

# **ROOF TILES**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of Roof tiles with a capacity of 27,300 pieces per annum.

The present demand for the proposed product is estimated at 25,000 pieces per annum. The demand is expected to reach at 29,800 pieces by the year 2010.

The plant will create employment opportunities for 8 persons.

The total investment requirement is estimated at Birr 0.22 million, out of which Birr 0.11 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 13.4% and a net present value (NPV) of Birr 50.6 thousand, discounted at 8.5 %.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Roofing tiles made out of clay are used for roof covers. The existing practice is to use galvanized iron sheets whose raw material is imported in bulk as it is relatively cheaper and simpler to use. The product comes in different gauges ranging from 28 to 32 in thickness. Producing roofing tiles with locally available clay could reduce the cost of houses construction. Although the product is new to the market, it is believed to gain wide acceptance in a short time.

## **III. MARKET STUDY AND PLANT CAPACITY**

### **A. MARKET STUDY**

#### **1. Past Supply And Present Demand**

The demand for roof tiles is derived from building construction activities. As transporting and selling roof tiles over a long distance is not a profitable operation, the prospective market is the local or regional market.

It should, however, be noted that, among roofing materials, tiles are one of the most expensive. Their cost per meter square area is, for instance, considerably higher than corrugated iron sheet. As tiles are heavy materials, they also require metal trusses for support, and a fixing system of bolt and nut connection, which renders the cost of the building still more expensive. A wooden truss alternative exists but highly skilled carpenters are required for the work.

In view of the foregoing facts, few residential and other buildings are anticipated to be roofed with tiles in developing regions like Benishangul-Gumuz. However, for the purpose of this study, an assumption is made that presently 10 residential and 3 medium rise buildings having tiled roofs would be built. The average roof area of these buildings is estimated to be 63 meter square and 400 meter square, respectively. It is also known

that to cover a square meter of roof area, 12.5 tiles with 50 x 25 cm size are required. An allowance of 10% would also be necessary for overlap and wastage.

The total present effective demand for roof tiles estimated on the basis of the above assumptions is, therefore, about 25,000 pieces per annum.

## 2. Projected Demand

The future demand for roof tiles is dependent on the growth of building construction in general and high quality urban buildings in particular. It also depends on the growth of income of the population because residential and recreational buildings with roof tiles are generally expensive and classy. Hence, in view of these considerations, it would be prudent to project future demand at a growth rate of 3% per annum; and the demand projected in this manner ranges from 25,750 pieces in the year 2005 to 37,800 pieces by the year 2018.

**Table 3.1**  
**PROJECTED DEMAND FOR ROOF TILES**

<b>Year</b>	<b>Projected Demand (pieces)</b>
2004	25000
2005	25750
2006	26500
2007	27300
2008	28200
2009	29000
2010	29800
2011	30700
2012	31700]
2013	32600
2014	33600
2015	34600
2016	35600
2017	36700
2018	37800

## 3. Pricing and Distribution

Roof tiles are made in different mix, colour and grade. Currently, the price of one piece roof tile varies between Birr 2 and 5 depending on the above factors. Birr 4 per pieces, is considered for the financial analysis of the envisaged project.

## **B. PLANT CAPACITY AND PRODUCTION PROGRAMME**

### **1. Plant Capacity**

The plant will have a capacity of producing 27,300 roofing tiles on a single shift of 8 hours a day and 300 working days per annum considering 52 Sundays and 13 public holidays as non-working days.

### **2. Production Programme**

The plant will operate at 75% 85% capacity utilization in the first and second year, respectively. Full (100%) capacity will be reached on the third year. Gradual capacity build-up is required to allow the operators gain experience on working with the plant machinery and equipment. Co-ordination of sufficient supplies and inputs as well as penetration of the market is also expected to take sometime.

## **IV. MATERIALS AND INPUTS**

### **A. MATERIALS**

The basic raw material is clay. The clay has to be burned and, hence, wood or coal can be used to fire the burns. Accordingly, the annual requirement will be as follows.

Clay	160 tonnes	=	Birr 3,200
Wood/coal	48 tonnes	=	Birr 24,000

### **B. UTILITIES**

Electrical power consumption of the plant will be around 3,600 kWh, annually. In addition to this, 100 m<sup>3</sup> of water will be required. Cost of electric power and water will be Birr 4,320 and 250, respectively.

## **V. TECHNOLOGY AND ENGINEERING**

### **A. TECHNOLOGY**

#### **1. Production Process**

The raw clay is exposed to weather for about a year. This will improve the plasticity of the clay. The weathered clay is then cut and crushed with hand tools. The crushed and pugged clay is extruded in the form of blocks and is directed to a wire cutting table.

The blocks are allowed to dry for a few days and the dried stabs are moulded with a title press. The moulded tiles are dried in a continuous drying kiln. After the furnace is allowed to cool, the tiles will be unloaded for dispatch.

## 2. Source of Technology

The technology, machinery and equipment could be secured from India.

The address of the machinery supplier is given below.

MOVERS (INDIA)  
PRIVATE LTD  
BASAVA BHAVAN, HIGH GROUND  
FAX 91-802263606.

## B. ENGINEERING

### 1. Machinery and Equipment

The machinery and equipment requirement along with estimated cost is given in Table 5.1.

**Table 5.1**  
**MACHINERY AND EQUIPMENT REQUIREMENT AND COST**

Sr. No.	Description	Qty. (No.)	Costs ' 000 Birr		
			FC	LC	TC
1	Hand operated screw press with dies	1	30	10	40
2	Hand operated cutting table	1	20	6	26
3	Mouth piece	1	10	2	12
4	Roofing tiles dies	2	20	6	26
5	Wooden plated & racks	Lumpsum	-	5	5
	<b>Grand Total</b>		<b>80</b>	<b>29</b>	<b>109</b>

### 2. Land, Building and Civil Works

The plant requires a total area of 300 m<sup>2</sup>, out of which 120 m<sup>2</sup> is covered area. The additional 120 m<sup>2</sup> of land is estimated to be sufficient for the storage of rejected products and raw clay exposed to weathering. Taking land lease rate of 1.2 Birr/m<sup>2</sup> for 70 years of land holding, the land value is computed at Birr 25,200. The civil works cost at a rate of Birr 300 /m<sup>2</sup> is estimated at Birr 36,000. Thus, the total investment cost for land, building and civil works assuming that the total land lease cost will be paid in advance is estimated at Birr 61,200.

### 3. Proposed Location

The envisaged plant can be located in Assosa & Bambesi towns.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

The manpower requirement of the plant is 8 persons. The list of manpower & salary requirement is as presented in Table 6.1.

**Table 6.1**  
**MANPOWER REQUIREMENT AND ANNUAL LABOUR COST (IN BIRR)**

Sr. No.	Description	Req. No.	Monthly Salary	Annual Salary
1	Supervisor	1	500	6,000
2	Operators	2	300	7,200
3	Labourers	5	200	12,000
	<b>Grand Total</b>	<b>8</b>		<b>25,200</b>

### B. TRAINING REQUIREMENT

The envisaged plant is of small scale that on-job-training of about two weeks for supervisor and operators is required during commissioning period by expert of machinery supplier. The cost of this training is estimated at Birr 6,000.

## VII. FINANCIAL ANALYSIS

The financial analysis of the Roof tiles project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 years
Source of finance	30 % equity 70 % loan
Tax holidays	3 years
Bank interest	7.5 %
Discounted cashflow	8.5 %
Repair and maintenance	3 % of the total plant and machinery
Accounts receivable	30 days
Raw material, local	30 days
Raw materials, import	90 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	15 days

## A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the project including working capital is estimated at Birr 0.22 million.

The major breakdown of the total initial investment cost is shown in Table 7.1

**Table 7.1**  
**INITIAL INVESTMENT COST**

Sr. No.	Cost Items	Total ('000 BIRR)
1	Land lease value	25.2
2.	Building and Civil Work	36
3.	Plant Machinery and Equipment	109
4.	Office Furniture and Equipment	5
5.	Vehicle	-
6.	Pre-production Expenditure*	22.7
7	Working Capital	22.9
	<b>Total Investment cost</b>	<b>220.9</b>
	<b>Foreign share</b>	

## B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 1.0 million (see Table 7.2). The material and utility cost accounts for 27.8 per cent while repair and maintenance take 1.8 per cent of the production cost.

\* *N.B Pre-production expenditure includes interest during construction (Birr 11.7 thousand), training (Birr 6 thousand), and ( Birr 5 thousand) costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*



**Table 7.2**  
**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	27.2	27.8
Utilities	4.6	4.7
Maintenance and repair	1.75	1.8
Labour direct	25.2	25.8
Factory overheads	5.0	5.2
Administration Cost	6.3	6.4
<b>Total Operating Costs</b>	<b>70.1</b>	<b>71.6</b>
Depreciation	16.7	17.0
Cost of Finance	11.1	11.3
<b>Total Production Cost</b>	<b>97.8</b>	<b>100.0</b>

## C. FINANCIAL EVALUATION

### 1. Profitability

According to the projected income statement, the project will start generating profit in the 2<sup>nd</sup> year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the lifetime of the project.

The income statement and the other indicators of profitability show that the project is viable.

### 2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity ( year 3) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 42.8\%$$

### 3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 6 years.

**4. Internal Rate of Return and Net Present Value**

Based on the cash flow statement, the calculated IRR of the project is 13.4 % and the net present value at 8.5% discount rate is Birr 50.6 thousands.

**D. ECONOMIC BENEFITS**

The project can create employment for 8 persons. In addition to supply of the domestic needs, the project will generate Birr 4 thousand per annum in terms of tax revenue when it starts to operate at full capacity. Moreover, the Regional Government can collect employment, income tax and sales tax revenue.