PROPOSAL

DEVELOPMENT OF *JATROPHA CURCAS* PLANTATION AS A SOURCE OF RAW MATERIAL FOR BIODIESEL

DIRECTORATE OF ESTATE CROP DEVELOPMENT
DIRECTORATE GENERAL OF ESTATE CROP
Jakarta, June 2005

CONTENT

I. Introduction

1. Background
2. Objective and Goal

II. Market Prospect

III. Technical Standard for the Cultivation of *Jatropha Curcas*

1. Botanical Aspects of *Jatropha Curcas*
2. Technical Aspects of *Jatropha Curcas* Cultivation

IV. Development Planning

1. Target Location and Development Areas
2. Development Model
3. Required Costs
4. Production Estimation

V. Loss – Profit Analysis

1. Calculation of Production Cost
2. Input – Output Analysis

VI. Benefits

VII. Closing

VIII. Attachments

INTRODUCTION

1. Background Information

Considering the upward trend of the population and society's welfare as well as automotive industrial development, both in Indonesia and in the world, demand for fuel, particularly diesel fuel, will continue to increase in the future. Starting in 2007, or at the latest of 2015, Indonesia will become a net importer of petroleum. When the domestic demand for petroleum achieves a figure of 22 million ton per year, around 7.2 million ton out of this figure must have been imported. It is predicted that petroleum reserve in Indonesia will be exhausted within 10 – 15 year, provided that no alternative sources are invented. Currently, based on researches developed in the world, a promising alternative source of fuel, called Biodiesel, has been developed.

Bio-diesel is a chemical compound of methyl ester, which can be extracted from both plant and animal oil. Research results indicate that biodiesel as fuel can be perfectly burnt (clean burning), do not release any toxic substance to the nature, and it is a renewable source of fuel. Biodiesel can be used as a pure substance as well as mixed with petro-diesel. Several industrial countries, such as Germany, USA, Austria, and France have used biodiesel as an alternative fuel. Malaysia and Indonesia have conducted several researches on biodiesel extracted from Palm Oil, both as crude palm oil (CPO) and palm kernel oil (PKO).

Taking into account the fact that palm oil is edible oil, any increase in the price of this oil will disturb the supply of biodiesel. Therefore, alternative sources should be invented, such as curcas oil extracted from *Jatropha curcas.* The advantages of this type of oil cover the following:

- Curcas oil is not edible oil
- *Jatropha curcas* grows well in rain-fed and marginalized land
- Indonesia has a potential area of around 20 million hectare located in eastern part of Indonesia

In addition to its potential as raw material for biodiesel, curcas oil, in Latin America, is also used for producing soap, and its by-product can be used for producing organic fertilizer because of its high content of nitrogen and other organic substance.

2. Objectives and Purposes

The objectives of the proposed project cover the followings:

- Reducing import of petroleum, particularly Automotive Diesel Oil (ADO)
- Improving the security of biodiesel supply
- Creating employment opportunities
- Increasing foreign earnings (supposed it can be exported)
- Supporting equal plantation development, particularly for the eastern part of Indonesia.

The purposes of the proposed project focus mainly on gradual development of plots and cultivation of *Jatropha curcas* on the potential areas of around 200.000 ha through the establishment of Industrial Areas of Community Plantation (KIM-BUN) and five models of plantation development in the eastern part of Indonesia.

MARKET PROSPECT

Considering the fact that biodiesel is a substitute for petrodiesel whose reserve has been exhausted, the market prospect for biodiesel is highly promising for the future. Besides, since biodiesel is also considered as an environmental friendly fuel because of its properties such as "*clean burning*" and "*non-toxic*" fuel, the market of biodiesel is highly prospective in those countries have major concerns on the cleanliness of the environment.

Currently, the prevailing price of petrodiesel in other countries is around USD 255.5/ton, while that of biodiesel is around USD 515 or USD 464/Kltr (in Europe) or USD 0.464/ltr. The price of biodiesel is, in fact, still higher than that of petrodiesel, but in Germany the price is lower. The price of petrodiesel in several countries is listed below:

Countries	Price of Petrodisel	Price in USD
Indonesia	Rp 900	0.009
Malaysia	RM 0.75	0.190
Singapore	S$ 0.615	0.365
Germany	F 4.3	0.600
USA	USD 0.39	

Although the price of biodiesel is still higher than that of petrodiesel, with the development of technology, advantage of biodiesel, limited reserve of petrodiesel, and renew-ability of the bio-diesel sources, the use of biodiesel will be surely increasing in the future.

TECHNICAL STANDARD FOR THE CULTIVATION OF *JATROPHA CURCAS*

1. Botanical Aspects

Jatropha curcas has many different names in different areas in Indonesia, for example: *nawaih nawas* (Aceh), *Jarak kosta* (Sunda), *jarak gundul, jarak china, jarak pagar* (Java), *paku kare* (Timor), *peleng kaliki* (Bugis), *etc.*

Jatropha curcas is originated from Tropical America. The height of this plant ranges from 1.5 to 8.0 m. Its newly growing branches exude transparent sap, while the well-developed branches exude brown sap. Its leaves have a hearth-shape and have long stem. Its flowers have a bowl-shape, consisting of male and female flowers whose color is yellowish green. Its fruits are round, blackish yellow in color, and have three spaces.

Jatropha curcas grows well in the lowland areas (around 400 m above the sea level) and areas whose rainfall ranges from 480 to 2380 mm/year (the most suitable rainfall is 625 mm/year). It also grows well in porous lands but not in compact soil.

The multiplication of *Jatropha curcas* is done through grafting or seeds. Seeds can be either directly planted on the plantation areas or first grown on the seed bed before being planted in the plantation areas. The plant can reach the age of 40 – 50 years. It is relatively resistant to pests and diseases. Since its roots can function as water reserve, the plant is well known as pioneer plant and can prevent erosions. Besides, the plant can also function as natural fences because no cattle like its leaves.

In a normal condition, *Jatropha curcas* can produce around 8 tons / ha / year and has oil content of around 33%. The sap contains 18% tannin which is commonly used for medicine. The seeds contain 35 – 45% curcas oil and texal bumin, which is also used for medicine.

2. Technical Aspects of Cultivation

Jatropha curcas can be cultivated as monoculture, mixed cropping, or used as fences. In Indonesia, this plant has not been properly cultivated as a source of curcas oil. But it is used more for fences or as a substitute for gravestone in the cemeteries. Therefore, researches on its cultivation techniques are still rare.

Experience from Nicaragua shows that the cultivation of *Jatropha curcas* use a planting pattern of 3 x 3 m. So that an area of 1 ha can accommodate around 1.100 trees. For a wide plantation purposes, the seeds should be prepared on the seed bed 6 months prior to the planting time. The estimated cost required for developing 1 ha plantation is described on attachment 1, 2, and 3.

DEVELOPMENT PLANNING

1. Target Location and Development Areas

Considering the requirements for its growth, described above, the plantation of *Jatropha curcas* should be developed for the purpose of triggering an equal development of wide plantation, land conservation, and as raw material sources for biodiesel. The development target of *Jatropha curcas* plantation in Indonesia is as follow:

Table 1. Development Planning of *Jatropha curcas* in Indonesia

No	Provinces	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	NTT	8.000	8.000	8.000	8.000	8.000	40.000
2	NTB	4.000	4.000	4.000	4.000	4.000	20.000
3	Gorontalo	4.000	4.000	4.000	4.000	4.000	20.000
4	Sulsel	4.000	4.000	4.000	4.000	4.000	20.000
	Total	20.000	20.000	20.000	20.000	20.000	100.000

2. Development Model

The plantation of *Jatropha curcas* in Indonesia has been developed through "*Areas Development of Community Industrial Plantation*" where each unit covers an area of 20.000 ha with an integrated processing unit. Its development model adopts the five models of plantation development, i.e. Plantation Business Cooperative (KUP), Cooperative – Investor Partnership, Investor – Cooperative Partnership, Operate and Transfer, and BTN model.

Considering that *Jatropha curcas* has not been commercially developed before, the development plan for this commodity must surely face several obstacles, such as seed supply and cultivation technique. Therefore prior to its implementation, pilot projects are required in all of the targeted provinces.

The implementation of the pilot projects can be handled through join cooperation among Directorate General of Plantation, local government office for plantation development, research centers, universities, and investors. This pilot projects can cover an area of 5 – 20 ha in each province.

3. Required Budget

The required budget for developing 1 ha *Jatropha curcas* plantation is shown on attachment 2 and 3. In the first year, the plantation will absorb a total budget of around Rp 4.055.000 and in the second/third and fourth/fifth year the required budget will be around Rp 1.485.000 and 2.050.000, respectively. The detail required budget is described on table 2.

Table 2. Required budget for planting and cultivation

No	Year I	Year II	Year III	Year IV	Year V	Total Cost
1	78.700					78.700
2	32.500	78.700				111.200
3	32.500	32.500	78.700			143.700
4	37.400	32.500	32.500	78.700		181.100
5	37.400	37.400	32.500	32.500	78.700	218.200
6	37.400	37.400	37.400	37.400	32.500	177.200
7	37.400	37.400	37.400	37.400	32.500	182.100
8	37.400	37.400	37.400	37.400	37.400	187.000
9	37.400	37.400	37.400	37.400	37.400	187.000
10	37.400	37.400	37.400	37.400	37.400	187.000
11	37.400	37.400	37.400	37.400	37.400	187.000
12	37.400	37.400	37.400	37.400	37.400	187.000
13	37.400	37.400	37.400	37.400	37.400	182.100
14	37.400	37.400	37.400	37.400	37.400	187.000
15	37.400	37.400	37.400	37.400	37.400	187.000
16	37.400	37.400	37.400	37.400	37.400	187.000
17	37.400	37.400	37.400	37.400	37.400	187.000
18	37.400	37.400	37.400	37.400	37.400	187.000
19	37.400	37.400	37.400	37.400	37.400	182.100
20	37.400	37.400	37.400	37.400	37.400	187.000
21	37.400	37.400	37.400	37.400	37.400	187.000
22	37.400	37.400	37.400	37.400	37.400	187.000
23	37.400	37.400	37.400	37.400	37.400	187.000
24	37.400	37.400	37.400	37.400	37.400	187.000
25	37.400	37.400	37.400	37.400	37.400	187.000

Note: Investment cost year 1 – 5: Rp 78.700/year

In addition to the required budget for planting, described above, a bunch of money is also required for constructing infrastructure, such as road, bridge, and processing facilities. The estimated budget for this purpose is described below:

Table 3. Required budget for infrastructure and processing unit of curcas oil per 100.000 ha

Year	Infrastructure	Building and Road	Processing Unit	Total
Year 1	5.000	10.000		15.000
Year 2	5.000	10.000	50.000	64.000
Year 3		10.000		10.000
Total	10.000	30.000	50.000	90.000

4. Production Estimation

The estimated production of *Jatropha curcas* is 8 ton dried seed per hectare in the first year and in the second year the production will be around 2 ton per ha, while in the third and fourth year, the plantation will produce around 3 ton and 4 ton per hectares. In the years after, the production on average will be 6 ton per ha (see table 4)

Table 4. Estimated production of *Jatropha curcas* (in ton)

Year	20.000 ha	20.000 ha	20.000 ha	20.000 ha	20.000 ha	Total
1						
2	40.000					40.000
3	80.000	40.000				120.000
4	120.000	80.000	40.000			240.000
5	120.000	120.000	80.000	40.000		360.000
6	120.000	120.000	120.000	80.000	40.000	480.000
7	120.000	120.000	120.000	120.000	80.000	560.000
8	120.000	120.000	120.000	120.000	120.000	600.000
9	120.000	120.000	120.000	120.000	120.000	600.000
10	120.000	120.000	120.000	120.000	120.000	600.000
11	120.000	120.000	120.000	120.000	120.000	600.000
12	120.000	120.000	120.000	120.000	120.000	600.000
13	120.000	120.000	120.000	120.000	120.000	600.000
14	120.000	120.000	120.000	120.000	120.000	600.000
15	120.000	120.000	120.000	120.000	120.000	600.000
16	120.000	120.000	120.000	120.000	120.000	600.000
17	120.000	120.000	120.000	120.000	120.000	600.000
18	120.000	120.000	120.000	120.000	120.000	600.000
19	120.000	120.000	120.000	120.000	120.000	600.000
20	120.000	120.000	120.000	120.000	120.000	600.000
21	120.000	120.000	120.000	120.000	120.000	600.000
22	120.000	120.000	120.000	120.000	120.000	600.000
23	120.000	120.000	120.000	120.000	120.000	600.000
24	120.000	120.000	120.000	120.000	120.000	600.000
25	120.000	120.000	120.000	120.000	120.000	600.000

LOSS – PROFIT ANALYSIS

1. Calculation of Production Cost

a. *Jatropha curcas* kernel

Based on the required budget for planting and cultivation of *Jatropha curcas* (see attachment 1, 2, and 3), and its estimated production per hectare, the cost of production for *Jatropha curcas* can be calculated using the following table:

Table 5. Estimated production cost of *Jatropha curcas* seed per hectare

Year	Cost (Rp 000	Kernel (kg)	Year	Cost (Rp 000)	Kernel (kg)
1	3.935		14	1.870	6.000
2	1.625	2.000	15	1.870	6.000
3	1.625	4.000	16	1.870	6.000
4	1.870	6.000	17	1.870	6.000
5	1.870	6.000	18	1.870	6.000
6	1.870	6.000	19	1.870	6.000
7	1.870	6.000	20	1.870	6.000
8	1.870	6.000	21	1.870	6.000
9	1.870	6.000	22	1.870	6.000
10	1.870	6.000	23	1.870	6.000
11	1.870	6.000	24	1.870	6.000
12	1.870	6.000	25	1.870	6.000
13	1.870	6.000	Total	48.325	138.000

According to the above table, the cost for producing 138.000 ton is around Rp 48.325.000. Therefore, the cost of production per hectare is Rp 350.18 or Rp 350.

b. Curcas Oil

Provided that the average oil content of *Jatropha curcas* is 33%, the *Jatropha curcas* kernel required for producing 1 ton oil is 3.0 ton. The required cost for producing 1 ton oil can be calculated as follows:

- Price of 3.0 ton kernel : Rp 1.050.000
- Cost of sack and transportation : Rp 250.000
- Cost of packing and processing : Rp 150.000
- Cost of marketing : Rp 150.000
- Shrinking cost : Rp 80.000

Estimated cost per 1 ton oil : Rp 1.680.000
Processing cost per 1 ton oil : Rp 630.000

2. Input – Output Analysis

a. Gross Income

With refer to the production estimation of *Jatropha curcas* kernel presented on chapter III.4, and provided that the oil content is 40% and estimated price of the oil is USD 300/ton or Rp 3.000.000/ton, the gross income derived from the cultivation of 200.000 ha *Jatropha curcas* is as follows:

Table 6. Gross income for curcas oil

Year	Kernel Production (ton)	Curcas Oil (ton)	Gross Income
1			
2	40.000	13.300	39.900
3	120.000	40.000	120.000
4	240.000	80.000	240.000
5	360.000	120.000	360.000
6	480.000	160.000	480.000
7	560.000	186.000	560.000
8	600.000	200.000	600.000
9	600.000	200.000	600.000
10	600.000	200.000	600.000
11	600.000	200.000	600.000
12	600.000	200.000	600.000
13	600.000	200.000	600.000
14	600.000	200.000	600.000
15	600.000	200.000	600.000
16	600.000	200.000	600.000
17	600.000	200.000	600.000
18	600.000	200.000	600.000
19	600.000	200.000	600.000
20	600.000	200.000	600.000
21	600.000	200.000	600.000
22	600.000	200.000	600.000
23	600.000	200.000	600.000
24	600.000	200.000	600.000
25	600.000	200.000	600.000
Total	12.600.000	4.200.000	12.600.000

b. Cost Recapitulation

The recapitulation of the required costs for developing *Jatropha curcas* plantation involving cultivation costs, non-cultivation costs (transportation infrastructures, processing units, etc.), and processing cost as well as overhead costs can be described as follows:

Table 7. Recapitulation of the required costs for developing *Jatropha curcas* plantation of 100.000 ha within 25 years (in Rupiah):

Year	Plants	Processing	Over-head (15%)	Non-Plants	Total
1	78.700		11.805	15.000	105.505
2	111.200	8.379	17.937	65.000	202.516
3	143.700	25.200	25.335	10.000	204.235
4	181.100	50.400	34.725		266.225
5	218.200	75.600	44.070		337.870
6	177.200	100.800	41.700		319.700
7	182.100	119.621	45.258		346.979
8	187.000	126.000	46.950		359.950
9	187.000	126.000	46.950		359.950
10	187.000	126.000	46.950		359.950
11	187.000	126.000	46.950		359.950
12	187.000	126.000	46.950		359.950
13	187.000	126.000	46.950		359.950
14	187.000	126.000	46.950		359.950
15	187.000	126.000	46.950		359.950
16	187.000	126.000	46.950		359.950
17	187.000	126.000	46.950		359.950
18	187.000	126.000	46.950		359.950
19	187.000	126.000	46.950		359.950
20	187.000	126.000	46.950		359.950
21	187.000	126.000	46.950		359.950
22	187.000	126.000	46.950		359.950
23	187.000	126.000	46.950		359.950
24	187.000	126.000	46.950		359.950
25	187.000	126.000	46.950		359.950
Total	4.458.200	2.648.000	1.065.930	90.000	8.262.130

c. Net Income

Based on the calculation of gross income and the required costs, the net income derived from *Jatropha curcas* plantation of 200.000 ha within 20 years can be calculated as follows:

Table 8. Net income from *Jatropha curcas* plantation (in Rupiah)

Year	Benefit	Cost	Net Benefit
1		105.505	- 106.505
2	39.900	202.516	- 162.616
3	120.000	204.235	- 84.235
4	240.000	266.225	- 26.225
5	360.000	337.870	22.130
6	480.000	319.700	160.300
7	560.000	346.979	213.121
8	600.000	359.950	240.050
9	600.000	359.950	240.050
10	600.000	359.950	240.050
11	600.000	359.950	240.050
12	600.000	359.950	240.050
13	600.000	359.950	240.050
14	600.000	359.950	240.050
15	600.000	359.950	240.050
16	600.000	359.950	240.050
17	600.000	359.950	240.050
18	600.000	359.950	240.050
19	600.000	359.950	240.050
20	600.000	359.950	240.050
21	600.000	359.950	240.050
22	600.000	359.950	240.050
23	600.000	359.950	240.050
24	600.000	359.950	240.050
25	600.000	359.950	240.050
Total	12.6000.000	8.262.	4.337.870

Based on the above calculation (using fixed price assumption), and assuming that the price of curcas oil is USD 300 (Rp 3.000.000) per ton and bank interest rate is neglected, the net income derived from the business is around Rp 4.337.870.000.000.

Referring to attachment 3 and 4, and taking the Discount Factor into account, we can come up with the Net Present Value (NPV), Benefit Cost Ratio (BCR), and Internal Rate of Return as follow:

NPV 15% = Rp 492.603.000.000
BCR = 1.28
IRR = 27.97%

BENEFIT

In addition to its function as a source of net income of around Rp 4.3 trillions, *Jatropha curcas* plantation can also function as a raw material source for biodiesel and create employment opportunities. For developing 1 ha *Jatropha curcas* plantation (from seedling to 25 yeas period), around 3.085 HOK are created. Therefore, 100.000 ha plantation can create around 308.500.000 HOK per 25 years or around 12,340.000 HOK per year or equivalent to 514.000 persons per year. Besides, this proposed project can create new centers of economic developments, particularly in the eastern part of Indonesia.

CLOSING

Though the development of *Jatropha curcas* plantation is less prospective than that of other businesses, this plantation can grow well in the areas with dry climate, where other crops hardly survive. Therefore, *Jatropha curcas* can function as pioneer or land-conserving crop.

In order to gain additional income from this plantation, a mixed cropping pattern can be developed. For example, during the rainy season we can grow annual crops such as maize and sorghum in between the main crops.

Financial support from international funding agencies is highly required, particularly those with low interest rate.

Attachment 1. Standard for *Jatropha curcas* seedlings per hectare.

Growing period : 6 months
Germination rate : 112.500
Ready-to-plant seed : 100.000 stems
Area : 1.0 hectare
Effective planting area : 0.7. ha

No	Activities	Unit	Volume	Cost/unit (Rp)	Total Costs (Rp)
I	Labor	HOK	100	8.000	800.000
1.	Land cultivation	HOK	25	8.000	200.000
2.	Seed bad	HOK	200	8.000	1.600.000
3.	Poly-bag	HOK	100	8.000	800.000
4.	Planting	HOK	200	8.000	1.600.000
5.	Watering	HOK	100	8.000	800.000
6.	Fertilizer application	HOK	10	8.000	80.000
7.	Pest management	HOK	20	8.000	160.000
8.	Fencing	HOK	200	8.000	1.600.000
9.	Weeding	HOK	20	8.000	160.000
10.	Drainage	HOK	30	8.000	240.000
11.	Seed selection	HOK	1.005	8.000	8.040.000
II	Materials				
1.	Plastic Bag	Pieces	125.000	250	31.250.000
2.	Manure	Kg	2.000	500	1.000.000
3.	Bamboo	Pieces	500	4000	2.000.000
4.	Fertilizer NPK	Kg	1.000	3000	3.000.000
5.	Nail	Kg	3	10000	30.000
6.	Plastic rope	Pieces	3	5000	15.000
7.	Seeds	Pieces	125.000	100	12.500.000
	Total				49.795.000
III	Equipments				
1.	Sprayer	pieces	2	500.000	1.000.000
2.	Hoe	pieces	5	20.000	100.000
3.	Plastic pail	pieces	5	20.000	100.000
4.	Watering can	pieces	10	25.000	250.000
5.	Measuring glass	pieces	2	20.000	40.000
	Total				1.490.000
	Total I + II + III				59.325.000
	Price of Seeds				593
	Rounding up				600

Attachment 2. Standard for *Jatropha curcas* plantation

Number of required seeds : 1200 stems
Number of plants/ha : 1100 stems
Planting space : 3 x 3 m

No	Activities	Unit	Volume	Cost/unit (Rp)	Total Cost (Rp)
1	2	3	4	5	6
	Year 1				
I	Labors				
1.	Land preparation	HOK	20	15.000	300.000
2.	Drainage	HOK	10	15.000	150.000
3.	Fencing	HOK	10	15.000	150.000
4.		HOK	25	15.000	375.000
5.		HOK	25	15.000	375.000
6.	First fertilizer application	HOK	10	15.000	150.000
7.	Planting activities	HOK	40	15.000	600.000
8.	Weeding	HOK	80	15.000	1.200.000
9.	Pest control	HOK	10	15.000	150.000
	Total		230		3.450.000
II	Materials				
	Seeds	Stems	1.200	500	600.000
		Pieces	1.100	50	55.000
	Rope	M	110	100	11.000
	Fertilizer NPK	Kg	500	3.000	1.500.000
	Pesticide	Kg/lt	2	100.000	200.000
	Total				2.366.000
III	Equipments				
1	Sprayer	Unit	0.25	500.000	125.000
2	Small equipments	Set	1	100.000	100.000
	Total				225.000
	Total I + II + III				6.041.000

Attachment 3. Cultivation for year 2 and 3

No	Activities	Unit	Volume	Cost/unit	Total Costs
1	2	3	4	5	6
	Year 1				
I	Labor				
1	Weeding	HOK	50	15.000	750.000
2	Fertilizer application	HOK	10	15.000	150.000
3	Pest control	HOK	10	15.000	150.000
4	Drainage	HOK	10	15.000	150.000
5	Harvesting	HOK	40	15.000	600.000
	Total		**120**		**1.800.000**
II	Materials				
1	Fertilizer NPK	Kg	100	3.000	300.000
2	Pesticides	Kg/lt	2	100.000	200.000
	Total				**500.000**
III	Equipment				
1	Sprayer	Unit	0.25	500.000	125.000
					125.000
	Total I + II + III				**2.425.000**

Cultivation for year 4

No.	**Activities**	**Unit**	**Volume**	**Cost/unit (Rp)**	**Total Cost (Rp)**
1	2	3	4	5	6
I	Labor				
1	Weeding	HOK	25	15.000	375.000
2	Fertilizer application	HOK	10	15.000	150.000
3	Pest control	HOK	10	15.000	150.000
4	Drainage	HOK	10	15.000	150.000
5	Harvesting	HOK	60	15.000	900.000
	Total		**115**		**1.725.000**
II	Materials				
1	Fertilizer NPK	Kg	165	3.000	495.000
2	Pesticides	Kg/lt	5	100.000	500.000
	Total				**995.000**
III	Equipment				
1	Sprayer	Unit	0.25	500.000	125.000
2	Small equipment	Set	1	100.000	100.000
	Total				**225.000**
	Total I + II + III				**2.820.000**