

**Investment Office ANRS**

**PROJECT PROFILE ON THE ESTABLISHMENT  
OF A PLANT PRODUCING FERTILIZER FROM  
CRUSHED BONE**

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## **1. Executive Summary**

This project envisages production of 15000 tons or 150,000 quintals of fertilizer from crushed bone (Normal Super Phosphate-NSP) per annum. The total investment required by the project is estimated at about Birr 34.1 million of the cost of machinery and equipment (20 million), building and civil-works (3 million), and the cost of initial working capital (8 million) are major items.

Based on the cash flow statement, the calculated internal rate of return (IRR) and simple rate of return of the project are 25.9 % and 23.5 %; respectively .The net present value (NPV) at 18 % discounting rate is Birr 9,309 thousand.

The plant is expected to create employment opportunities for about 65 persons.

## **2. Product Description and Application**

The type of fertilizer considered in this profile is normal super phosphate (NSP). NSP can be manufactured from phosphate rock or bone. NSP fertilizer is used as a source of phosphorous, one of the basic elements required for plant growth. Besides, crushed bones of cattle are also rich in calcium, ammonia, nitrogen and citric acid.

## **3. Market Study, Plant Capacity and Production Program**

### ***3.1 Market Study***

#### **3.1.1 Present Demand and Supply**

Ethiopia's economy depends more on agriculture than any other sector. The majority of its people are rural peasant farmers of a traditional type that their productivity is very low as compared to their hard work throughout of a year.

To help improve the productivity of these primitive type farmers, the usage of artificial fertilizer was introduced in the late 1960. Research institutes like WADU and KADU were established to make intensive research to encourage the popular use of fertilizer among the rural farmers to increase their production per hectare. This had positive results and the use of fertilizer started to become so popular in the project areas. Significant change in the consumption of artificial fertilizer occurred after EPID extension works throughout the country. The demand for artificial fertilizer is currently met through imports.

Although the peasant had realised the advantage of using natural fertilizer long time ago, the major natural fertilizers such as "Cow-dung" and harvest residuals have being used more and more for fuel because of shortage of fire wood and other energy sources.

The import data of artificial fertilizers for the past ten years is given below.

**TABLE 3.1**  
**IMPORT OF FERTILIZER**

<b>Year E.C</b>	<b>Amount(In Tons)</b>
1990	186,534
1991	228,816
1992	155,082
1993	182,739
1994	319,412
1995	121,036
1996	455,605
1997	299,497
1998	356,065
1999	312,576

Source: Compiled from CSA's Import Data of Different Years

In the past ten years alone, the country imported more than 2.6 million tons of artificial fertilizers; which was over 260 thousand tons per annum, on average. Of the total artificial fertilizer consumption, ANRS shares around 32 % or 838 thousand tons in the decade under consideration or 84 thousand tons per annum (on average). If there is a

market for a chemical and artificial fertilizer, there will definitely be a market for a natural fertilizer.

### 3.1.2 Projected Demand

Looking at the past trend of fertilizer import it is possible to forecast the future demand for the product for the coming decade. If we take the import of fertilizer in the year 1999 E.C as a base figure and the growth rate of the agriculture sector (which is reported to be more than 10 % in the past three years) to project the future demand for fertilizer we will have the following projection.

**TABLE 3.2**  
**PROJECTED DEMAND FOR FERTILIZER**

Year E.C	AT National Level (In “000” Tons)	At ANRS Level (In “000” Tons)
2000	344	110
2001	379	121
2002	417	133
2003	458	147
2004	504	161
2005	554	177
2006	610	195
2007	671	215
2008	738	236
2009	812	260
2010	893	286

The national demand for fertilizer is expected to reach 554 thousand ton and 893 in 2005 E.C. and 2010 E.C, respectively. Similarly, demand for fertilizer at ANRS level is expected to reach 177 thousand ton and 286 in 2005 E.C. and 2010 E.C, respectively. This situation clearly necessitates the establishment of several medium scale fertilizer producing plants in the country.

### 3.1.3 Pricing and Distribution

The price of fertilizer is usually subsidized and varies from time to time. Currently, the prices of urea is about Birr 2800 per ton while that of DAP is around Birr 3200 per ton. The price of the envisaged project would be Birr 2200 per ton which leaves a reasonable

gap for profit margin. Similarly, the by products- animal fats and glue- that are used as inputs for other industries will be sold at Birr 1000 per ton. It is necessary to contact the importers and wholesalers to take this locally produced fertilizes and to sell it using their existing channels. There would be no problem of sales but the product should be introduced to the public through the media.

### **3.2 Plant Capacity**

Since the project is to rely on bone as a raw material input, the capacity of the fertilizer plant is determined on the basis of the available quantity of bone. In other words, although the demand for fertilizer would justify the setting up of a large plant, the supply of bone around the project location is the main constraining factor that determines the choice of plant capacity. Therefore, the magnitude of bone supply in the ANRS has to be taken into consideration.

The ANRS has 12 million heads of cattle and some 8.4 million heads of goats and sheep. Taking average cattle mortality of 10 percent, there are almost 1.2 million heads cattle are killed or died naturally every year; this is by ignoring the goat and sheep population. An average adult cattle carcass yields about 27.3 to 36.4 kg of bones along with other by-products of economic importance such as hooves and horns. This means that about 38.4 million Kg or 38.4 thousand tons of bones are available every year; and this quantity will increase as the cattle population increases. Of course, this quantity is scattered throughout the region, but with effective mechanism, it is possible to collect at least 60 %-70 % percent or 23 thousand to 27 thousand tons of this quantity to one or two bone crushing plants (i.e., it will be similar to the collection of hides and skins).

This project envisaged to produce 15 thousand tons of NSP fertilizers per annum from crushed bone. This requires 10 thousand tons of animal bone as one of the major two ingredients.

### **3.3 Production Program**

The plant can start operation at 50 % of its capacity in the first year. It will then build up its production capacity to 70 % and 100 % in the second and third year, respectively. As the networking of the raw material supply channel takes time, it is not possible to have the amount of bone that is required for the full capacity production in the early period of production. Thus, production build-up is made to start at reduced capacity and gradually rise to full capacity. The low production level at the initial stage is also to develop substantial market outlets for the product.

## **4. Raw Materials and Utilities**

### **4.1 Availability and Source of Raw Materials**

The entire cattle growing areas of ANRS can be taken as sources of raw material for the production of fertilizer from crushed bone.

### **4.2 Annual Requirement and Cost of Raw Materials and Utilities**

As stated earlier, the quantity of bone annually required to produce 15,000 tons of fertilizer will be 10,000 tons; this implies, there is another major ingredient that is required to produce normal super phosphate (NSP), and which is sulphuric acid. To produce NSP, "clean" bone (bone after fat and glue are removed) and sulphuric acid should be mixed in 8:7 proportion. Note that 20 % of the mass of cattle bone is fat and glue; after the fat and glue are removed the 10 thousand ton of cattle bone would be 8 thousand ton of clean bone. Thus, to produce 15 thousand ton of NSP, 8 thousand tons of clean bone (i.e., 10 thousand ton of cattle bone) and 7 thousand ton of sulphuric acid are required as major ingredients. Note that the 2,000 tons by product (bone fat and glue) can be used to produce glue. In this case, however, this by-product will be sold at a relatively cheaper price as an input for other industry.

**TABLE 4.1**  
**RAW & AUXILARY MATERIALS REQUIREMENT**

No	Description	Qty Tons	Unit Price Birr			
				F.C	L.C	Total
1	Cattle Bone	10,000	500		5,000,000	5000000
2	Sulphuric Acid	7,000	2000	14,000,000		14,000,000
3	Paper Bags (Piece)	200,000	0.25		50,000	50,000
	<b>Total</b>			<b>14,000,000</b>	<b>5,050,000</b>	<b>19,050,000</b>

**TABLE 4.2**  
**UTILITIES REQUIREMENT**

No.	Utility	Requirement (Annual)	Unit Price	Cost (Birr)
1.	Electricity	325 MWH	Birr0.55 /KWH	178,750
3.	Fuel	15,000 tons		105,000
2.	Water	12,000 m <sup>3</sup>	Birr2.65 /m <sup>3</sup>	31,800
	<b>Total</b>			<b>315,550</b>

## 5. Location and Site

For its convenience for distribution of fertilizer and collection of bone, Gonder is an appropriate choice for NSP fertilizer producing plant in the region.

## 6. Technology and Engineering

### 6.1 Production Process

Before processing, the bone is cleaned to remove foreign materials. Then it is crushed to facilitate further processing. Fat is extracted using gasoline as a solvent. The next step is the separation of glue. Glue is extracted by boiling bone under 1.5 – 2.0 bar steam. The last step is the chemical transformation of the tri-calcium phosphate (the bone material



from which fat and glue were removed) to normal super phosphate. This is achieved through the reaction of bone with sulphuric acid. The NSP is finally granulated into the required size and packed in paper bags of 50 Kg.

Currently, there is no alternative technology to produce NSP from crushed bone.

## **6.2 Machinery and Equipment**

The machinery and equipment required is given in Table 6.1.

**TABLE 6.1**  
**LIST OF MACHINERY AND EQUIPMENT**

Item	Qty
Bone Crouching	
Bone Washer	1
Crusher	2
Silo (10 Cubic metre)	1
Fat Extraction	
Extractor	4
Fat Storage Tank (2000 litres capacity, heated)	1
Glue Extraction	
Steam jacketed autoclave (gross volume of 6000 litres)	4
Glue Container	1
Coarse filter	1
Evaporative unit	1
Clarifier (2000 litres capacity)	1
Series of plastic trays	1
NSP Production	
Steam jacketed auto clave (gross volume of 6000 litres)	2
Ball mill	1
Hopper (5000 kg. capacity)	1
Weight hoppers (500 kg. capacity)	2
Tank for measuring sulphuric acid (500 cubic metres capacity)	1
Tank for sulphuric acid storage (500 cubic litres capacity)	1
Pan mixer, including standby (1 ton capacity)	1
Drug line scraper	1
Auxiliary Equipment	
Boiler and accessories (5 tonnes/hour capacity)	1
Conveyors far bone transfer	1
Mobile grab bucket (for crusher loading)	1

The total cost of machinery/equipment is estimated at Birr 20 million of which Birr 18 million is in foreign currency, and Birr 2 million in local currency.

**Machinery Suppliers' Address:**

**LAXMI EN-FEB**  
**25, Nilisin Plot, Phase 1, GIDC Vatav, Ahmedabad,**  
**Gujarat, India**

### **6.3 Civil Engineering Cost**

The building area required by the plant is estimated to be 1,500m<sup>2</sup>, and it costs Birr 3,000,000. This would include cost of land preparation and associated civil works. The total land area of the plant including the open space is 3000 m<sup>2</sup> and its lease cost equals Birr 180,000. The cost of the land lease is as per ANRS land lease rate for Gondar which is equal to Birr 60 per square meter for industrial purpose. Of the total cost of the lease, 5 % is paid in the beginning while the rest will be paid in 40years.

## **7. Human Resource and Training Requirement**

### **7.1 Human Resource**

Details of the manpower requirement of the plant is shown in Table 7.1.

**TABLE 7.1**  
**MANPOWER REQUIREMENT**

Description	No	Monthly Salary (Birr)	Annual Salary (Birr)
<b>A. Administration</b>			
1. Manager	1	5000	60000
3 Chemist	2	2300	55200
4. Technicians	3	2000	72000
5. Personnel Officer	1	2000	24000
6. Accountant	1	2000	24000
7. Seretary	1	1300	15600
8. Slaesman	1	1300	15600
9. Storekeeper	1	600	7200
10. Guards	4	300	14400
11. Driver	2	600	14400
<b>Sub-total</b>	<b>17</b>		<b>302,400</b>
<b>B. Production</b>			
1. Skilled workers (operators)	16	600	115,200
2. Unskilled Workers (laborers)	32	300	115,200
Benefits (20%)			106560
	<b>65</b>		<b>639,360</b>

The total annual wages and salary, including 20 % benefits, amount to Birr **639,360**.

## **7.2 Training Requirement**

One month on job training is required for technical personnel. And this can be managed by hiring one or more expert in the area from the technology suppliers.

## **8. Financial Analysis**

### **8.1 Underlying Assumption**

The financial analysis of *Fertilizer from Crushed Bone (NSP)* producing plant is based on the data provided in the preceding chapters and the following assumptions.

### **A. Construction and Finance**

Construction Period	2 Years
Source Of Finance	40% Equity and 60% Loan
Tax Holidays	2 Years
Bank Interest Rate	12%
Discount For Cash Flow	18%
Value Of Land	Based on Lease Rate of ANRS
Spare Parts, Repair & Maintenance	3% of the Fixed Investment

### **B. Depreciation**

Building	5%
Machinery And Equipment	10%
Office Furniture	10%
Vehicles	20%
Pre-Production (Amortization)	20%

### **C. Working Capital (Minimum Days of Coverage**

Raw Material-Local	30 Days
Raw Material-Foreign	120 Days
Factory Supplies In Stock	30 Days
Spare Parts In Stock And Maintenance	30 Days
Work In Progress	10 Days
Finished Products	15 Days
Accounts Receivable	30 Days
Cash In Hand	30 Days
Accounts Payable	30 Days

## 8.2 Investment

The total investment cost of the project including working capital is estimated at Birr 34.1 million as shown in Table 8.1 below. The Owner shall contribute 40 % of the finance in the form of equity while the remaining 60 % is to be financed by bank loan.

**TABLE 8.1**  
**TOTAL INITIAL INVESTMENT**

<b>Items</b>	<b>L.C</b>	<b>F.C</b>	<b>Total</b>
Land	9,000		9,000
Building And Civil Works	3,000,000		3,000,000
Office Equipment	100,000		100,000
Vehicles	1,000,000		1,000,000
Plant Machinery & Equipment	2,000,000	18,000,000	20,000,000
<i>Total Fixed Investment Cost</i>	<b>6,109,000</b>	<b>18,000,000</b>	<b>24,109,000</b>
Pre Production Capital Expenditure*	305,450		1,205,450
<i>Total Initial Investment</i>	<b>6,414,450</b>	<b>18,000,000</b>	<b>25,314,450</b>
Working Capital at Full Capacity	2,668,192	6,109,091	8,777,283
<b>Total</b>	<b>9,082,642</b>	<b>24,109,091</b>	<b>34,091,733</b>

*\*Pre-production capital expenditure includes - all expenses for pre-investment studies, consultancy fee during construction and expenses for company's establishment, project administration expenses, commission expenses, preproduction marketing and interest expenses during construction.*

The foreign component of the project accounts for Birr 24.1 million or 70.7 % of the total investment cost.

## 8.3 Production Costs

The total production cost at full capacity operation is estimated at Birr 25.4 million (See Table 8.2). Raw materials and utilities account for 76.3 %.

**TABLE 8.2**  
**PRODUCTION COST AT FULL CAPACITY**

Raw Material Requirement	Cost
1. Local Raw Materials	5,050,000
2. Foreign Raw Materials	14,000,000

<b>Total Production Cost at full Capacity</b>	
Items	Cost
1. Raw materials	19,050,000
2. Utilities	315,550
3. Wages and Salaries	639,360
4. Spares and Maintenance	723,270
<i>Factory Costs</i>	<i>20,728,180</i>
5. Depreciation	2,601,090
6. Financial Costs	2,045,504
<b><i>Total Production Cost</i></b>	<b><i>25,374,774</i></b>

## **8.4 Financial Evaluation**

### *I. Profitability*

According to the projected income statement (See Annex 4) the project will generate profit beginning from the second year of operation and increases on wards. The income statement and other profitability indicators also show that the project is viable.

### *II. Breakeven Analysis*

The breakeven point of the projects is given by the formula:

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{Sale} - \text{Variable Cost}} \quad \text{at full capacity.}$$

The project will break even at 22.1 % of capacity utilization

### *III. Payback Period*

Investment cost and income statement projection are used in estimating the project payback period. The project will payback fully the initial investment less working capital in three years.

### *IV. Simple Rate of Return*

The project's simple rate of return (SRR) is given by the formula:

$SRR = (\text{Net Profit} + \text{Interest}) / (\text{Total Investment Outlay})$  at full capacity utilization.

The SRR would be 23.5 % at full capacity utilization.

### *V. Internal Rate of Return and Net Present Value*

Based on cash flow statement (See Annex 2) the calculated internal rate of return (IRR) of the project is 25.9 % and the net present value (NPV) at 18 % discount is Birr 9,309 thousands.

### *VI. Sensitivity Analysis*

The sensitivity test result which undertaken by increasing the cost of production by 10 % still indicates that the project would be viable.

## **9. Economic and Social Benefit and Justification**

Based on the foregoing presentation and analysis, we can learn that the proposed project possesses wide range of benefits that complement the financial feasibility obtained earlier. In general the envisaged project promotes the socio-economic goals and objectives stated in the strategic plan of the Amhara National Regional State. These benefits are listed as follows

### ***A. Profit Generation***

The project is found to be financially viable and earns on average a profit of Birr 6.2 million per year and Birr 62.1 million within the project life. Such result induces the

project promoters to reinvest the profit which, therefore, increases the investment magnitude in the region.

### ***B. Tax Revenue***

In the project life under consideration, the region will collect about Birr 25 million from corporate tax payment alone (i.e. excluding income tax, sales tax and VAT). Such result create additional fund for the regional government that will be used in expanding social and other basic services in the region

### ***C. Import Substitution and Foreign Exchange Saving***

As there is no local production of fertilizer in the country, the commencement of this project relieves a portion of the import burden. That is, based on the projected figure we learn that in the project life an estimated amount of US Dollar 31.5 million will be saved as a result of the proposed project. This will create room for the saved hard currency to be allocated on other vital and strategic sectors

### ***D. Employment and Income Generation***

The proposed project is expected to create employment opportunity to several citizens of the country. That is, it will provide permanent employment to 65 professionals as well as support stuffs. Consequently the project creates income of birr 639 thousands per year. This would be one of the commendable accomplishments of the project.

### ***E. Pro Environment Project***

The proposed production process is environment friendly.



# **ANNEXES**

## Annex 1: Total Net Working Capital Requirements (in Birr)

	CONSTRUCTION		PRODUCTION			
	Year 1	Year 2	1	2	3	4
<b>Capacity Utilization (%)</b>	0	0	50%	75%	100%	100%
<b>1. Total Inventory</b>	0.00	0.00	7666555.37	11499833.06	15333110.75	15333110.75
<b>Raw Materials in Stock- Total</b>	0.00	0.00	3330000.00	4995000.00	6660000.00	6660000.00
<b>Raw Material-Local</b>	0.00	0.00	275454.55	413181.82	550909.09	550909.09
<b>Raw Material-Foreign</b>	0.00	0.00	3054545.45	4581818.18	6109090.91	6109090.91
<b>Factory Supplies in Stock</b>	0.00	0.00	12725.06	19087.58	25450.11	25450.11
<b>Spare Parts in Stock and Maintenance</b>	0.00	0.00	39451.09	59176.64	78902.18	78902.18
<b>Work in Progress</b>	0.00	0.00	318126.41	477189.61	636252.82	636252.82
<b>Finished Products</b>	0.00	0.00	636252.82	954379.23	1272505.64	1272505.64
<b>2. Accounts Receivable</b>	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
<b>3. Cash in Hand</b>	0.00	0.00	52086.00	78129.00	104172.00	104172.00
<b>CURRENT ASSETS</b>	0.00	0.00	6243186.83	9364780.24	12486373.66	12486373.66
<b>4. Current Liabilities</b>	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
<b>Accounts Payable</b>	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
<b>TOTAL NET WORKING CAPITAL REQUIRMENTS</b>	0.00	0.00	4388641.37	6582962.06	8777282.75	8777282.75
<b>INCREASE IN NET WORKING CAPITAL</b>	0.00	0.00	4388641.37	2194320.69	2194320.69	0.00

### Annex 1: Total Net Working Capital Requirements (in Birr) (continued)

	PRODUCTION					
	5	6	7	8	9	10
<b>Capacity Utilization (%)</b>	100%	100%	100%	100%	100%	100%
<b>1. Total Inventory</b>	15333110.75	15333110.75	15333110.75	15333110.75	15333110.75	15333110.75
<b>Raw Materials in Stock-Total</b>	6660000.00	6660000.00	6660000.00	6660000.00	6660000.00	6660000.00
<b>Raw Material-Local</b>	550909.09	550909.09	550909.09	550909.09	550909.09	550909.09
<b>Raw Material-Foreign</b>	6109090.91	6109090.91	6109090.91	6109090.91	6109090.91	6109090.91
<b>Factory Supplies in Stock</b>	25450.11	25450.11	25450.11	25450.11	25450.11	25450.11
<b>Spare Parts in Stock and Maintenance</b>	78902.18	78902.18	78902.18	78902.18	78902.18	78902.18
<b>Work in Progress</b>	636252.82	636252.82	636252.82	636252.82	636252.82	636252.82
<b>Finished Products</b>	1272505.64	1272505.64	1272505.64	1272505.64	1272505.64	1272505.64
<b>2. Accounts Receivable</b>	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
<b>3. Cash in Hand</b>	104172.00	104172.00	104172.00	104172.00	104172.00	104172.00
<b>CURRENT ASSETS</b>	12486373.66	12486373.66	12486373.66	12486373.66	12486373.66	12486373.66
<b>4. Current Liabilities</b>	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
<b>Accounts Payable</b>	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
<b>TOTAL NET WORKING CAPITAL REQUIRMENTS</b>	8777282.75	8777282.75	8777282.75	8777282.75	8777282.75	8777282.75
<b>INCREASE IN NET WORKING CAPITAL</b>	0.00	0.00	0.00	0.00	0.00	0.00

<b>Annex 2: Cash Flow Statement (in Birr)</b>						
	<b>CONSTRUCTION</b>		<b>PRODUCTION</b>			
	<b>Year 1</b>	<b>Year 2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>TOTAL CASH INFLOW</b>	12657225.00	21434507.75	18854545.45	26427272.73	34927272.73	34000000.00
<b>1. Inflow Funds</b>	12657225.00	21434507.75	1854545.45	927272.73	927272.73	0.00
<b>Total Equity</b>	5062890.00	8573803.10	0.00	0.00	0.00	0.00
<b>Total Long Term Loan</b>	7594335.00	12860704.65	0.00	0.00	0.00	0.00
<b>Total Short Term Finances</b>	0.00	0.00	1854545.45	927272.73	927272.73	0.00
<b>2. Inflow Operation</b>	0.00	0.00	17000000.00	25500000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	0.00	0.00	17000000.00	25500000.00	34000000.00	34000000.00
<b>Interest on Securities</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>3. Other Income</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL CASH OUTFLOW</b>	12657225.00	12657225.00	21928036.49	24409388.47	31720789.85	28312825.89
<b>4. Increase In Fixed Assets</b>	12657225.00	12657225.00	0.00	0.00	0.00	0.00
<b>Fixed Investments</b>	12054500.00	12054500.00	0.00	0.00	0.00	0.00
<b>Pre-production Expenditures</b>	602725.00	602725.00	0.00	0.00	0.00	0.00
<b>5. Increase in Current Assets</b>	0.00	0.00	6243186.83	3121593.41	3121593.41	0.00
<b>6. Operating Costs</b>	0.00	0.00	10364466.35	15424017.03	20483567.70	20483567.70
<b>7. Corporate Tax Paid</b>	0.00	0.00	0.00	0.00	2660951.50	2783681.74
<b>8. Interest Paid</b>	0.00	0.00	5320383.31	2454604.76	2045503.96	1636403.17
<b>9. Loan Repayments</b>	0.00	0.00	0.00	3409173.27	3409173.27	3409173.27
<b>10. Dividends Paid</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Surplus(Deficit)</b>	0.00	8777282.75	-3073491.03	2017884.25	3206482.87	5687174.11
<b>Cumulative Cash Balance</b>	0.00	8777282.75	5703791.72	7721675.97	10928158.84	16615332.96

<b>Annex 2: Cash Flow Statement (in Birr): Continued</b>						
	<b>PRODUCTION</b>					
	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>TOTAL CASH INFLOW</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>1. Inflow Funds</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Equity</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Long Term Loan</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Short Term Finances</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>2. Inflow Operation</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Interest on Securities</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>3. Other Income</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL CASH OUTFLOW</b>	28026455.33	27872411.78	27586041.22	23890497.39	23890497.39	23890497.39
<b>4. Increase In Fixed Assets</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fixed Investments</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Pre-production Expenditures</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>5. Increase in Current Assets</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>6. Operating Costs</b>	20483567.70	20483567.70	20483567.70	20483567.70	20483567.70	20483567.70
<b>7. Corporate Tax Paid</b>	2906411.98	3161469.21	3284199.45	3406929.69	3406929.69	3406929.69
<b>8. Interest Paid</b>	1227302.38	818201.59	409100.79	0.00	0.00	0.00
<b>9. Loan Repayments</b>	3409173.27	3409173.27	3409173.27	0.00	0.00	0.00
<b>10.Dividends Paid</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Surplus(Deficit)</b>	5973544.67	6127588.22	6413958.78	10109502.61	10109502.61	10109502.61
<b>Cumulative Cash Balance</b>	22588877.63	28716465.85	35130424.63	45239927.24	55349429.85	65458932.46

### Annex 3: DISCOUNTED CASH FLOW-TOTAL CAPITAL INVESTED

	CONSTRUCTION		PRODUCTION			
	Year 1	Year 2	1	2	3	4
<b>TOTAL CASH INFLOW</b>	0.00	0.00	17000000.00	25500000.00	34000000.00	34000000.00
<b>1. Inflow Operation</b>	0.00	0.00	17000000.00	25500000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	0.00	0.00	17000000.00	25500000.00	34000000.00	34000000.00
<b>Interest on Securities</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>2. Other Income</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL CASH OUTFLOW</b>	12657225.00	12657225.00	14753107.72	17618337.71	22677888.39	23267249.44
<b>3. Increase in Fixed Assets</b>	12657225.00	12657225.00	0.00	0.00	0.00	0.00
<b>Fixed Investments</b>	12054500.00	12054500.00	0.00	0.00	0.00	0.00
<b>Pre-production Expenditures</b>	602725.00	602725.00	0.00	0.00	0.00	0.00
<b>4. Increase in Net Working Capital</b>	0.00	0.00	4388641.37	2194320.69	2194320.69	0.00
<b>5. Operating Costs</b>	0.00	0.00	10364466.35	15424017.03	20483567.70	20483567.70
<b>6. Corporate Tax Paid</b>	0.00	0.00	0.00	0.00	0.00	2783681.74
<b>NET CASH FLOW</b>	-12657225.00	-12657225.00	2246892.28	7881662.29	11322111.61	10732750.56
<b>CUMMULATIVE NET CASH FLOW</b>	-12657225.00	-25314450.00	-23067557.72	-15185895.44	-3863783.82	6868966.74
<b>Net Present Value (at 18%)</b>	-12657225.00	-10726461.86	1613683.05	4797023.00	5839819.21	4691384.19
<b>Cumulative Net present Value</b>	-12657225.00	-23383686.86	-21770003.82	-16972980.82	11133161.61	-6441777.42

**Annex 3: DISCOUNTED CASH FLOW-TOTAL CAPITAL INVESTED (Continued)**

	PRODUCTION					
	5	6	7	8	9	10
<b>TOTAL CASH INFLOW</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>1. Inflow Operation</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Interest on Securities</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>2. Other Income</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL CASH OUTFLOW</b>	23389979.68	23645036.91	23767767.15	23890497.39	23890497.39	23890497.39
<b>3. Increase in Fixed Assets</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fixed Investments</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>Pre-production Expenditures</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>4. Increase in Net Working Capital</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>5. Operating Costs</b>	20483567.70	20483567.70	20483567.70	20483567.70	20483567.70	20483567.70
<b>6. Corporate Tax Paid</b>	2906411.98	3161469.21	3284199.45	3406929.69	3406929.69	3406929.69
<b>NET CASH FLOW</b>	10610020.32	10354963.09	10232232.85	10109502.61	10109502.61	10109502.61
<b>CUMMULATIVE NET CASH FLOW</b>	17478987.06	27833950.15	38066182.99	48175685.60	58285188.21	68394690.82
<b>Net Present Value (at 18%)</b>	3930286.16	3250682.13	2722164.44	2279248.74	1931566.73	1636920.96
<b>Cumulative Net present Value</b>	-2511491.26	739190.87	3461355.31	5740604.04	7672170.77	9309091.73
<b>Net Present Value (at 18%)</b>	<b>9,309,091.73</b>					
<b>Internal Rate of Return</b>	<b>25.9%</b>					

Annex 4: NET INCOME STATEMENT ( in Birr)					
	PRODUCTION				
	1	2	3	4	5
Capacity Utilization (%)	50%	75%	100%	100%	100%
<b>1. Total Income</b>	17000000.00	25500000.00	34000000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	17000000.00	25500000.00	34000000.00	34000000.00	34000000.00
<b>Other Income</b>	0.00	0.00	0.00	0.00	0.00
<b>2. Less Variable Cost</b>	9991229.35	14986844.03	19982458.70	19982458.70	19982458.70
<b>VARIABLE MARGIN</b>	7008770.65	10513155.98	14017541.30	14017541.30	14017541.30
<b>(In % of Total Income)</b>	41.23	41.23	41.23	41.23	41.23
<b>3. Less Fixed Costs</b>	2974327.00	3038263.00	3102199.00	3102199.00	3102199.00
<b>OPERATIONAL MARGIN</b>	4034443.65	7474892.98	10915342.30	10915342.30	10915342.30
<b>(In % of Total Income)</b>	23.73	29.31	32.10	32.10	32.10
<b>4. Less Cost of Finance</b>	5320383.31	2454604.76	2045503.96	1636403.17	1227302.38
<b>5. GROSS PROFIT</b>	-1285939.66	5020288.22	8869838.34	9278939.13	9688039.92
<b>6. Income (Corporate) Tax</b>	0.00	0.00	2660951.50	2783681.74	2906411.98
<b>7. NET PROFIT</b>	-1285939.66	5020288.22	6208886.83	6495257.39	6781627.94
<b>RATIOS (%)</b>					
<b>Gross Profit/Sales</b>	-7.56%	19.69%	26.09%	27.29%	28.49%
<b>Net Profit After Tax/Sales</b>	-7.56%	19.69%	18.26%	19.10%	19.95%
<b>Return on Investment</b>	13.58%	23.43%	24.21%	23.85%	23.49%
<b>Return on Equity</b>	-9.43%	36.81%	45.53%	47.63%	49.73%



<b>Annex 4: NET INCOME STATEMENT (in Birr):Continued</b>					
	<b>PRODUCTION</b>				
	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Capacity Utilization (%)</b>	100%	100%	100%	100%	100%
<b>1. Total Income</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Sales Revenue</b>	34000000.00	34000000.00	34000000.00	34000000.00	34000000.00
<b>Other Income</b>	0.00	0.00	0.00	0.00	0.00
<b>2. Less Variable Cost</b>	19982458.70	19982458.70	19982458.70	19982458.70	19982458.70
<b>VARIABLE MARGIN</b>	14017541.30	14017541.30	14017541.30	14017541.30	14017541.30
<b>(In % of Total Income)</b>	41.23	41.23	41.23	41.23	41.23
<b>3. Less Fixed Costs</b>	2661109.00	2661109.00	2661109.00	2661109.00	2661109.00
<b>OPERATIONAL MARGIN</b>	11356432.30	11356432.30	11356432.30	11356432.30	11356432.30
<b>(In % of Total Income)</b>	33.40	33.40	33.40	33.40	33.40
<b>4. Less Cost of Finance</b>	818201.59	409100.79	0.00	0.00	0.00
<b>5. GROSS PROFIT</b>	10538230.71	10947331.51	11356432.30	11356432.30	11356432.30
<b>6. Income (Corporate) Tax</b>	3161469.21	3284199.45	3406929.69	3406929.69	3406929.69
<b>7. NET PROFIT</b>	7376761.50	7663132.05	7949502.61	7949502.61	7949502.61
<b>RATIOS (%)</b>					
<b>Gross Profit/Sales</b>	30.99%	32.20%	33.40%	33.40%	33.40%
<b>Net Profit After Tax/Sales</b>	21.70%	22.54%	23.38%	23.38%	23.38%
<b>Return on Investment</b>	24.04%	23.68%	23.32%	23.32%	23.32%
<b>Return on Equity</b>	54.09%	56.19%	58.29%	58.29%	58.29%

### Annex 5: Projected Balance Sheet (in Birr)

	CONSTRUCTION		PRODUCTION			
	Year 1	Year 2	1	2	3	4
<b>TOTAL ASSETS</b>	12657225.00	34091732.75	35946278.20	37198726.22	40925712.50	44011796.62
<b>1. Total Current Assets</b>	0.00	8777282.75	11946978.55	17086456.22	23414532.50	29101706.62
Inventory on Materials and Supplies	0.00	0.00	3382176.15	5073264.22	6764352.29	6764352.29
Work in Progress	0.00	0.00	318126.41	477189.61	636252.82	636252.82
Finished Products in Stock	0.00	0.00	636252.82	954379.23	1272505.64	1272505.64
Accounts Receivable	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
Cash in Hand	0.00	0.00	52086.00	78129.00	104172.00	104172.00
Cash Surplus, Finance Available	0.00	8777282.75	5703791.72	7721675.97	10928158.84	16615332.96
Securities	0.00	0.00	0.00	0.00	0.00	0.00
<b>2. Total Fixed Assets, Net of Depreciation</b>	12657225.00	25314450.00	22713360.00	20112270.00	17511180.00	14910090.00
Fixed Investment	0.00	12054500.00	24109000.00	24109000.00	24109000.00	24109000.00
Construction in Progress	12054500.00	12054500.00	0.00	0.00	0.00	0.00
Pre-Production Expenditure	602725.00	1205450.00	1205450.00	1205450.00	1205450.00	1205450.00
Less Accumulated Depreciation	0.00	0.00	2601090.00	5202180.00	7803270.00	10404360.00
<b>3. Accumulated Losses Brought Forward</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>4. Loss in Current Year</b>	0.00	0.00	1285939.66	0.00	0.00	0.00
<b>TOTAL LIABILITIES</b>	12657225.00	34091732.75	35946278.20	37198726.22	40925712.50	44011796.62
<b>5. Total Current Liabilities</b>	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
Accounts Payable	0.00	0.00	1854545.45	2781818.18	3709090.91	3709090.91
Bank Overdraft	0.00	0.00	0.00	0.00	0.00	0.00
<b>6. Total Long-term Debt</b>	7594335.00	20455039.65	20455039.65	17045866.37	13636693.10	10227519.82
Loan A	7594335.00	20455039.65	20455039.65	17045866.37	13636693.10	10227519.82
Loan B	0.00	0.00	0.00	0.00	0.00	0.00
<b>7. Total Equity Capital</b>	5062890.00	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10
Ordinary Capital	5062890.00	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10
Preference Capital	0.00	0.00	0.00	0.00	0.00	0.00
Subsidies	0.00	0.00	0.00	0.00	0.00	0.00
<b>8. Reserves, Retained Profits Brought Forward</b>	0.00	0.00	0.00	-1285939.66	3734348.56	9943235.39
<b>9. Net Profit After Tax</b>	0.00	0.00	0.00	5020288.22	6208886.83	6495257.39
Dividends Payable	0.00	0.00	0.00	0.00	0.00	0.00
Retained Profits	0.00	0.00	0.00	5020288.22	6208886.83	6495257.39

**Annex 5: Projected Balance Sheet (in Birr): Continued**

	PRODUCTION					
	5	6	7	8	9	10
<b>TOTAL ASSETS</b>	47384251.29	51351839.51	55605798.29	63555300.90	71504803.51	79454306.12
<b>1. Total Current Assets</b>	35075251.29	41202839.51	47616798.29	57726300.90	67835803.51	77945306.12
Inventory on Materials and Supplies	6764352.29	6764352.29	6764352.29	6764352.29	6764352.29	6764352.29
Work in Progress	636252.82	636252.82	636252.82	636252.82	636252.82	636252.82
Finished Products in Stock	1272505.64	1272505.64	1272505.64	1272505.64	1272505.64	1272505.64
Accounts Receivable	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
Cash in Hand	104172.00	104172.00	104172.00	104172.00	104172.00	104172.00
Cash Surplus, Finance Available	22588877.63	28716465.85	35130424.63	45239927.24	55349429.85	65458932.46
Securities	0.00	0.00	0.00	0.00	0.00	0.00
<b>2. Total Fixed Assets, Net of Depreciation</b>	12309000.00	10149000.00	7989000.00	5829000.00	3669000.00	1509000.00
Fixed Investment	24109000.00	24109000.00	24109000.00	24109000.00	24109000.00	24109000.00
Construction in Progress	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Production Expenditure	1205450.00	1205450.00	1205450.00	1205450.00	1205450.00	1205450.00
Less Accumulated Depreciation	13005450.00	15165450.00	17325450.00	19485450.00	21645450.00	23805450.00
<b>3. Accumulated Losses Brought Forward</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>4. Loss in Current Year</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL LIABILITIES</b>	47384251.29	51351839.51	55605798.29	63555300.90	71504803.51	79454306.12
<b>5. Total Current Liabilities</b>	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
Accounts Payable	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91	3709090.91
Bank Overdraft	0.00	0.00	0.00	0.00	0.00	0.00
<b>6. Total Long-term Debt</b>	6818346.55	3409173.27	0.00	0.00	0.00	0.00
Loan A	6818346.55	3409173.27	0.00	0.00	0.00	0.00
Loan B	0.00	0.00	0.00	0.00	0.00	0.00
<b>7. Total Equity Capital</b>	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10
Ordinary Capital	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10	13636693.10
Preference Capital	0.00	0.00	0.00	0.00	0.00	0.00
Subsidies	0.00	0.00	0.00	0.00	0.00	0.00
<b>8. Reserves, Retained Profits Brought Forward</b>	16438492.78	23220120.73	30596882.23	38260014.28	46209516.89	54159019.50
<b>9. Net Profit After Tax</b>	6781627.94	7376761.50	7663132.05	7949502.61	7949502.61	7949502.61
Dividends Payable	0.00	0.00	0.00	0.00	0.00	0.00
Retained Profits	6781627.94	7376761.50	7663132.05	7949502.61	7949502.61	7949502.61