PROJECT REPORT

OF

BIODIESEL MANUFACTURING UNIT

PURPOSE OF THE DOCUMENT

This particular pre-feasibility is regarding Biodiesel Manufacturing Unit.

The objective of the pre-feasibility report is primarily to facilitate potential entrepreneurs in project identification for investment and in order to serve his objective; the document covers various aspects of the project concept development, start-up, marketing, finance and management.

[We can modify the project capacity and project cost as per your requirement. We can also prepare project report on any subject as per your requirement.]

Lucknow Office: Sidhivinayak
Building , 27/1/B, Gokhlley Marg, Lucknow-226001
Delhi Office: Multi-Disciplinary Training
Centre, Gandhi Darshan Rajghat, New Delhi 110002

Email: info@udyami.org.in
Contact: +91 7526000333, 444, 555

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PROJECT AT GLANCE

1	**Name of Proprietor/Director**	XXXXXXXX
2	**Firm Name**	XXXXXXXX
3	**Registered Address**	XXXXXXXX
4	**Nature of Activity**	XXXXXXXX
5	**Category of Applicant**	XXXXXXXX
6	**Location of Unit**	XXXXXXXX
7	**Cost of Project**	24.72 Rs. In Lakhs
8	**Means of Finance**	
i)	**Own Contribution**	2.47 Rs. In Lakhs
ii)	**Term Loan**	15.75 Rs. In Lakhs
iii)	**Working Capital**	6.50 Rs. In Lakhs
9	**Debt Service Coverage Ratio**	3.08
10	**Break Even Point**	0.39
11	**Power Requiremnet**	18 KW
12	**Employment**	9 to 10 Persons
13	**Major Raw Materials**	Non-edible vegetabe oils, animal fats & Short chain alcohols, Catalyst such as NaOH, KOH, And packing materials etc.

14 Details of Cost of Project & Means of Finance

Cost of Project

Particulars	Amount in Lacs
Land	Owned/Leased
Building & Civil Work	Owned/Leased
Plant & Machinery	16.50
Furniture & Fixture	-
Other Misc Assets	1.00
Working Capital Requirement	7.22
Total	**24.72**

Means of Finance

Particulars	Amount in Lacs
Own Contribution	2.47
Term Loan	15.75
Working capital Loan	6.50
Total	**24.72**

1. INTRODUCTION

Biofuels are renewable alternatives to petroleum-based motor fuels, such as gasoline and diesel. These are derived from plants, animal waste, or algae material. The major biofuel variants available in the market include bio-gasoline from sugar-based bioethanol and biodiesel from vegetable oils or fatty acid methyl esters (FAME). These fuels offer several advantages over conventional fossil fuels, such as better lubricating properties, cost-effectiveness, ease of source, and reduced greenhouse gases emissions. Since biofuels are created from organic matter (biomass), they can be quickly replenished. At the same time, the low emissions associated with their combustion means they are an attractive prospect for usage in various industries. Biodiesel production is the process of producing biofuel, biodiesel, through the chemical reactions of transesterification and esterification. This involves vegetable or animal fats and oils being reacted with short-chain alcohols (typically methanol or ethanol). The alcohols used should be of low molecular weight. Biodiesel has become more attractive recently because of its environmental benefits and the fact that it is made from renewable resources. The cost of biodiesel, however, is the bottleneck to its commercialization. To make Bio-diesel, hydrocarbons (i.e., oil or fats) are filtered and get mixed with alcohol, which are usually methanol and a catalyst. Ester and glycerol bio-diesel fuel, are the major products of this reaction that have been used for commercial purposes.

2. PRODUCT DESCRIPTION

2.1 PRODUCT USES

Biodiesel is a domestically produced, clean-burning, renewable substitute for petroleum diesel. Using biodiesel as a vehicle fuel increases energy security, improves air quality and the environment, and provides safety benefits.

2.2 PRODUCT RAW MATERIAL

- The raw materials for biodiesel production are vegetable oils, animal fats, and short-chain alcohols. Since cost is the primary concern in biodiesel production and trading (fundamentally due to oil prices), the utilization of non-edible vegetable oils is recommended. Other than its lower cost, one more evident benefit of non-edible oils for biodiesel production lies in the fact that no foodstuffs are spent to produce fuel. Animal fats are also an interesting option, especially in countries with plenty of livestock resources, although it is necessary to carry out preliminary treatment since they are solid; furthermore, highly acidic grease from cattle, pork, poultry, and fish can be used. Methanol is the most frequently used alcohol although ethanol can also be used.

- **Other:** Catalyst**,** Packing materials, etc. Strong alkali catalysts such as NaOH, KOH, CH3ONa, and CH3OK (potassium methoxide) are used for biodiesel production.

2.3 MANUFACTURING PROCESS

This process can be broken down into the following steps-

- **Raw material procurement**
- **Production Process**
- **Testing**

Raw Material Procurement

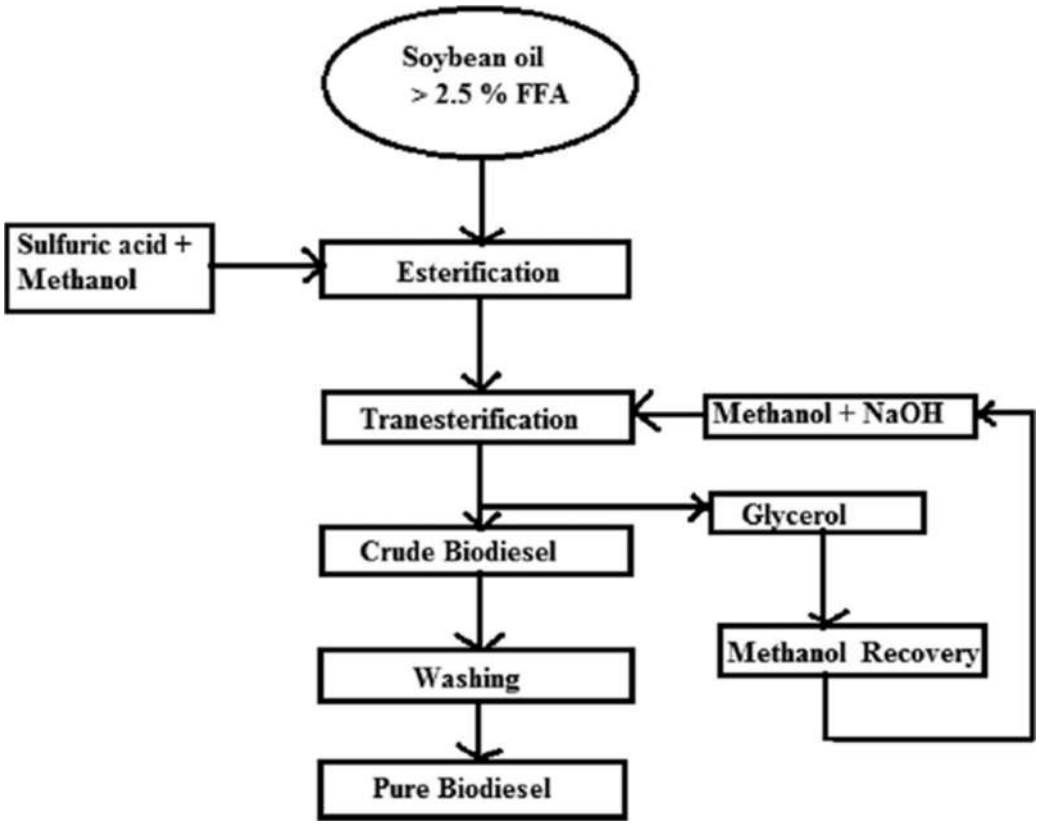
To ensure complete quality control, all raw materials are checked strictly as per established quality standards and requirements. Individual supplier assessment and supplier rating are done depending upon the rejection levels at the incoming quality control stage. After quality control, sorting of raw material will be done. In the sorting procedure, the different types of materials will be sorted out. Then treatment of raw materials will be done. In the case of highly acidic raw materials (animal fats from cattle, poultry, pork; vegetable oils from cotton, coconut, most used oils, etc.) an acid transesterification is necessary as a preliminary stage, to reduce the level of FFAs and they will be stored in a neat storage area for further processing.

Production process

1. **Storage:** Before or after treatment, raw material will be collected and stored in a storage tank for further processing. In this initial stage filtration of raw material can also be done. The storage tank is connected with the esterification tank. The raw material will be sent to the esterification tank.
2. **Esterification:** Esterification increases the yield of biodiesel. When oil contains an excess of free fatty acids they have to go through the process of esterification. The key to effectively preparing for the esterification process is to make sure the raw material has been sufficiently filtered by removing all contaminants and water. Upon filtration, the raw materials are fed to the acid or resin esterification process. The catalyst, sulfuric acid, is dissolved in methanol and then mixed with the pretreated oil. Once the mixture is heated and stirred, the free fatty acids are converted to biodiesel. The final step of esterification is to dewater and feed the product to the transesterification process.
3. **Transesterification:** The transesterification reactions are the most common method of converting triglycerides (TAG) from oils into methyl esters (biodiesel). The conversion of vegetable oil into biodiesel through the transesterification process reduces the molecular weight to one-third, reduces the viscosity by about one-seventh, reduces the flashpoint slightly, increases the volatility marginally, and reduces the pour point considerably. Then, the fuel produced has approximately the same property as petrodiesel and can be used in conventional diesel engines without any change in this last. After transesterification, the ester can be separated from glycerol by simple gravitational sedimentation and the ester has to be washed to remove traces of alkali.
4. **Decantation:** Due to its low solubility in esters, separation is usually performed by either decantation or centrifugation. In the separation by decantation, the biodiesel and glycerol mixture are rested in tanks. The separation cost is low, but it is a slow process.
5. **Purification:** Biodiesel is conventionally purified using water and dry washing technologies. Water could eliminate the remaining sodium salts and soaps formation; this is due to their water solubility.
6. **Storage and filling:** Storage conditions are important for biodiesel storage. Biodiesel should not be stored or transported in copper, bronze, brass, lead, tin, or zinc metal tanks because these metals will hasten degradation. Instead, containers made from aluminum,

steel, fluorinated polyethylene, fluorinated polypropylene, or fiberglass tanks can be used. Tanks that are designed to store and transport petro-diesel can also be used to store biodiesel. Heat, sunlight, and oxygen will also cause biodiesel to degrade more rapidly, so storage should minimize exposure to these conditions. If biodiesel will be stored for longer than about four to five months, a stability additive should be used. Biodiesel will be filled by using an oil filling machine. The biodiesel shall be packed in suitable airtight sealed containers as agreed between the purchaser and the supplier. The use of airtight sealed containers, such as drums or totes, can enhance the storage life of biodiesel.

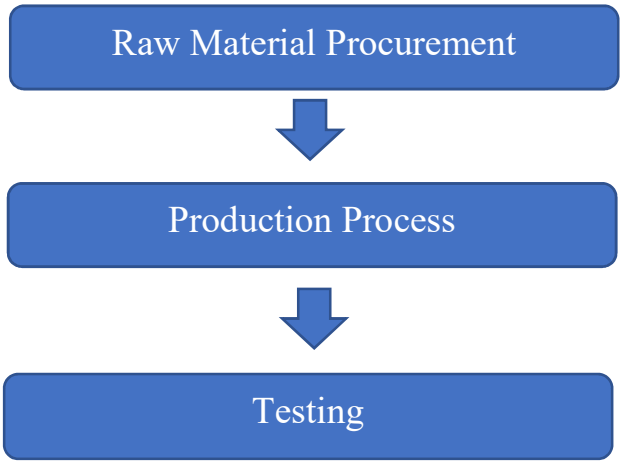
7. **Shipping:** When biodiesel is transported, ensure the transportation container has been cleaned (except if it recently carried petro-diesel or biodiesel) and that there is no water in the tank. The tank might require insulation or heating if the biodiesel is being transported in cold weather. On the other hand, the biodiesel can be allowed to freeze in the tank and afterward be heated at the destination. Pure biodiesel is not considered flammable, has a flash point greater than 200°F, and can be transported without any warning signs. Biodiesel blends require cautioning signs if the flashpoint of the blended fuel is lower than 200°F.



Testing

- Quality Control

FLOW CHART OF THE PROCESS



3 PROJECT COMPONENTS

3.1 Land & Building

The land required for this manufacturing unit will be approx. around 2000 to 2500 square feet. Land Purchase and Building Civil Work Cost have not been considered as part of the cost of project. It is expected that the premises will be on rental and approximate rentals assumed of the same will be Rs.20000 to Rs.25000 per month.

Land and building requirement may vary depending on the size of project.

3.2Plant & Machinery

- **Biodiesel production plant:** The biodiesel production plant consists of a storage tank, and an esterification tank. Transesterification tank, distillation tank, condenses, columns, reactors, cooling towers, receiver, finisher tanks, etc.

1. **Storage tanks:** These tanks are used for raw material processing and storage.
2. **Esterification tank:** This tank is used for the esterification process.
3. **Transesterification tank:** This tank is used for the transesterification process.
4. **Glycerol reactor:** This reactor is used to process or separate glycerol.
5. **Distillation unit:** The distillation unit is a pressure vessel that heats the crude oil in a pressurized environment to separate it into different components because they vaporize at different boiling points. To achieve this, oil refineries use two main types of distillation columns.
6. **Columns:** Columns are used for countercurrent contacting of vapor and liquid to effect separations by distillation or absorption.

7. **Condensers:** Condensers are used in chemical processes such as distillation.
8. **Cooling tower:** Cooling towers are primarily used for heating, ventilation, and air conditioning (HVAC) and industrial purposes. Cooling towers provide a cost-effective and energy-efficient operation of systems in need of cooling.
9. **Receiver tanks:** The receiver tank acts as a reservoir of compressed air for peak demands. The receiver tank will help remove water from the system by allowing the air a chance to cool. The receiver tank minimizes pulsation in the system caused by a reciprocating compressor or a cyclic process downstream.
10. **Finish tank:** Finish tank is used to store the final product. These containers are made from aluminum, steel, fluorinated polyethylene, fluorinated polypropylene, Teflon®, or fiberglass. To prevent free water accumulation, make sure storage tanks are cleaned and dried before biodiesel is put into the tank. As much as possible, keep only a small air space above the fuel – 2% air space is recommended to allow for thermal expansion. More air space may allow the biodiesel to accumulate more water from the air. If possible, drain free water off the bottom of storage tanks regularly.
11. **Oil filling machine:** This machine is used to fill oils in a drum or container.

- **Other:** Vacuum pump, Piping system, etc.

4 LICENSE & APPROVALS

Basic registration required in this project:

- MSME Udyam registration
- GST registration
- NOC for fire safety board and from Pollution Control Board
- Trade License
- Factory License (Optional)
- BIS certification
- Choice of a Brand Name of the product and secure the name with Trademark if required.

PROJECTED BALANCE SHEET **(in Lacs)**

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Liabilities					
Capital					
Opening balance		4.70	7.33	10.17	14.38
Add:- Own Capital	2.47				
Add:- Retained Profit	4.73	7.13	9.34	12.21	15.20
Less:- Drawings	2.50	4.50	6.50	8.00	10.50
Closing Balance	**4.70**	**7.33**	**10.17**	**14.38**	**19.08**
Term Loan	14.00	10.50	7.00	3.50	-
Working Capital Limit	6.50	6.50	6.50	6.50	6.50
Sundry Creditors	1.85	2.11	2.39	2.69	3.00
Provisions & Other Liability	0.40	0.48	0.58	0.80	0.96
TOTAL :	**27.45**	**26.92**	**26.64**	**27.87**	**29.54**
Assets					
Fixed Assets (Gross)	17.50	17.50	17.50	17.50	17.50
Gross Dep.	2.63	4.86	6.75	8.36	9.74
Net Fixed Assets	**14.88**	**12.64**	**10.75**	**9.14**	**7.76**
Current Assets					
Sundry Debtors	4.08	4.88	5.52	6.28	7.09
Stock in Hand	5.34	6.05	6.78	7.62	8.45
Cash and Bank	1.16	1.11	1.09	1.34	2.24
Loans & Advances	2.00	2.25	2.50	3.50	4.00
TOTAL :	**27.45**	**26.92**	**26.64**	**27.87**	**29.54**

PROJECTED PROFITABILITY STATEMENT **(in Lacs)**

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
Capacity Utilisation %	**55%**	**60%**	**65%**	**70%**	**75%**
SALES					
Gross Sale					
Biodiesel	81.51	97.51	110.33	125.55	141.73
Total	**81.51**	**97.51**	**110.33**	**125.55**	**141.73**
COST OF SALES					
Raw Material Consumed	55.44	63.36	71.76	80.64	90.00
Electricity Expenses	1.90	2.38	2.58	2.78	2.98
Depreciation	2.63	2.23	1.90	1.61	1.37
Wages & labour	7.44	7.81	8.20	8.61	9.04
Repair & maintenance	1.63	1.95	2.21	3.77	4.25
Packaging	0.82	0.98	1.10	1.26	1.42
Cost of Production	69.85	78.71	87.75	98.67	109.06
Add: Opening Stock	-	3.49	3.94	4.39	4.93
Less: Closing Stock	3.49	3.94	4.39	4.93	5.45
Cost of Sales	66.36	78.27	87.30	98.12	108.54
GROSS PROFIT	**15.15**	**19.24**	**23.03**	**27.43**	**33.18**
	18.59%	**19.73%**	**20.88%**	**21.85%**	**23.41%**
Salary to Staff	3.24	3.73	4.28	4.93	5.67
Interest on Term Loan	1.55	1.36	0.98	0.59	0.21
Interest on working Capital	0.72	0.72	0.72	0.72	0.72
Rent	2.88	3.31	3.81	4.38	5.04
Selling & Administrative Exp.	2.04	2.44	2.76	3.14	3.54
TOTAL	**10.42**	**11.55**	**12.55**	**13.76**	**15.17**
NET PROFIT	4.73	7.69	10.49	13.67	18.01
Taxation	-	0.56	1.15	1.46	2.81
PROFIT (After Tax)	4.73	7.13	9.34	12.21	15.20
NET PROFIT RATIO	**5.80%**	**7.31%**	**8.46%**	**9.73%**	**10.72%**

PROJECTED CASH FLOW STATEMENT **(in Lacs)**

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
SOURCES OF FUND					
Own Margin	2.47				
Net Profit	4.73	7.69	10.49	13.67	18.01
Depreciation & Exp. W/off	2.63	2.23	1.90	1.61	1.37
Increase in Cash Credit	6.50	-	-	-	-
Increase In Term Loan	15.75	-	-	-	-
Increase in Creditors	1.85	0.26	0.28	0.30	0.31
Increase in Provisions & Oth labilities	0.40	0.08	0.10	0.22	0.16
	-				
TOTAL :	**34.33**	**10.26**	**12.76**	**15.80**	**19.85**
APPLICATION OF FUND					
Increase in Fixed Assets	17.50				
Increase in Stock	5.34	0.71	0.73	0.84	0.83
Increase in Debtors	4.08	0.80	0.64	0.76	0.81
Repayment of Term Loan	1.75	3.50	3.50	3.50	3.50
Increase in Loans & Advances	2.00	0.25	0.25	1.00	0.50
Drawings	2.50	4.50	6.50	8.00	10.50
Taxation	-	0.56	1.15	1.46	2.81
TOTAL :	**33.17**	**10.32**	**12.78**	**15.56**	**18.95**
Opening Cash & Bank Balance	-	1.16	1.11	1.09	1.34
Add : Surplus	1.16	-0.05	-0.01	0.24	0.90
Closing Cash & Bank Balance	**1.16**	**1.11**	**1.09**	**1.34**	**2.24**

CALCULATION OF D.S.C.R

PARTICULARS	1st year	2nd year	3rd year	4th year	5th year
CASH ACCRUALS	7.36	9.36	11.23	13.83	16.57
Interest on Term Loan	1.55	1.36	0.98	0.59	0.21
Total	8.90	10.72	12.21	14.42	16.78
REPAYMENT					
Instalment of Term Loan	1.75	3.50	3.50	3.50	3.50
Interest on Term Loan	1.55	1.36	0.98	0.59	0.21
Total	3.30	4.86	4.48	4.09	3.71
DEBT SERVICE COVERAGE RATIO	**2.70**	**2.20**	**2.73**	**3.52**	**4.52**
AVERAGE D.S.C.R.					**3.08**

REPAYMENT SCHEDULE OF TERM LOAN							
					Interest		11.00%
Year	**Particulars**	**Amount**	**Addition**	**Total**	**Interest**	**Repayment**	**Closing Balance**
1st	Opening Balance						
	1st month	-	15.75	15.75	-	-	15.75
	2nd month	15.75	-	15.75	0.14	-	15.75
	3rd month	15.75	-	15.75	0.14	-	15.75
	4th month	15.75	-	15.75	0.14		15.75
	5th month	15.75	-	15.75	0.14		15.75
	6th month	15.75	-	15.75	0.14		15.75
	7th month	15.75	-	15.75	0.14	0.29	15.46
	8th month	15.46	-	15.46	0.14	0.29	15.17
	9th month	15.17	-	15.17	0.14	0.29	14.88
	10th month	14.88	-	14.88	0.14	0.29	14.58
	11th month	14.58	-	14.58	0.13	0.29	14.29
	12th month	14.29	-	14.29	0.13	0.29	14.00
					1.55	**1.75**	
2nd	Opening Balance						
	1st month	14.00	-	14.00	0.13	0.29	13.71
	2nd month	13.71	-	13.71	0.13	0.29	13.42
	3rd month	13.42	-	13.42	0.12	0.29	13.13
	4th month	13.13	-	13.13	0.12	0.29	12.83
	5th month	12.83	-	12.83	0.12	0.29	12.54
	6th month	12.54	-	12.54	0.11	0.29	12.25
	7th month	12.25	-	12.25	0.11	0.29	11.96
	8th month	11.96	-	11.96	0.11	0.29	11.67
	9th month	11.67	-	11.67	0.11	0.29	11.38
	10th month	11.38	-	11.38	0.10	0.29	11.08
	11th month	11.08	-	11.08	0.10	0.29	10.79
	12th month	10.79	-	10.79	0.10	0.29	10.50
					1.36	**3.50**	
3rd	Opening Balance						
	1st month	10.50	-	10.50	0.10	0.29	10.21
	2nd month	10.21	-	10.21	0.09	0.29	9.92
	3rd month	9.92	-	9.92	0.09	0.29	9.63
	4th month	9.63	-	9.63	0.09	0.29	9.33
	5th month	9.33	-	9.33	0.09	0.29	9.04
	6th month	9.04	-	9.04	0.08	0.29	8.75
	7th month	8.75	-	8.75	0.08	0.29	8.46
	8th month	8.46	-	8.46	0.08	0.29	8.17
	9th month	8.17	-	8.17	0.07	0.29	7.88
	10th month	7.88	-	7.88	0.07	0.29	7.58
	11th month	7.58	-	7.58	0.07	0.29	7.29
	12th month	7.29	-	7.29	0.07	0.29	7.00
					0.98	**3.50**	

4th	Opening Balance						
	1st month	7.00	-	7.00	0.06	0.29	6.71
	2nd month	6.71	-	6.71	0.06	0.29	6.42
	3rd month	6.42	-	6.42	0.06	0.29	6.13
	4th month	6.13	-	6.13	0.06	0.29	5.83
	5th month	5.83	-	5.83	0.05	0.29	5.54
	6th month	5.54	-	5.54	0.05	0.29	5.25
	7th month	5.25	-	5.25	0.05	0.29	4.96
	8th month	4.96	-	4.96	0.05	0.29	4.67
	9th month	4.67	-	4.67	0.04	0.29	4.38
	10th month	4.38	-	4.38	0.04	0.29	4.08
	11th month	4.08	-	4.08	0.04	0.29	3.79
	12th month	3.79	-	3.79	0.03	0.29	3.50
					0.59	**3.50**	
5th	Opening Balance						
	1st month	3.50	-	3.50	0.03	0.29	3.21
	2nd month	3.21	-	3.21	0.03	0.29	2.92
	3rd month	2.92	-	2.92	0.03	0.29	2.63
	4th month	2.63	-	2.63	0.02	0.29	2.33
	5th month	2.33	-	2.33	0.02	0.29	2.04
	6th month	2.04	-	2.04	0.02	0.29	1.75
	7th month	1.75	-	1.75	0.02	0.29	1.46
	8th month	1.46	-	1.46	0.01	0.29	1.17
	9th month	1.17	-	1.17	0.01	0.29	0.88
	10th month	0.88	-	0.88	0.01	0.29	0.58
	11th month	0.58	-	0.58	0.01	0.29	0.29
	12th month	0.29	-	0.29	0.00	0.29	-
					0.21	**3.50**	

DOOR TO DOOR	60	MONTHS
MORATORIUM PERIOD	6	MONTHS
REPAYMENT PERIOD	54	MONTHS

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