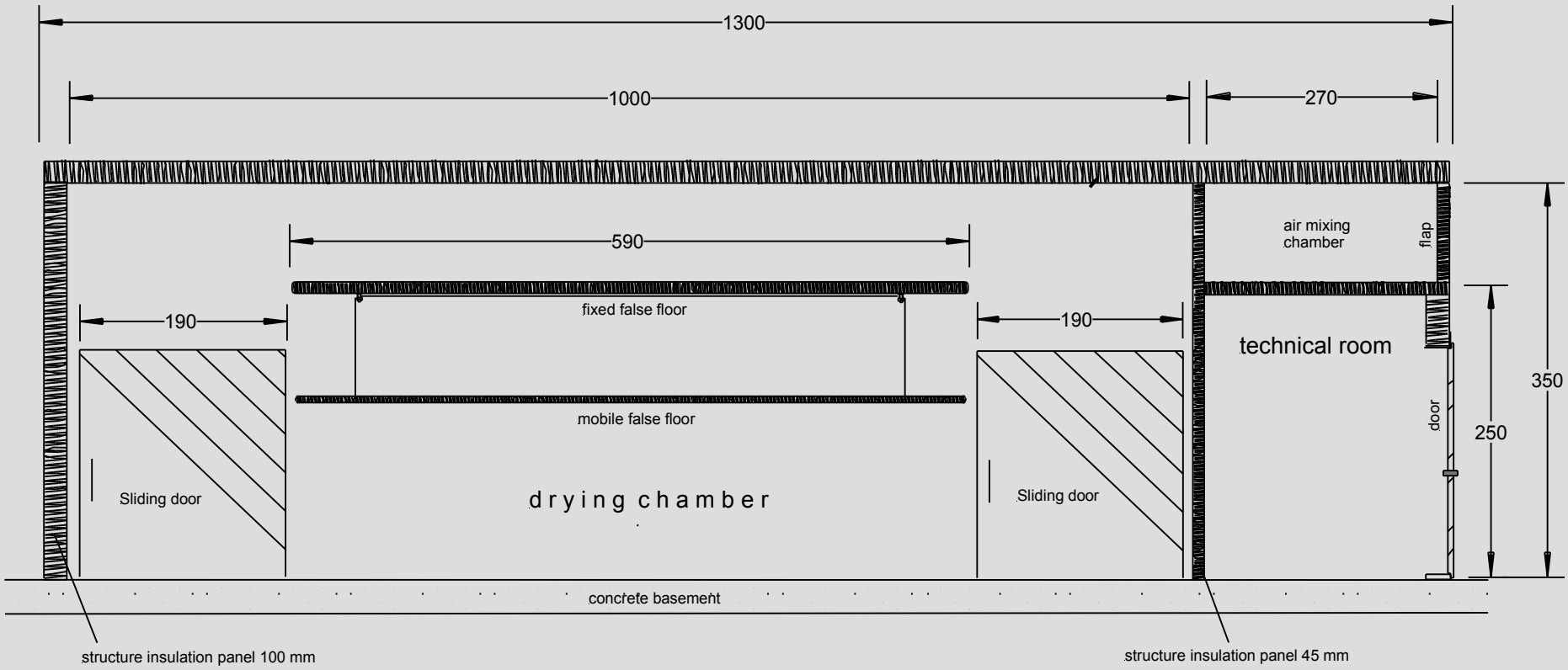
Innotech Drying Chamber

INNOTECH
Ingenieursgesellschaft mbH

Drying chamber

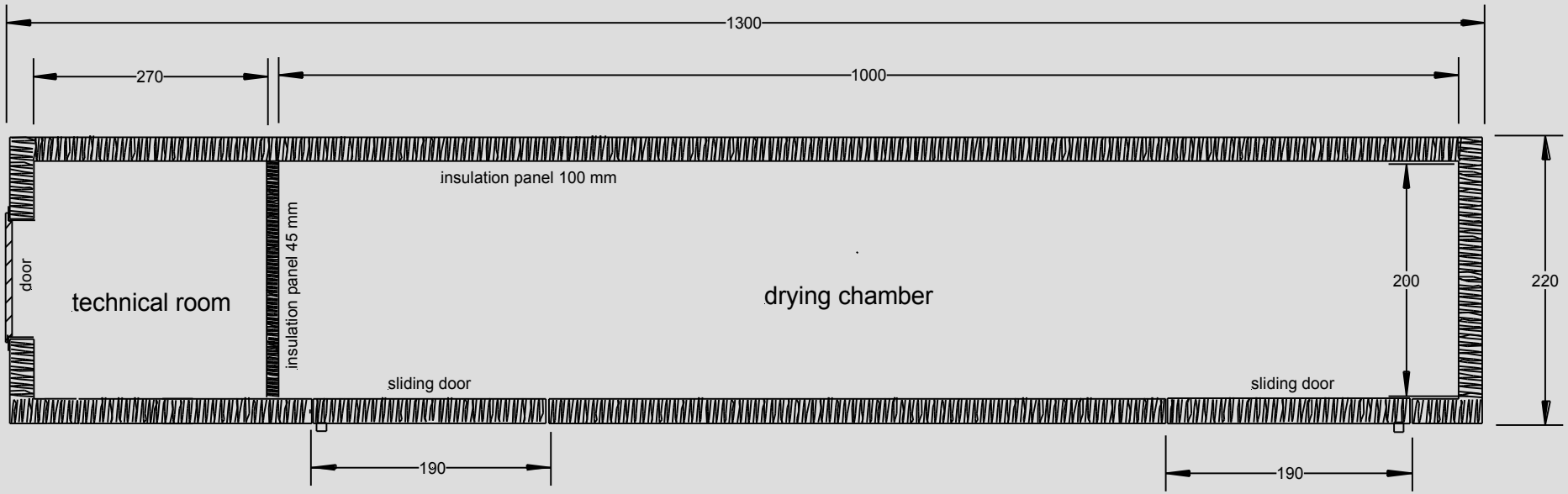
INNOTECH
Ingenieursgesellschaft mbH

Technical Sketch



INNOTECH
Ingenieursgesellschaft mbH

Top view



Energy sources

Electricity provided by:

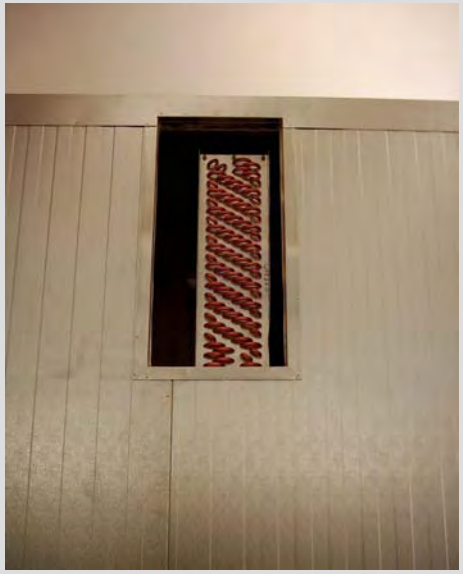
- Public grid
- Generator
- Co-generation

Heat generated by:

- Natural Gas
- Liquid Petroleum Gas
- Biogas
- Diesel
- Wood furnace
- Biomass furnace
- Garbage furnace
- Steam generator
- Hot spring
- Solar air heater
- Solar water heater
- Co-generation

Heating I

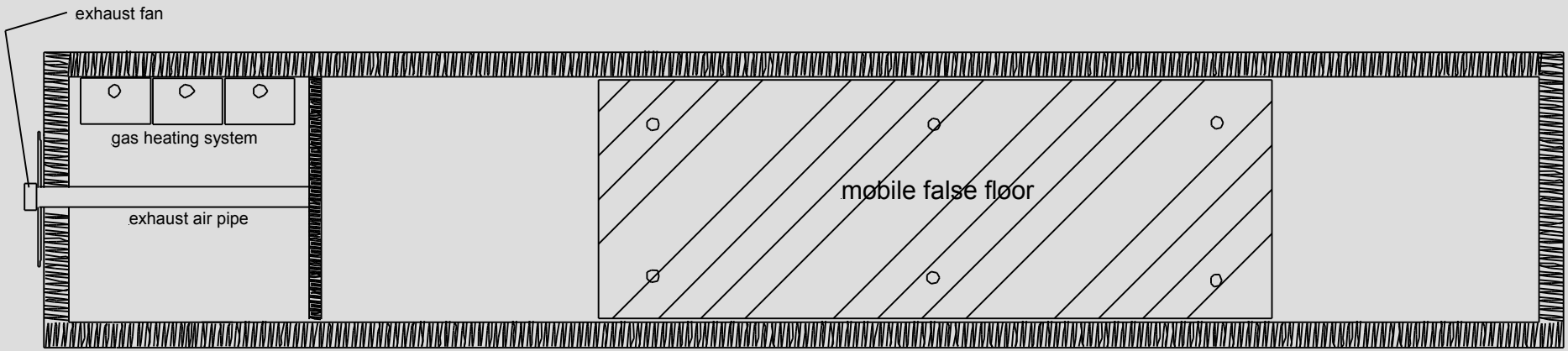
- by means of an integrated air-water heat exchanger

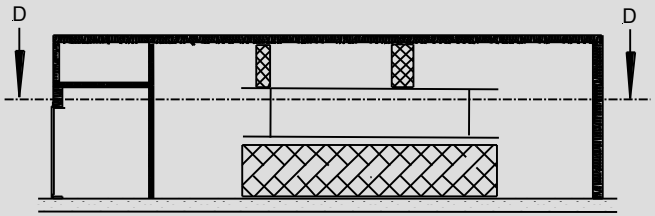


Heating II

- and a gas heating system

Heating III


exhaust fan
gas heating system
exhaust air pipe
mobile false floor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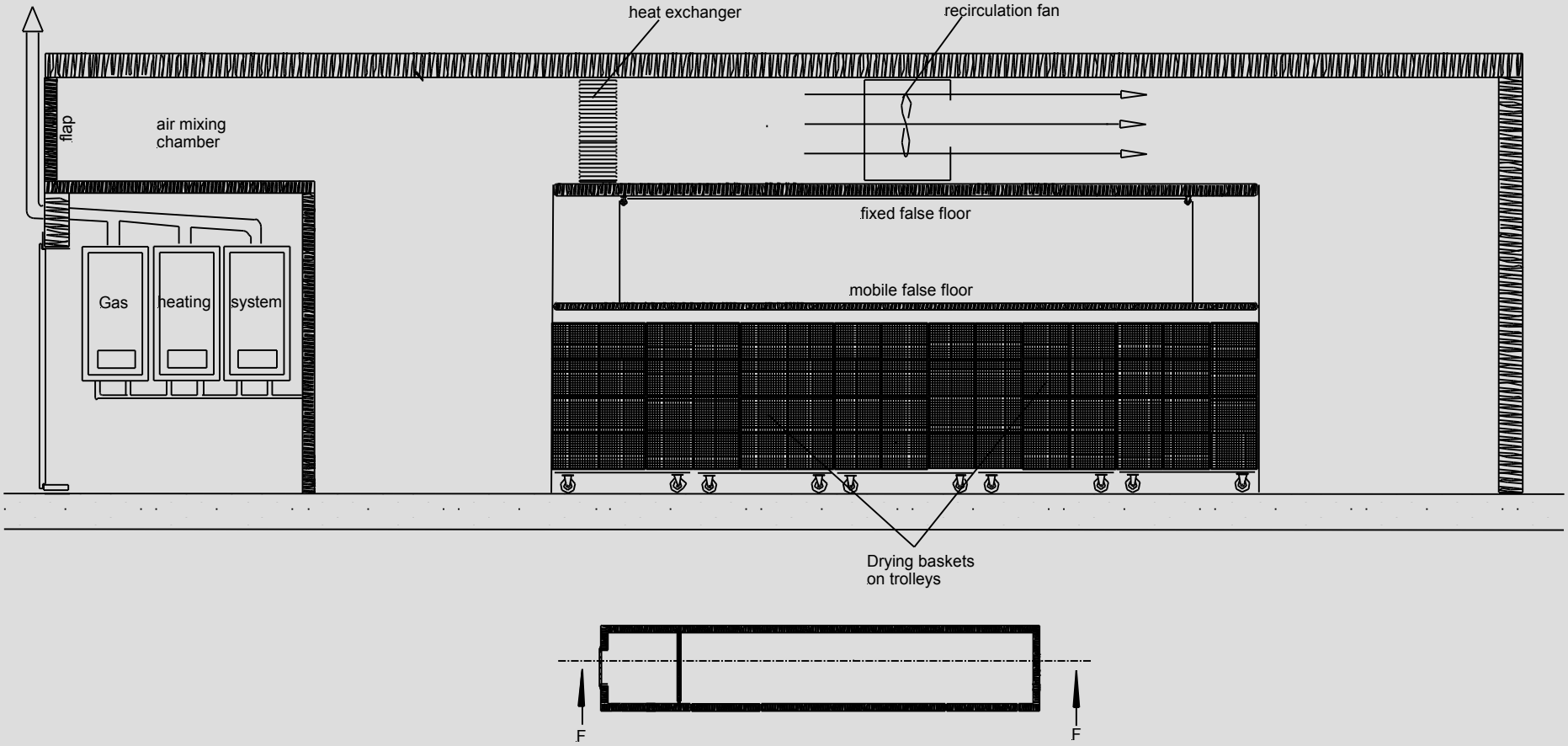
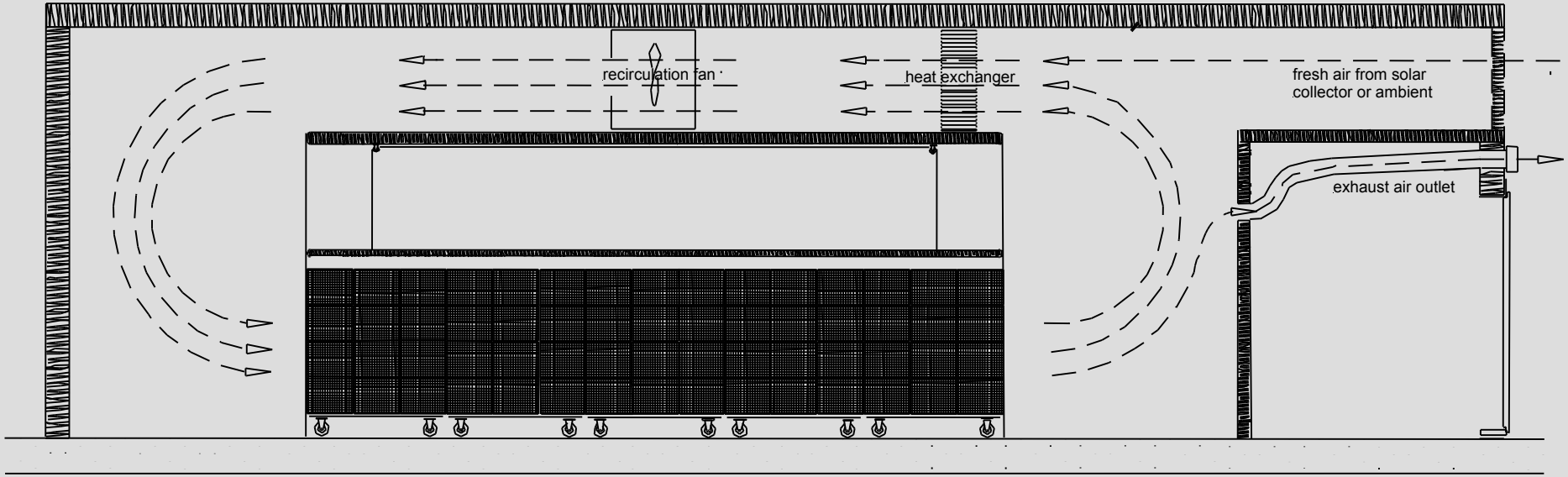
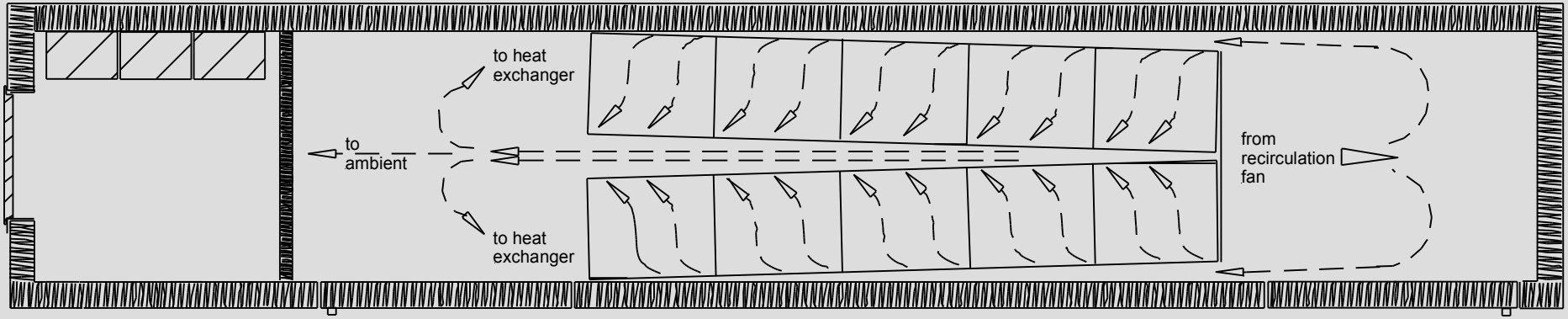
Heating IV



Air system I


recirculation fan
heat exchanger
fresh air from solar
collector or ambient
exhaust air outlet

Air system II



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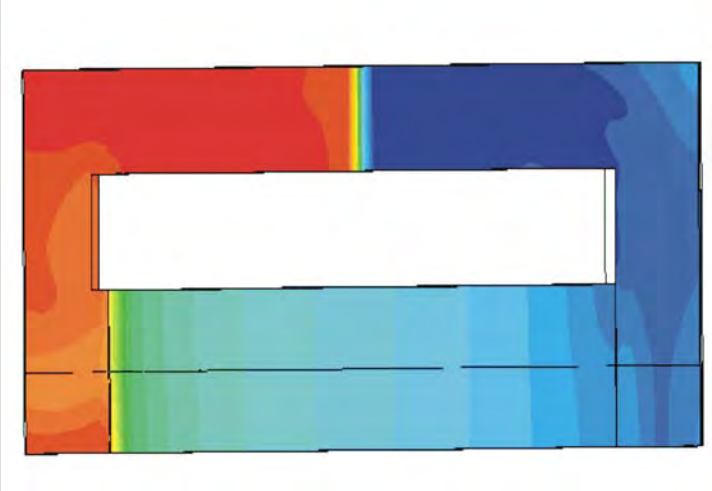
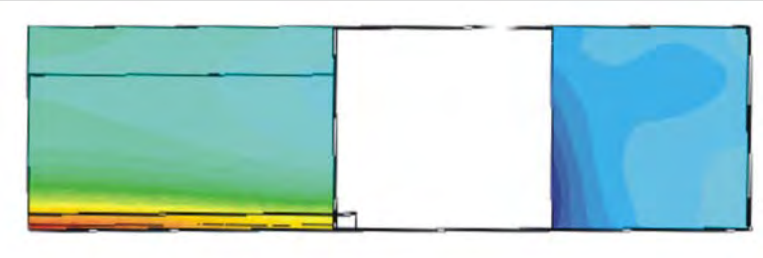
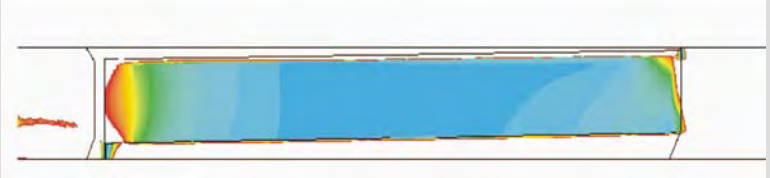
Air system II







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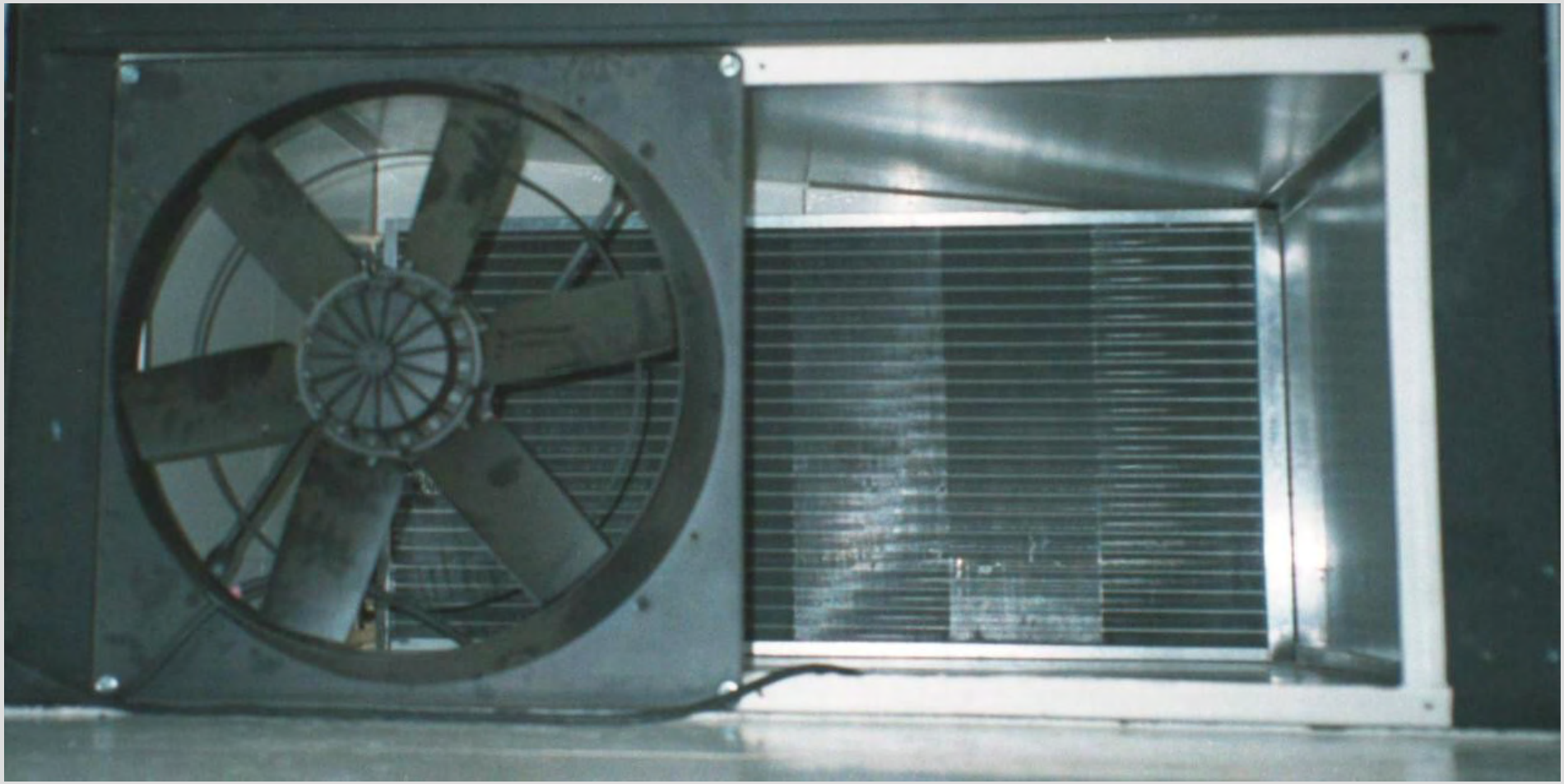
Circulation fan



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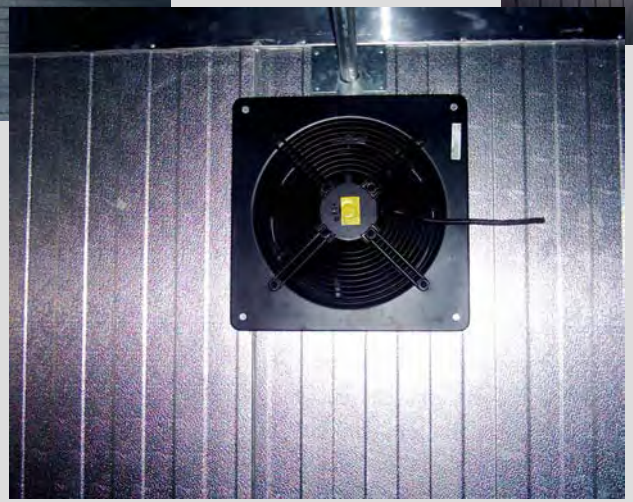
Air inlet and outlet



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Interior I

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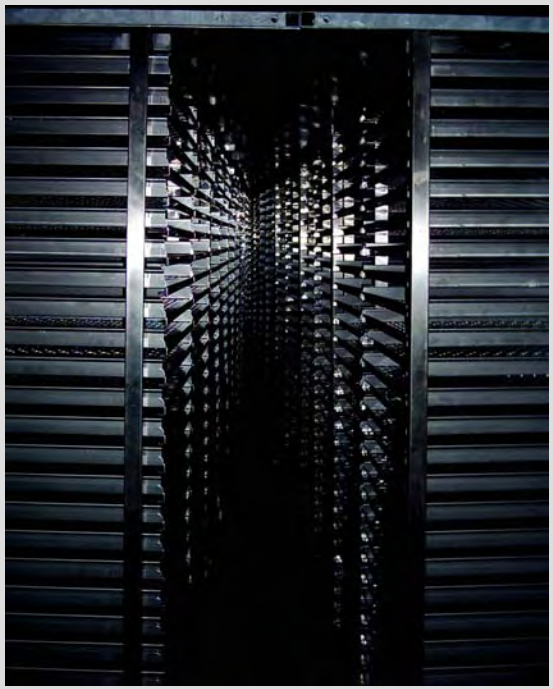
Interior I



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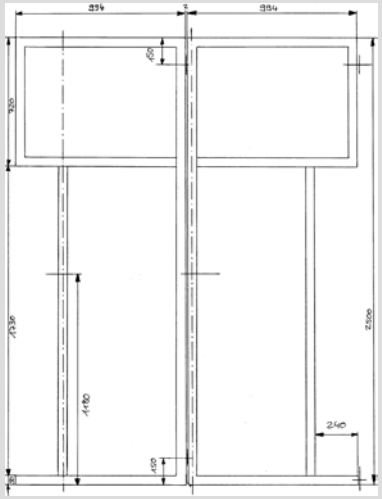
Interior II



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Trays and Trolleys

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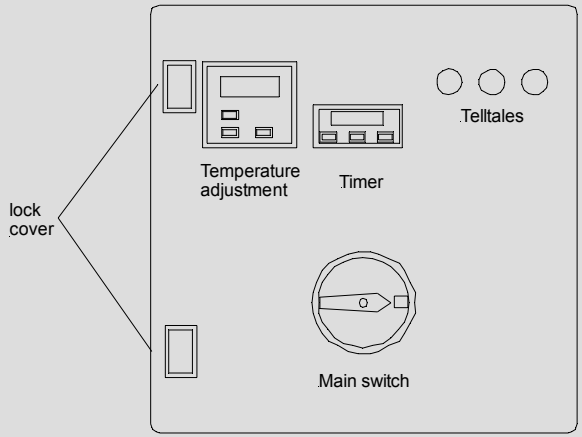
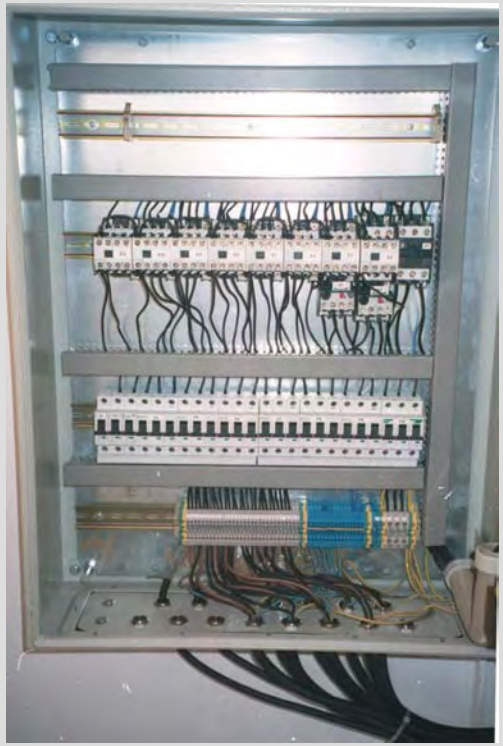
Control system





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Technical room

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Technical data I

Drying Chamber

Length:	10.00 m
Width:	2.20 m
Total Height:	3.50 m
Material Chamber:	100 mm PU-Heat insulation panels
Material False Floor:	45 mm PU-Heat insulation panels
Doors:	2 Sliding doors, ca. 1.9 m wide Interior
Equipment:	10 Stainless steel trolleys equipped with stainless steel trays

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Technical data II

Technical Room

Length:	4.00 m
Width:	2.20 m
Height:	2.50 m
Material Room:	45 mm PU-Heat insulation panels
Door:	0.90 m x 2.00 m

Technical Equipment

Recirculating fans:	2 High performance axial flow fans, 400V
Exhaust fan:	1 High performance axial flow fan, 400 V
Standard-Heating System:	2 modulating gas fired water heater 65 kW each, air-water heat exchanger
Control System:	Temperature control, 24 h timer

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Innotech Dryers worldwide in operation

Argentina
Azerbaijan
Australia
Austria
Bangladesh
Belize
Benin
Bolivia
Bosnia and Herzegovina
Brazil
Burkina Faso
Cameroon
Canada
Chile
China
Costa Rica
Cyprus
Dominican Republic
Ecuador
Egypt
El Salvador
Ethiopia

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Innotech Dryers worldwide in operation

France
Georgia
Germany
Ghana
Greece
Guatemala
Haiti
Hungary
India
Indonesia
Iran
Italy
Israel
Kenya
Kyrgyzstan
Lebanon
Madagascar
Malawi
Mali
Macedonia
Mexico
Morocco

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Innotech Dryers worldwide in operation

Mozambique
Myanmar
Nepal
Nicaragua
Nigeria
North Korea
Pakistan
Paraguay
Peru
Philippines
Portugal
Romania
Rwanda
Saudi Arabia
Senegal
Serbia
South Africa
South Korea
Spain
Sri Lanka
Sudan
Switzerland

Innotech Dryers worldwide in operation

Tanzania
Thailand
Togo
Turkey
Tunisia
Uganda
Uruguay
USA
Uzbekistan
Vietnam
Yemen
Zambia

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Selection of installed units I

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Selection of installed units II

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Awards I

Innotech Dryer received i.a. the following awards

- Winner of the international dryer competition, Almeria 1995
- Environmental award of Kreissparkasse Calw
- Innovation Award of the State Baden-Württemberg, Dr. Rudolf Eberle Preis acknowledgement

Awards II

Innotech Dryer received i.a. the following awards

- Special award of Deutsche Wirtschaftsjunioren
- Award for Outstanding Innovations 2003, American Society of Agricultural Engineers (ASAE)

Innotech Ingenieursgesellschaft

The **INNOTECH** Ingenieursgesellschaft cooperates with Ministries, Organisations of the technical cooperation, developing aid organisations, small and medium sized enterprises of the food processing industry, farms as well as universities and research institutes all over the world

Contact I

Production, Development, Sales:

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Fax: ++ 49 (0)7031 / 74 47 42
Mail: info@innotech-ing.de
VAT Id No.: DE 146 024 177

Contact II

Administration:

INNOTECH Ingenieursgesellschaft mbH
Brandenburger Strasse 2
D-71229 Leonberg
Tel.: ++ 49 (0)7152 / 76 184
Fax: ++ 49 (0)7152 / 76 101
Mail: administration@innotech-ing.de
VAT Id No.: DE 146 024 177

APPENDIX III: INNOTECH DRYING CHAMBER – QUOTATION

HURST BOILER & WELDING CO., INC.

PO Drawer 530 • 21971 Highway 319 N. • Coolidge, GA 31738-0530 • Tel: 229 346-3545 • Fax: 229 346-3874

PROPOSAL # 081506-250-150

250 HORSEPOWER

MANGO AND PINEAPPLE WASTE FIRED STEAM BOILER

(8,625 POUNDS OF STEAM PER HOUR)

FOR

PATRICK HANEMANN
FARM2MARKET AGRIBUSINESS CONSULTING, INC
WEST AFRICA

Phone : 956-682-3808
Fax :956-358-8909
Email : farm2market@gmail.com

GENERAL SPECIFICATIONS

1.	Scope of Equipment:	Mango & Pineapple Waste Fired
2.	Gasifier Fuel Requirements:	Size that will fit thru 18" x 24" cast iron door. (2 units provided)
3.	Approximate Fuel Usage at Maximum Firing Rate:	1200 lbs per hour based on moisture control.
4.	Firing Rate:	(8,625 lbs. of steam per hour from and at 212° F.)
5.	Boiler Pressure:	15 psig steam. Maximum Operating pressure is 13.5 psig.
6.	Boiler Design:	Low Pressure Firebox Type Built in accordance with the ASME Code.

1.1 ENGINEERING SERVICES

Hurst Boiler & Welding Co., Inc. will supply all required design and specifications for the proposed equipment.

Engineering will include:

1. Boiler room/storage layout drawings for locating new equipment.

2. Foundation details for proposed waste fired boiler based on 2500 PSF soil conditions.

3. Assistance in completing and filing of boiler's environmental emission permit

4. All required installation prints and specifications required to install the proposed equipment.

5. Two (2) sets of operating and maintenance manuals.

1.2 SYSTEM START-UP & OPERATOR TRAINING

When installation is complete, Hurst Boiler & Welding Co., Inc. will start the equipment and train personnel on the proper maintenance and operation of the system to include:

1. Check out of all system components to assure proper rotation, alignment, sequencing, function, etc.

2. Start-up of the system to test operation of controls, conveyors and other related equipment.

3. Adjustment of controls to provide efficient operation of all boiler functions.

4. Start-up of the equipment with mill personnel to familiarize them with proper operation and maintenance procedures.

5. Hurst Boiler & Welding Co., Inc.'s personnel are available on site equipment is started-up and operating training. Start-up services are not part of this proposal, Rate: 750.00 per day plus all travel & living expenses.

2.1 SLAB WOOD COMBUSTION CHAMBER & GRATE

Substochiometric Incline fuel gasifier to include:

1. (4) 18" X 24" cast iron doors for fuel input.
2. 6" x 6" air cooled site glass.
3. Flat type overfeed stoker to include:

   -Heavy duty stoker support with (3) air zones.

   -Grates supports assembly.

   -Chain type grate with rod locks.

   -Flat grates cast of Warite, a cast iron alloy of chrome and nickel.
4. Substochiometric combustion air system to include:

   -(3) Direct blower with TEFC motor.

   -Prefabricated combustion air duct work for interconnection of blower to gasifier.

   -Zoned undergrate plenum with (3) blowers units (1) per zone.
5. Combustion chamber casing to include:

   -Furnace front of 1/4" steel plate.

   -Furnace sides and rear of 3/16" steel plate reinforced with angle and channel irons.

-Chamber lining of:

-9" refractory wall and radiant arch with a service temperature of: 3000 F.

-2" "M" block service temperature of: 1900 F.

-2" mineral wool, service temperature: 1200 F.

6. One (1) air cooled observation ports with heat shields and tinted site glasses.

7. Four (4) cast iron overfire access doors with heat shield and lockable handles.

8. Undergrate access doors (Steel fab type).

9. Skids and support assembly.

Note: Refractory shipped loose. For field installation.

2.2 OVERFIRE BLOWER & HEADER ASSEMLBY

For the combustion of fuel gas Hurst Boiler & Welding Co., Inc. will furnish:

1. Combustion air system to include:

   -Direct driven blower with TEFC motor.

   -Prefabricated combustion air duct work for interconnection of blower to zoned air port plenum.

2. Combustion chamber casing complete with the following:

   -Casing of 3/16" steel plate with inlet and outlet flanges and angle and channel iron reinforcement.

   -Chamber lining of:

      -9" refractory wall, and radiant arch with a service temperature: 3000°F.

      -2" "M" block, service temperature: 1900°F.

      -2" mineral, wool, service temperature: 1200°F.

Note: Refractory shipped loose. For field installation.

2.3 PRESSURE VESSEL (FIREBOX TYPE)

Hurst Firebox Boiler designed for efficient heat recovery from solid fuel combustion. Unit built in strict accordance with the ASME Code and stamped, and rated at no less than 10 square feet of heating surface per boiler horsepower.

The generator (firetube) section includes:

1. Front and rear smoke boxes complete with twin air tight doors. The doors on the Hurst boiler are internally insulated and incorporate an abrasion resistant shield on the interior of the doors.

2. Steam, water inspection and blowdown openings.

3. Lugs for connecting support structure.

4. Support assembly for attaching to combustion chamber casing.

5. Blowdown opening on lower drum.

6. Manway inspection openings on the top of drum.

The generator and radiant sections of the Firebox boiler are insulated with 2" of high density fiberglass and clad with 22 gauge "Paint-Grip" zinc coated steel jacket material and galvanized screws for attachment and joining.

2.4 BOILER TRIM AND LIMIT CONTROLS

1. Relief valves per ASME Code.

2. Boiler bottom blowdown valves.

   - One (1) quick opening.
   - One (1) slow opening.

3. Surface blowdown valves consisting of one (1) needle and one (1) check.

4. Steam pressure gauge with pigtail and gauge cock.

5. Boiler feedwater system to include: globe valve, two (2) check valves and stop valves. (Shipped loose)

6. Low water limits:

   -Primary: Float type with tri-cocks, gauge glass, and pump controller.
   -Secondary: Probe type.

7. Pressure limits include:

   -Opening limit.
   -High pressure limit.
   -Low pressure limit.

2.5 POLLUTION CONTROL AND INDUCED DRAFT EQUIPMENT

Pollution control and induced draft system consisting of:

1. Flanged breeching, prefabricated of angle iron reinforced 3/16" steel plate for routing flue gas from boiler to multi cyclone.

2. Primary dry mechanical multiple cyclone flyash arrester with 9" diameter clones, rotary airlock discharge valve.

3. Flanged transition of angle iron reinforced 3/16" steel plate for routing flue gas from multicyclone into induced draft fan.

4. Centrifugal type induced draft fan designed for combustion air service complete with multi-louver inlet side damper with control linkage and proportional position actuator, oil cooled pillow block roller bearings (located outside hot gas stream), heavy duty shaft with heat slinger, TEFC motor, belt drive, and OSHA belt guard.

5. Flanged transition and self supporting stack constructed of 10 gauge 3/16" steel plate to exhaust spent gasses 25' above grade.

2.6 ELECTRICAL CONTROL SYSTEM

An integrated, control system housed in a free standing, pre-wired panel for automatic operation to include:

1. Control panel fabricated of 10 gauge steel plate, primed and painted interior and exterior.

2. Circuit breakers for all motors furnished by Hurst Boiler & Welding Co., Inc.

3. Motor starters for all motors furnished by Hurst Boiler & Welding Co., Inc.

4. Interlocking devices, glove type selector switches and status lights for all motors furnished by Hurst Boiler & Welding Co., Inc.

5. Draft control & field mod motor assembly for automatic draft.

6. Combustion air damper on/off.

7. Over fire air damper on/off.

3.1 SERVICES PROVIDED BY HURST BOILER & WELDING CO.,INC.

- All drawings and specifications required for foundations and civil works.
- Technical assistance required for the shipment and haulage of the plant components.
- Technical assistance required for environmental permitting.
- The application of rust inhibitors and final paintwork on machines and other components of our supply and stacking inside the container.
- Plan view diagram of the complete plant.
- Erection and electric flow diagram drawings.
- All interconnecting steam and condensate piping, including required fittings and piping included.
- Steam piping from the main valve.
- All electrical wiring for connecting proposed equipment.

3.2 RESPONSIBILITIES OF PURCHASER

-Obtain all necessary building and applicable permits and or testing.

-Provide P.E. stamp if necessary.

-Provide all site preparation to assure a minimum soil bearing capacity of 2500 PSF.

-Install foundation per Hurst Boiler & Welding Co., Inc. drawings and specifications.

-Provide freight from factory to job site.

-Provide crane service for unloading and erection of steam plant.

-Custom duties, taxes, fees, and other charges of any kind which may arise from importing the equipment into customer's country.

-Furnish all tools and labor to install the boiler system.

-Insulation on hot service piping if required.

-Furnish and install building and lighting.

-Furnish fuel preparation and placement of fuel in boiler.

-Provide local travel costs, room and board expenses for our technicians.

-Receive and protect materials prior to the start of construction.

-Provide main disconnect and wiring to main lugs located in master control panel.

-Plumbing supplies to install boiler to kiln (steam, water & condensate supply).

-Feedwater system to boiler.

4.1 PRICE SUMMARY

Hurst Boiler & Welding Co., Inc. presents the system as outlined in this proposal for equipment and services for the sum of

New 250 Horsepower System

a) Boiler pressure vessel assembly (2500 sq ft). 85,000.00

b) Combustion chamber assembly 27,844.00

c) Casing trim. 4,755.00

d) Refractory, installation and hanger support. 23,915.00

e) Grate system with blower and over fire air manual &
blower assembly 21,074.00

f) Flyash arrestor system: (if required)

9" OD Collector unit, rotary valve unit, ID/Fan stack, & duct work 30,715.00

g) Control panel assembly 12,572.00

Total complete 250 Horsepower Boiler System F. O. B. Factory..... 205,875.00

Optional Equipment

250 Gallon Feedwater System with (2) pumps 12,989.00

4.2 DELIVERY

Based on the present shop load and materials on hand Hurst Boiler & Welding Co., Inc. will have the steam plant complete and ready for shipment within 5 months after the receipt of order.

4.3 TERMS

35% With order
65% Upon delivery of Hurst shipping documents to the bank.
Note: All bank charges are the responsibility of the opener.

GENERAL TERMS AND CONDITIONS

1. You will sign or have signed our proposal of which the general terms and conditions are a part. For and in consideration of one dollar in hand paid by you, the purchaser and by us, the seller, to each other and other good and valuable considerations, the receipt and adequacy of which are hereby acknowledge by each of us, you and we agree to the following as a part of our contract. If there exists a conflict between the rest of our contract and, then the General Terms and Conditions, then the General Terms and Conditions will take precedence..

2. Security Interest and Title. Hurst Boiler and Welding Co., Inc.("Hurst" and sometimes "we," "us" and "seller") is hereby granted and will retain a purchase money security interest in, and to the extent allowed by applicable law, equitable title to, the equipment described in our proposal to you, and all products and proceeds thereof, until Hurst is paid in full. In order to perfect that interest, we ask that you execute one or more financing statements. Purchaser agrees to sign and deliver to seller all UCC-1s, UCC-2s and other documents required to perfect such security interest, and to do so immediately upon signing of the contract. This will be recorded and will be public notice that we retain a purchase money security interest in the equipment and all products and proceeds thereof. You and our company agree and it is our mutual intention that the equipment proposed and described in our quote is now and shall remain personal property and shall not become a fixture or part of a fixture until we have been paid in full.

3. Price, Terms and Payment. Hurst's price to you is stated in the contract. Our price is a cash price and you agree to pay us in cash. You agree to pay us 35% of the cash price at the time of acceptance of the contract and another 55% thereof upon notification by Hurst to you that the equipment is ready for shipment, which payment must be received by us before shipment. The final 10% is due upon completion of our work, but in no event later than 90 days after notification to you that the equipment is ready for shipment. Your payment to us will not be dependent or contingent upon receipt of payment by you from any other party. Any balance of the remaining cash price unpaid 31 days after the invoice date will be subjected to a 1 ½ per cent monthly service fee until the invoice is completely paid in full. In the event that we have to engage an attorney to collect the balance due us, including the service fee, you agree to reimburse us for all collection costs including reasonable attorney's fees.

Our proposal includes the equipment we offer to furnish you at the prices stated, and these prices will remain firm if you sign and return our proposal within 45 days from the date of our proposal. The prices could change if you should require changes such as a change in the design of the product or changes in the components we have quoted. We will issue the necessary change orders to either decrease or increase the price and/or time of completion, and said change orders will be deemed accepted and assented to by you if within a reasonable time the terms of the change order have not been objected to in writing to us by you, it being agreed upon that a reasonable time for objection is 20 days from the date of issuance of any said change order. We, of course, reserve the right to correct typing and clerical errors in our price or specifications.

4. Storage of Equipment. You will be notified of a tentative shipment date. Once the equipment is ready to be shipped, we may at our option, agree to store the equipment should you not be ready for delivery. This will not relieve your duty to pay all invoices as they become due according to the payment terms of the contract. Should we invoke our option to store the equipment for said reason you hereby agree to pay a storage fee to us at the rate of 1% of the contract price per month in addition to your duty to pay the cash price and service fees.

5. Inspection by Purchaser. All or much of the equipment work will be manufactured or fabricated at our factory near Coolidge, Georgia. Inspection by you during manufacturing or fabrication must be made at our factory at your expense prior to shipment there from, with 5 days' advance notice to seller.

6. Taxes, Permits and Licenses. Purchaser agrees to pay all sales, use and excise taxes due, payable or imposed by virtue of this sale, whether imposed on purchaser or seller. Purchaser agrees to pay the cost of all licenses and permits and environmental protection testing imposed on or incurred by purchaser or seller in connection with this sale by seller to purchaser. All such taxes, licenses, permits and testing paid by seller, together with all costs, expenses and charges incurred by seller defending against or resisting payment thereof, shall be reimbursed by purchaser to seller promptly upon receipt of an invoice therefor. If you are tax exempt on this job, you will need to provide us with your exemption certificate.

7. Freight, Transportation and Risk of Loss. All Freight, transportation or other charges and costs of delivery to purchaser of all equipment and work shall be assumed by the seller and is included in the contract price, and shall be F.O.B. destination or other point of shipment to Purchaser, if not shipped in our truck(s). Hurst is not responsible for shipment then the purchaser shall be held responsible for all necessary permits, escorts, and all other details for delivery of the equipment. In order for you to obtain proper delivery, it is agreed by you and by Hurst that you will provide the carrier with an access road to and from the job site which is capable of supporting trucks loaded to 75,000 pounds and with a 14 foot height clearance. Should the job site or such road not be suitable for such use and purposes, you will reimburse the carrier and us if we are responsible for the erection of the equipment , for any delays at the hourly labor rate and demurrage rate current at that time. You will also be responsible for unloading the equipment, unless we are responsible for the erection of the equipment.

8. Delays in Performance. We will not be liable for any damages sustained by you resulting from our company's or any supplier's failure to perform or delay in performing any obligation , if such failure(s) or delay(s) is/are caused directly or indirectly by circumstances or events beyond Hurst's control. Some examples are invasion, fire, floods, strikes, thefts, interference or restraint by civil or military authority, etc. You agree to hereby waive any right you have to incidental or consequential damages as a result of any delay, as stated in our warranty. You also agree that we will not be responsible for any "back charges" or costs unless you first obtain our company's written approval before you sustain any "back charges" or costs. You must obtain this approval in writing in advance from our authorized officer.

9. Limited Warranty. All material and equipment supplied by and or erected and or started up by us under the contract is warranted to you against defects in materials and workmanship and/or design for a period of one (1) year from the date of fire-up/start-up. This warranty applies only in the event of normal use, service and conditions. Assemblies, subassemblies, parts, and accessories

manufactured by others and incorporated into goods of our manufacture are warranted by Hurst only to the extent of the warranty of the original manufacturer. All claims for breach of warranty must be made in writing to Seller at the Seller's address as soon as any defect becomes apparent. IT IS EXPRESSLY AGREED THAT THE FOLLOWING IS BUYER'S/YOUR EXCLUSIVE REMEDY FOR BREACH OF THESE WARRANTIES: THE SOLE OBLIGATION OF HURST AND YOUR SOLE REMEDY UNDER THESE WARRANTIES IS LIMITED TO THE REPAIR OR, AT OUR OPTION, REPLACEMENT OF ANY COMPONENT PART MANUFACTURED BY HURST WHICH PROVES , UPON EXAMINATION BY HURST, TO HAVE BEEN DEFECTIVE ORIGINALLY. DEFECTIVE PARTS MUST BE RETURNED BY THE PURCHASER OR OWNER TO US.

In no event shall we bear any responsibility for the failure on your behalf to operate the equipment in accordance with our manuals, instructions, training, or service procedures. If you or any one you authorize other than Hurst repairs the equipment without prior written consent of an authorized officer of Hurst, then this limited warranty will no longer be valid.

HURST WILL NOT BE RESPONSIBLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES OF WHATSOEVER NATURE OR KIND. IN NO EVENT WILL HURST'S LIABILITY TO PURCHASER EXCEED THE CASH PRICE OF THE DEFECTIVE EQUIPMENT. IT IS MUTUALLY AGREED THAT THE PRICE STATED FOR THE EQUIPMENT HEREIN DESCRIBED IS A CONSIDERATION IN LIMITING HURST'S LIABILITY.

THIS LIMITED WARRANTY IS IN SUBSTITUTION FOR AND IN LIEU OF ANY AND ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND SUITABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE WHATSOEVER.

10. CANCELLATION. This contract may be canceled by you upon notice to us in writing, but only on the following terms: (a) payment by you in advance of cancellation date in full of the purchase price in effect on the day of cancellation for all equipment completed and all work performed, and (b)payment in full of all material and labor costs incurred, plus material handling, manufacturing, sales, engineering, and administrative overhead, plus 8% overall anticipated profit on all incomplete equipment and to- be- performed work. In addition to such cancellation charges, Purchaser also shall pay immediately and before the cancellation date the full cost of all special or specially fabricated tools and equipment considered a part of the contract and specifically enumerated therein which are on hand or for which the seller is obligated, together with all labor and other out-of-pocket expenses connected therewith. All cancellation costs are due and payable prior to the effective date of cancellation. Our company may cancel the order and contract at any time before receiving the final approved drawings, if Hurst deems itself insecure, or determines that it is commercially unreasonable for us to proceed. In this event you will be refunded any and all deposits you have made with us.

Purchaser, after receipt by seller of all cancellation costs referenced above, shall be permitted free access to the seller's premises, or other premises where the equipment may be found, and may remove same therefrom, all at purchaser's own and sole cost and expense. If such cancellation arises from the insolvency or bankruptcy of the seller, the purchaser may, at its own option [illegible] subject to its

obligation and rights herein contained, obtain from the seller or its trustee, as the case may be, a full and complete set of drawings and specifications, and purchaser shall be entitled to have others complete the fabrication and erection of the equipment, all at its sole cost and expense.

11. Events of default. Purchaser is in default upon the happening of any one or more of the following: (a) a failure to make any payment when due, (b) a negative change here after in the present financial condition, creditworthiness or responsibility of Purchaser materially affecting Purchaser's ability to pay Seller, (c) a refusal by Purchaser to accept any delivery, (d) failure to perform any obligation hereunder when and as required, or (e) a breach by Purchaser of any representation, promise or warranty herein contained.

12. Remedies on Default. If, in seller's reasonable opinion, the purchaser has defaulted under one or more of the provisions of this contract, seller may so notify the purchaser in writing of the happening of such event(s) of default, and then seller may immediately at its option (a) cease performance of any other obligation under this contract, or (b) exercise any remedy under the Uniform Commercial Code of Georgia or any other state where the remedy is sought to be exercised, or (c) take possession of all equipment and/or work wherever located and remove it from the premises where located, or (d) void all warranties and refuse service and fire-up/start-up, or (e) declare all sums owed, or to be payable to seller immediately payable, or (f) as attorney- in- fact for Purchaser to take possession of the property wherever located and sell the same at the best price obtainable at public or private sale, with or without notice, in the sole opinion of seller, and execute and deliver all documents necessary therefor with the right of the subsequent purchaser thereof to remove same from the premises where located, or any number of such remedies. The seller shall, upon exercise of one or more of its remedies of default, be entitled to receive all sums owed, or to be payable to seller by purchaser, to date of sale, plus such additional charges as may be specifically set forth herein for the cancellation hereof. If any net positive sale proceeds shall remain after completion of such sale and payment of all of seller's costs and charges, the net proceeds, so called, shall be remitted to purchaser forthwith. All remedies exercised by seller shall be free and clear to any liability therefor to purchaser, and the exercise of one or more of said remedies by seller shall not eliminate or waive its right to exercise any other legal or equitable remedy it may have.

13. Attorney's Fees and Costs. In the event of purchaser's default, purchaser agrees to pay to seller a reasonable attorney's fee for all sums collected by or through an attorney at law, along with any other costs incurred by seller in litigating such collection or otherwise exercising such remedies.

14. Entire Agreement. You and Hurst both agree that this contract, including but not limited to these Terms and Conditions, contains the complete and final agreement between you and Hurst and may not be modified, supplemented, explained or waived by parol evidence, your purchase order, course of dealing, or in any other way, except where made in writing and signed by you and our company's authorized officer.

15. Other Documents. Purchaser and seller agree to execute and deliver to each other any and all other documents necessary or useful in the discretion of seller to secure or exercise any power or remedy hereunder, including without limitation, financing statements, powers of attorney, bills of sale or additional security agreements.

16. Laws Governing. This is a Georgia Contract. The laws of the State of Georgia shall govern all the terms of this contract.

ACCEPTANCE OF PROPOSAL

The preceding prices, specifications and conditions are satisfactory and hereby accepted. You are authorized to do the work as specified. Payment will be made as outline in the proposal.

Signature _____ Date _____

Signature _____ Date _____

APPENDIX IV: MULTI-FUNCTIONAL PLATFORM

Mali	
Project title: Multifunctional platform for poverty reduction	
Project number: MLI/99/001	**Project start:** 1999
Total budget: US$8.6 million (Source: Project Document)	
Executed by: Government of Mali	**Collaborating partners:** NORAD, ABD, Nordic Funds, UNCDF, French Coop, Swiss Cooperation
Main/lead energy entry point (service line) ☐ Strengthening national policy frameworks ☐ Promoting clean energy technologies ☒ Promoting rural energy services ☐ Increasing access to investment financing	
Contact information: Kalfa Sanogo, UNDP Mali, kalfa.sanogo@undp.org	
Website: http://www.ptfm.net/ is a site dedicated to the Multifunctional Platform project, and hosts a variety of information, such as review reports, workshop reports, pictures, videos and much more.	

Description: Mali is one of the world's poorest countries with widespread illiteracy and a short life expectancy. Seventy per cent of the women and girls are illiterate and only 37 percent of girls are enrolled in school. Women do not own and control land, the primary economic asset. They do not own and have little access, if any, to productive equipment and tools, including means of transport. Often, they do not form part of the information networks within and outside the village. Men control the formal decision-making fora.

The multipurpose platform project was designed to reduce rural women's poverty by providing a source of energy which yields both mechanical and electrical power. It intends to install a simple diesel engine mounted on a platform in 450 villages serving about 10 percent of the rural population. The platform is built around a simple diesel engine that can power various tools, such as a cereal mill, husker, alternator, battery charger, pump, welding, and carpentry equipment. It can also generate electricity for lighting and pumping water. Although old fashioned and cumbersome in appearance, it is actually more economical than modern engines. The technological innovation of the multi-purpose platform lies in its multiple functions, its simplicity and its sturdiness. The multiple functions allow it to be used all year, and its simplicity has allowed rural technicians to master its installation and maintenance. It is an example of appropriate technology par excellence.

The engine can be run with low quality diesel found in rural Africa; pourgher oil, produced from crushing the seeds of the pourgher plant (Jatropha curcas), can be used interchangeably with diesel. One liter of fuel used in the crushing process produces about 21 liters of pourgher fuel. The pourgher plant grows easily in the populated regions of Mali and is an excellent nitrogen fixation plant in the drier climates.

The project is primarily driven by concerns about women's status as well as their poverty situation in rural areas in Mali. The platforms are intended to reduce many rural women's burdensome tasks (fetching water, grinding cereal); offer them income-generating opportunities and management experience; and, as they become more economically independent, help them improve their social status. Because so many activities would be supported by the platforms, their economic and social benefits would be felt at multiple levels, resulting in an overall empowerment of women. In the pilot phase of the project (1996-98), during which 45 platforms with 14 water or electricity networks were installed, the platforms' availability stimulated the creation, development, and modernization of artisan activities in participating villages.

At an estimated cost of US$4,000 per engine, rice de-huller, stone mill, battery charger, and housing for the platform, the platform is comparatively cheap to buy, install, maintain, and

replace. Between 40 and 50 percent of the cost is financed by the village women's association, often with financial support from the rest of the community, and a one-time subsidy of approximately US$2,500 is provided by the project. The project informs beneficiaries of existing financial and management support facilities and facilitates access to credit in order to finance the platform. Depreciation and variable costs (maintenance, salaries of female operators, etc.) are borne entirely by the women management committee.

APPENDIX V: HURST BIOMASS FURNACE – SPECIFICATIONS AND QUOTATION

1. Scope of delivery and performance

1. Innotech Drying chamber with technical room

Drying chamber:

Dimensions	
Width:	2.2 m
Height:	3.5 m
Length:	10.0 m
Material of chamber:	100 mm PU-insulation panels
Material of false floor:	45 mm PU-insulation panels
Doors:	2 revolving doors, ~1.9 m wide
Interior equipment:	10 trolleys for trays, containing 58 trays each V_2A, (0.55 x 0.75 m) = ~240 m² drying area

Technical room:

Dimensions	
Width:	2.2 m
Height:	3.5 m
Length:	3.0 m
Material of chamber:	45 mm PU-insulation panels
Door:	1 door x 2.0 m

2. Technical equipment

Re-circulating fan:	High performance axial fan, 400 V, 2.9 kW, IP 54, humidity protected, 2 pcs.
Exhaust air fan:	High performance axial fan, 400 V, 1.5 kW, IP 54, humidity protected, 1 pcs.
Standard – heating-system:	modulating gas-fired water heater nominal power 65 kW, with chimney, 2 pcs. (natural gas or LPG), air-water-heat-exchanger up to 200 kW heating power, pipes incl. primary and secondary circulation pumps, hydraulic switch, pressure-compensation-device.
Control unit:	Temperature controlled 24 h timer

3. Installation material:

Installation expenses:	Internal wiring and piping, as well as fastenings and fittings are included in the delivery.

Total amount No.1- 3 EXW Altdorf	**99.900,-- €**

4. Optional

Additional heating for reduction of heat-up time:	modulating gas-fired water-heater, nominal power 65 kW, incl. primary circulation water pump and fittings (natural gas or LPG) .	5.000,-- €
Teflon coating of the set of trays included in position 1		14.500,-- €
2. set of trays and trolleys		24.000,-- €
additional teflon coating of 2. set		14.500,-- €

5. Installation and constructive measures

Partly installation, i.e. 1-2 mechanics are provided against expenditure, travel expenses, daily allowance and accommodation.
Assistant helpers are provided by the customer.

Foundations / concrete base are provided by the customer

Supply- and connection mains are provided by the customer

14 days installation, putting into operation	19.000,-- €

6. Transport

Sea-transport 40”-container to port of destination against expenditure

7. Miscellaneous

Putting into operation, implementation of processing, training of staff, introduction of quality management against expenditure.

II. Mercantile conditions

1. Price quotation

   Above mentioned prices are given without VAT.

2. Terms of payment

   Advance payment of 50 % after acceptance of the order. Remaining balance against invoice and shipping documents. Save guarding the total amount by letter of credit.

3. Time of delivery

   Time of delivery is from 10 to 12 weeks after acceptance of the order and after clarification of technical and mercantile questions.

4. Court of jurisdiction

   Court of jurisdiction is Stuttgart.

5. Delivery exclusion

   Not part of our performance are:

   All structural works, particular subject to buildings which are necessary due to the assembly of the plant.

   Basement.

   Electrical supply cables to the switch box.

   Lifting equipment, means of transportation, tools, etc. must be provided.

   Services and equipment which are not expressly stated in the offer are not included in the total price.

   Technical alteration upon demand of the customer during production time against expenditure.

6. Miscellaneous

Contract will become valid due to our acceptance of your order.
German law is the only law which will be applied within this contract.

Technical details subject to alterations.