

#### **CHAPTER 4 PROPOSED BUSINESS MODEL FOR PV RURAL ELECTRIFICATION --- TOWARDS ARRANGEMENT OF PV MARKET---**

The Business Model is composed of "Project Formation" and "Financial Model". The parameters adopted in the latter financial model will be realized only when the project formation functions well as anticipated. Therefore, if the performance of the parties concerned such as ASER, operator, rural community/rural population is good, the cash flow will be eventually improved, resulting in reduction in tariff based on the review of fund management. Of course the opposite case will happen due to poor performance. The financial model is designed to be modified flexibly in cope with the performance of the project.

Above all, the renewal of the PV components, for instance, batteries, which will affect greatly the cash management, has been discussed in the financial model, taking into account current price of them at the renewal time and the tariff will be reviewed regularly subject to the clause of the contract. These kind of transparent project management and fund management will be required to make the project technically and financially sustainable.

The fee-for-service adopted in the Business Model carries greater commercial risk due to the longer cost-recovery period. In this respect, the model allows the operator to recover the investment capital in 10 years, if the performance during the initial 10 years be judged as excellent by ASER and accepted by the village users association (VUA) under such condition that the system be surely and satisfactorily managed by the village users association. It should be noted that this kind situation never happens without establishment of a reliable relationship between the Operator and VUA.

It is recognized among the Senegalese persons involved in the Pilot project in Mar island that the reliable relationship among Supplier/Operator, ASER/MMEH/JICA, VUA, was established in the pre-implementation stage and the implementation stage. This fact, not exaggerated, should be recognized and appreciated particularly by the Senegalese people. This was a critical factor to the success of the pilot project as well as to the global rural electrification. Among others, the fact of providing the rural population with good quality service and collecting the fee in a satisfactory manner is itself a fruit of efforts of the people engaged in this project. The important lesson from this project is truly the establishment of the reliable relationship, which leads to the success of the project. In this sense, this lesson indicates that the Business Model her-in-with proposed never works properly without reliable relationship/partnership among the parties concerned to be established prior to the implementation.

The basic pre-conditions for the project formation is presented as below.

#### **Basic Pre-conditions for Project Formation**

1. Concession : 20 years

2. Initial 10 Years (Chart B-1)

The Operator is fully responsible for the implementation, operation, and management of the PV system and fund management as well. The Operator is responsible for user education (\*1) on how to use the electric appliance properly, referring to the users' manual. In addition, Local Technician will be trained so as to be PV Expert by giving an opportunity to the former to get more advanced training course in Dakar. Trained local technician will be employed as PV Expert by the Operator for another project. At the same time, another Local Technician will be trained for the daily operation and maintenance for the next 10 years.

\*1 Consumer Awareness and Cost reduction

User education is essential for PV program success. Information and training in simple maintenance and safe operating procedures (including suitability of electric appliances) should be targeted to those persons in the households who will have primary responsibility for the system. Users need to understand that good operating practices minimize recurring costs and enhance battery life.

3. Second 10 years (Chart B-2)

The agreement on "Repair and Renewal" between the Operator and VUA will be reached under the approval of ASER. At the same time, the fund management will

be transferred to VUA. This transfer of the management system will take place only under such condition that the good and reliable partnership has been established and mutually recognized by both parties, but subject to approval of ASER.

### **Financial Model**

The major and minimum conditions for construction of the Financial Model, is as follows;

- Tax exemptions: VAT, import duties\*<sup>2</sup>, income tax, etc.
- Fund source for subsidy and loan
- Role and responsibility of the parties concerned (See the matrix below)

\*<sup>2</sup> Import Duties

Import duties are imposed on PV component. Therefore, the initial cost adopted in the financial model includes import duties.

	<b>ASER</b>	<b>Private Entity</b>	<b>Rural Community (VUA)</b>
<b>ASER</b>	-	-	<b>Monitoring</b>
<b>Private Entity</b>	Transparent accounting	-	<b>Provision of quality service</b>
<b>Rural Community (VUA)</b>	-	<b>Fee for service</b>	-

To practice the above simple principles, it should be again reminded that the reliable relationship, or good partnership, should be firstly created among the parties concerned in the pre-implementing stage, including public consultations (socio-economic survey, explanation of contents of service, tariff, payment method, etc.), and in the implementing stage (installation of PV system)

Referring to the Project Formation discussed in the previous section, the Financial Model has been constructed, in due consideration of Chart B-3 and the following conditions.

**Evolution of Project Formation**

	<b>Initial 10 years</b>	<b>Second 10 years</b>	<b>After 20 years</b>
<b>Concession</b>	Private Entity	Private Entity	Private Entity
<b>Ownership of PV system</b>	Private Entity	VUA (ASER)	VUA (ASER)
<b>Fund management</b>	Private Entity	VUA	VUA
<b>O&amp;M</b>	Private Entity	VUA	VUA
<b>Repair and Renewal</b>	—	Private Entity <sup>*1</sup>	Private Entity <sup>*1</sup>

The summary on “Monthly Payment versus Subsidy Rate” is shown as below.

**Table 4.1 Summary of Financial Analysis**

**Summary Results**

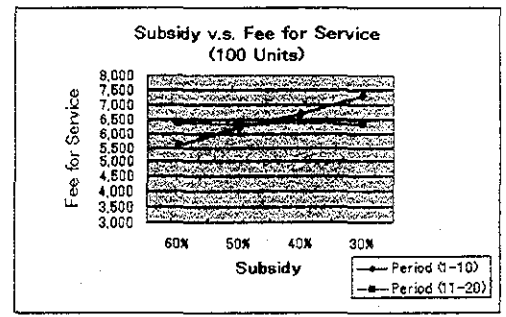
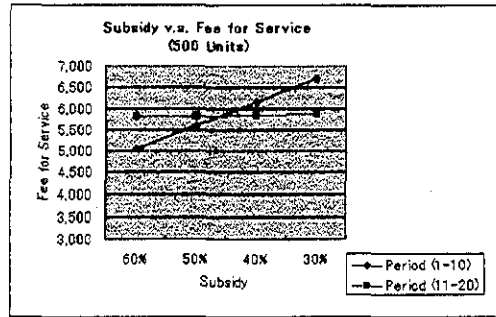
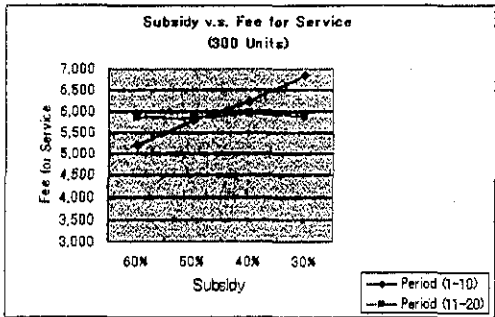
Assumption 1 : 50,000 CFA/system be secured at the time of sale for the operator  
 Assumption 2 : 5% for equity be secured for 10 years' operation  
 Assumption 3 : Renewal cost after 20 years' operation be secured.

50%	5,800	5,958	17.7%	4.8
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300 Units	Units		ROE	Cash Position after 20 years
	Period (1-10)	Period (11-20)		
60%	5,200	5,876	15.5%	1.6
50%	5,600	6,275	16.1%	0.7
40%	6,250	5,938	17.4%	0.1
30%	6,850	5,891	19.6%	0.5

500 Units	Units		ROE	Cash Position after 20 years
	Period (1-10)	Period (11-20)		
60%	5,050	5,808	15.9%	1.1
50%	5,600	5,824	18.4%	1.2
40%	6,150	5,843	17.9%	1.7
30%	6,700	5,869	19.5%	2.1

100 Units	Units		ROE	Cash Position after 20 years
	Period (1-10)	Period (11-20)		
60%	5,600	6,384	15.1%	0.7
50%	6,200	6,384	16.1%	0.7
40%	6,700	6,355	17.6%	0.1
30%	7,300	6,351	20.0%	0.7



**Table 4.2 Pre-conditions for Financial Model**

<b><u>Minimum Requirement</u></b>	
1. Concession	
• Period 20 years	
2. Local population	
• Initial payment	: More than 10% of the initial investment
• Monthly payment	: 5,000 CFA to 6,500 CFA in the initial 5 years (depending on the income of population and energy expenses in the respective rural community through the socio-economic survey)
3. Potential operator	
• Equity portion	: Not less than 20%
• Provision of good quality service	
• Concession period	: 20 years
• Fund management	: Secure the cashflow sufficiently enough to replace the equipment after 20 years
4. Government represented by ASER	
• Sustainable financial assistance	: Secure the enough fund for subsidy, refinancing, guarantee fund, etc. to meet the adequate profitability of the operator in term of ROE (return on equity), saying 15-20%.
• Appropriate establishment of PV training facilities	
• Tax exemptions	: Special legal decree applied to the rural electrification, such as income tax, VAT, etc.
<b><u>Conditions for Financial Model</u></b>	
1. PV System	
• Capacity: 55 Wp	
• System unit cost: 450,000 CFA	
• 300 units	
2. Renewal of PV components	
• PV Module	20 years
• Charge controller	10 years
• Battery	4 years
3. Financial Targets	
• ROE =15 to 20 %	
• Cash position after 20 years > the amount required to replace the necessary components	
4. Major Parameters	
• Subsidy rate be ranged between 30% and 60%	
• Increase % in tariff after 10 year will be determined depending on the cash position and future cashflow forecast, subject to the clause of the contract	
5. Outcome	
• Monthly payment be ranged between 5,000 CFA and 6,500 CFA	

**Table 4.3 Sensitivity Analysis**

<b>Initial Cost</b>		<b>Fee</b>	
450,000	CFA/system	5,800	CFA/month
400,000	CFA/system	5,400	CFA/month
<b>System</b>			
<b>Units</b>		<b>Fee</b>	
300	Units	5,800	CFA/month
330	Units	5,700	CFA/month
270	Units	5,900	CFA/month
<b>Deposit %</b>		<b>Fee</b>	
80%		5,858	CFA/month
60%		5,900	CFA/month
<b>Operator's Equity</b>	<b>Up to 10</b>	<b>11 to 20</b>	
	<b>Fee</b>	<b>Fee</b>	
20%	5,800	5,800	CFA/month
30%	5,700	5,871	CFA/month
<b>Operator Profit %</b>			
5%	5,700	CFA/month	
3%	5,500	CFA/month	
<b>Fee Collection Rate in %</b>			
100%	5,800	CFA/month	
95%	6,100	CFA/month	
90%	6,450	CFA/month	

## **Annex B**

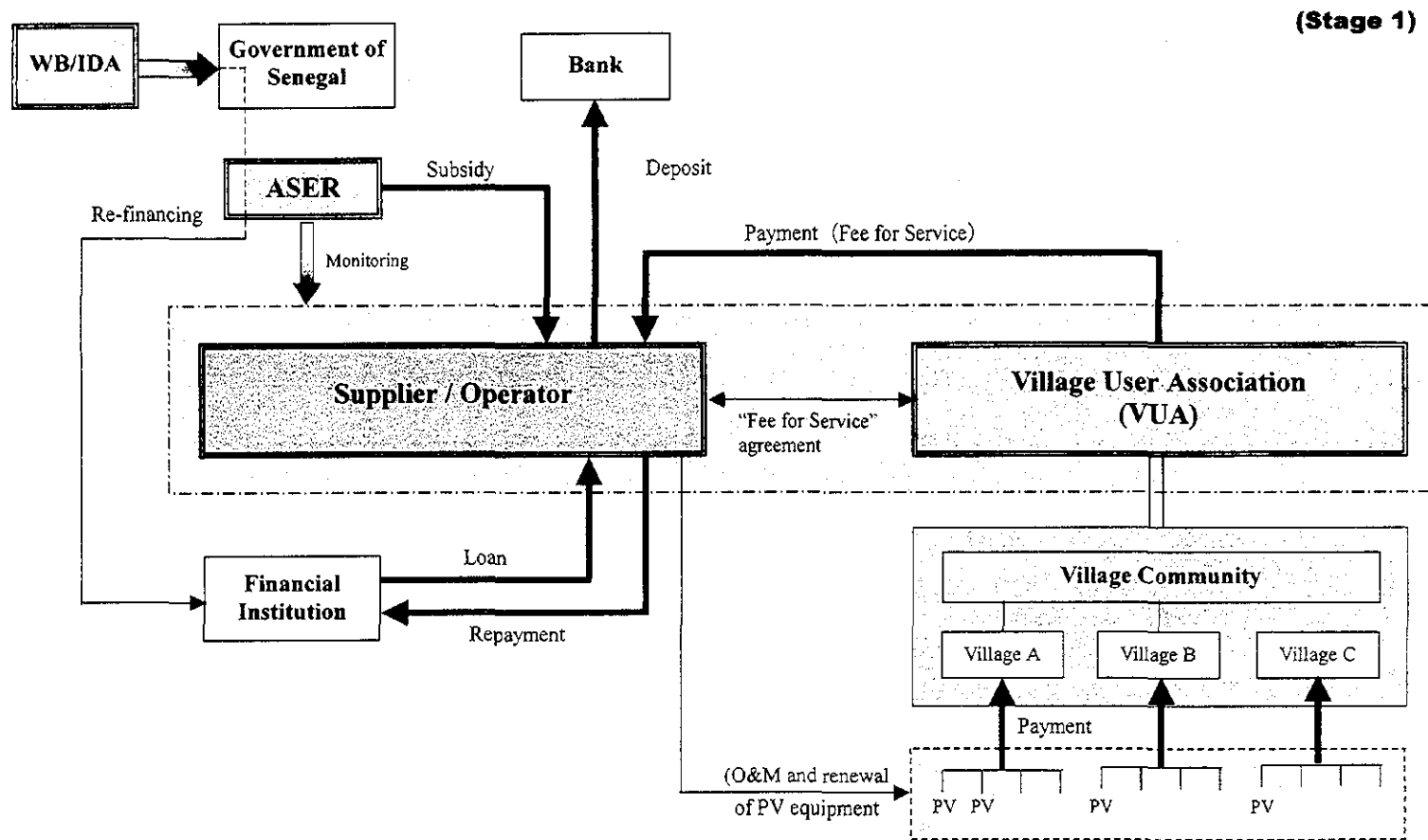
### **Proposed Business Model**

Project Formation (Stage 1) .....	B-1
Project Formation (Stage 2) .....	B-2
Financial Model (Subsidy 50%).....	B-3
<b>Alternative Cases</b>	
- Subsidy 30% .....	B-4
- Subsidy 45% .....	B-5
- Subsidy 60% .....	B-6

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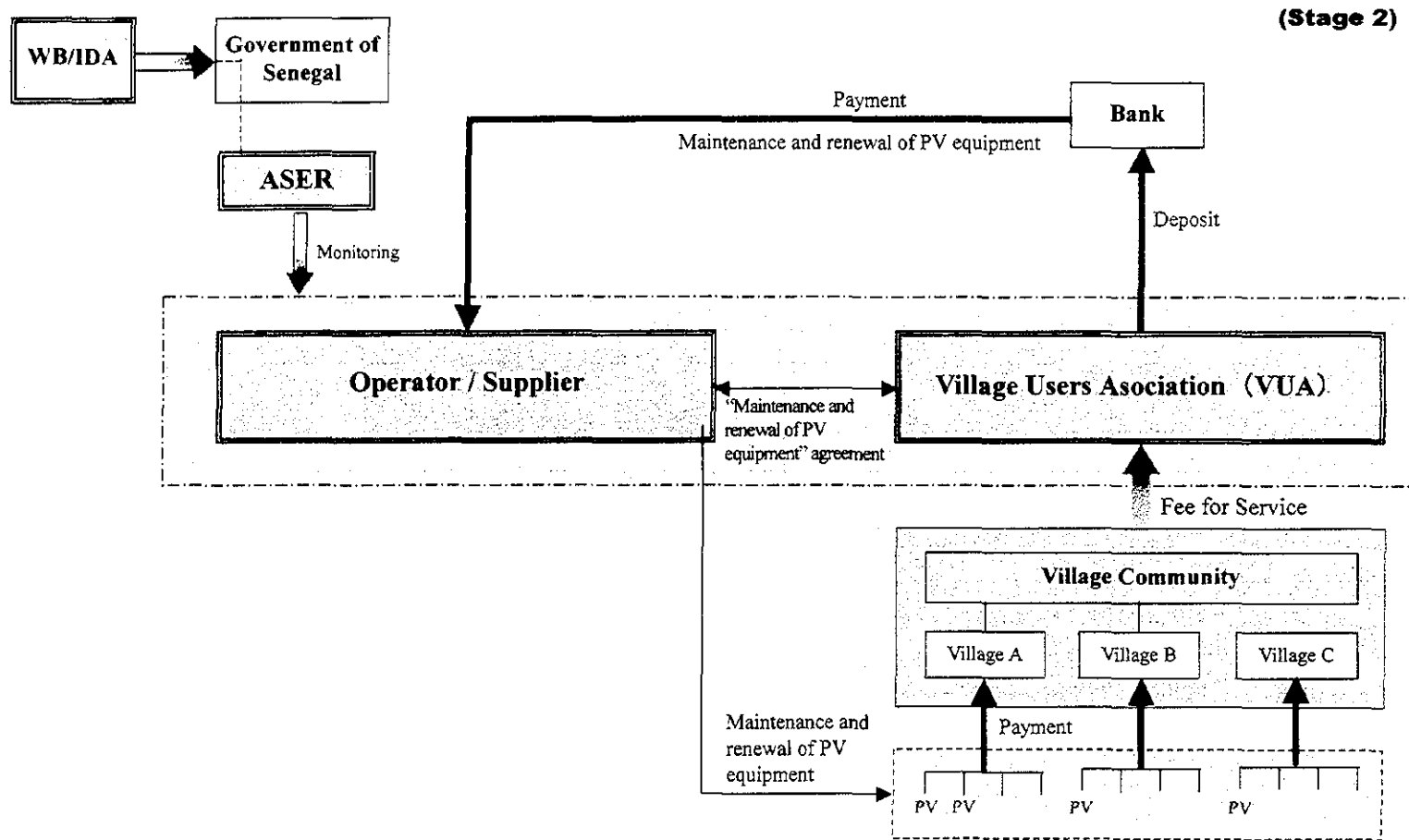


Chart B-1 Business Model – Project Formation -  
ERIL: Electrification Rural d’Initiative Local



(Stage 1)

Chart B-2 Business Model – Project Formation -  
ERIL: Electrification Rural d’Initiative Local



(Stage 2)

### Chart B-3 (1) Proposed Business Model: Summary of Financial Model

Chart 1 Summary Table and by VUA over a remaining period of 10 years

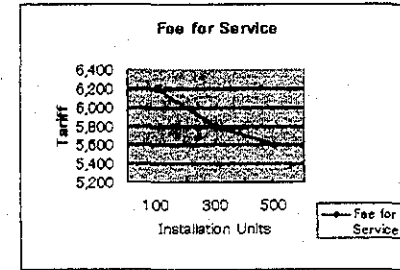
General Pre-Conditions		
System Unit (55 Wp)	300	Units
System Unit Cost	450,000	CFA
Replacement Cost	27.6	Million CFA after 10 years' operation

Fee for Service			
Period (Year)	Up to 5	6 to 10	11 to 20
Tariff (CFA/month)	5,800	5,858	5,858
		1%	1%

Initial Payment	
45,000	CFA/Unit

Replacement cost secured after 20 years

Case Study		Cash Position		
Subsidy Rate	ROE	After 10 years	After 20 years	Liquidation Amount
50%	Case 1	13.9%	5.9	44.0
Operator's Group		17.7%		4.8
			Million CFA	Million CFA



#### Summary Results

- Assumption 1 : 50,000 CFA/system be secured at the time of sale for the operator
- Assumption 2 : 5% for equity be secured for 10 years' operation
- Assumption 3 : Renewal cost after 20 years' operation be secured.

50%	5,800	5,858	17.7%	4.8
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300 Units	ROE	Cash Position
Period (1-10) Period (11-20)		after 20 years
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Period (1-10) Period (11-20)		after 20 years
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100 Units	ROE	Cash Position
Period (1-10) Period (11-20)		after 20 years
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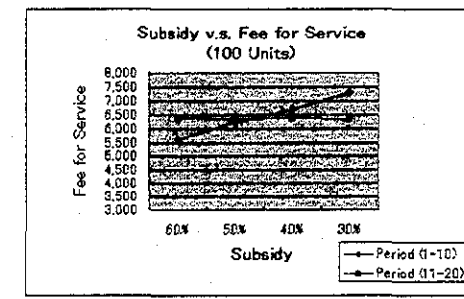
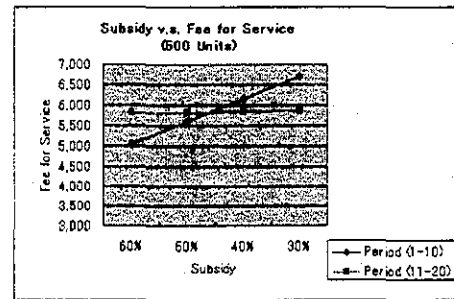
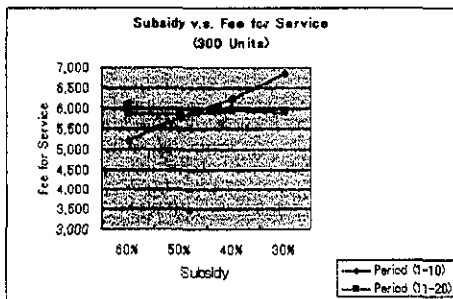
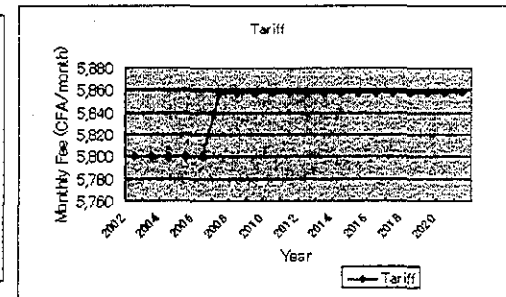
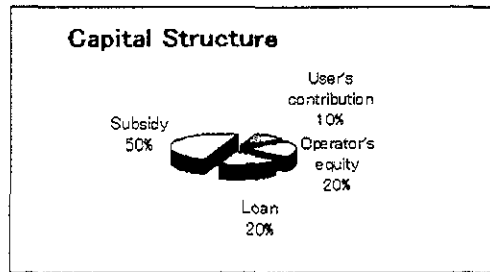


Chart B-3 (2) Proposed Business Model: Financial Model (Subsidy 50 %)

**1 Financial Model for PV Rural Electrification**  
 1 English, 0 French (In case of liquidation)

**Pre-Conditions**

1 System Unit Cost (\$5 Wp)	<b>450</b>	(1,000 FCFA)
2 O & M Cost for Private Operator	See "O & M and Renewal"	
3 Capital Structure		
Initial Investment Cost	155,000	0.21 US\$ million
User's contribution	10%	13,500
Operator's equity	20%	27,000
Loan	20%	27,000
Interest	7.0%	
Repayment	5,400 x 1,000 CFA/year	
Grace period	5 years	
Repayment period	10 years	



4 Others	Subsidy <b>50%</b>	67,500	ROE = <b>13.9%</b> over a period of 10 years for the operator's profitability	15,000 Profit at sales	
			ROE = <b>17.7%</b> over a period of 20 years for the operator's profitability without liquidation		
5 Tariff	45,000 FCFA	For the initial payment which may be regarded as 'User's Contribution'			
OK	<b>5,800</b> FCFA/Unit/month	For the monthly payment			
	741,000 (Total amount of user's payment for 10 years)	5,924 Minimum Acc. Cashflow	4,787 Minimum Acc. Cashflow		
6 No. of Subscribers	<b>300</b> Units	5,924 Cash Position after 10 years	4,787 Cash Position after 20 years	139.8	
		-43,980 For equity liquidation	after reduction of the replacement cost		
			where the amount required for replacement be secured, say, <b>135.0</b> Million CFA		
7 Depreciation	(US\$ = 650 FCFA)	18,177 to secure the cash position on the plus side over a period of 20 years			
	<b>Depreciation</b>	14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670
		14,670	14,670	14,670	14,670

up to 2006	up to 2011	after 2012
0%	1%	1%
5,800	5,858	5,858

Tariff going after 10 years  
 Increase in tariff after 10 years

55

**Chart B-3 (3) Proposed Business Model: Financial Model (Subsidy 50%)**

Projection of Income		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Fee Collection Rate		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Revenue		20,880	20,880	20,880	20,880	20,880	21,089	21,089	21,089	21,089	21,089	21,089	21,089	21,089	21,089	21,089	21,089	21,089
	Expenses Direct cost		5,112	5,112	5,112	3,600	3,600	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024
	<b>Gross Profit</b>	0	15,768	15,768	15,768	17,280	17,280	18,065	18,065	18,065	18,065	18,065	18,065	18,065	18,065	18,065	18,065	18,065	18,065
	Depreciation		14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
	Interest	0	1,890	1,890	1,890	1,890	1,890	1,890	1,512	1,134	756	378	0	0	0	0	0	0	0
	<b>Net Profit</b>	0	-792	-792	-792	720	720	1,505	1,883	2,261	2,639	3,017	3,395	3,395	3,395	3,395	3,395	3,395	3,395
	Income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Minimum income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Net Income</b>	0	-792	-792	-792	720	720	1,505	1,883	2,261	2,639	3,017	3,395	3,395	3,395	3,395	3,395	3,395	3,395
	<b>Accumulated Profit</b>	0	-792	-1,584	-2,376	-1,656	-936	569	2,452	4,712	7,351	-6,612	-3,217	177	3,572	6,967	10,362	13,757	27,336
<b>Debt Financing</b>		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20
	Loan at beg.		27,000	27,000	27,000	27,000	27,000	27,000	21,600	16,200	10,800	5,400	0	0	0	0	0	0	0
	Repayment							5,400	5,400	5,400	5,400	5,400							
	Interest	0	1,890	1,890	1,890	1,890	1,890	1,890	1,512	1,134	756	378	0	0	0	0	0	0	0
	Loan at end	27,000	27,000	27,000	27,000	27,000	27,000	21,600	16,200	10,800	5,400	0							
<b>Cash-Flow Stream</b>		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Net income	0	-792	-792	-792	720	720	1,505	1,883	2,261	2,639	3,017	3,395	3,395	3,395	3,395	3,395	3,395	3,395
	Depreciation	0	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
plus	User's contribution	13,500																	
plus	Equity	27,000										-27,000							
plus	Additional equity (Work	0										-16,980			0				
plus	Loan	27,000																	
plus	Subsidy	67,500																	
minus	Repayment	0	0	0	0	0	0	5,400	5,400	5,400	5,400	5,400	0	0	0	0	0	0	0
minus	Initial Investment	135,000										100%							
minus	Replacement		0	0	0	24,900	15,600	0	0	24,900	0	27,600	0	24,500	0	0	15,600	24,900	135,000

Chart B-3 (4) Proposed Business Model: Financial Model (Subsidy 50%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
Net Cashflow		0	13,878	13,878	13,878	-9,510	-210	10,775	11,153	-13,369	11,909	-59,293	18,065	-6,835	18,065	18,065	2,465	-6,835	-116,935
Accu. Cashflow	0	13,878	27,756	41,634	32,124	31,914	42,689	53,842	40,472	52,381	-6,913	11,153	4,317	22,382	40,447	42,912	36,077	-26,664	
Deposit bank rate	4.25%		13,878	28,228	43,066	35,020	36,001	47,999	60,784	49,482	63,073	5,924	24,190	18,177	36,860	56,178	60,553	55,777	4,787
% of the outstanding amount	80%																		
Equity Portion	-27,000	13,878	13,878	13,878	-9,510	-210	10,775	11,153	-13,369	-11,909	-59,293	18,065	-6,835	18,065	18,065	2,465	-6,835	-116,935	
80% Bank deposit effect for 80% of the outstandings at the beg. of the year		0	472	960	1,464	1,191	1,224	1,632	2,067	1,682	2,144	201	822	618	1,253	1,910	2,059	4,002	
Real Cash Flow	-27,000	13,878	14,350	14,838	-8,046	981	11,999	12,785	-11,303	13,591	-57,149	18,266	-6,013	18,683	19,318	4,375	-4,776	-112,933	
	4.8%		13,878	28,228	43,066	35,020	36,001	47,999	60,784	49,482	63,073	5,924	24,190	18,177	36,860	56,178	60,553	55,777	4,787

Profitability	5.0%	-27,000																	
Profit at sale		15,000																	
Operator RQE = (for 10 years)	13.9%	-12,000	0	0	0	0	0	0	0	0	0	49,980							
Equity owner (for 20 years)	17.7%	-49,500	13,878	14,350	14,838	-8,046	981	11,999	12,785	-11,303	13,591	-13,169	19,762	-4,467	20,282	20,971	5,084	-3,009	-110,912
Cumu. Cashflow			13,878	28,228	43,066	35,020	36,001	47,999	60,784	49,482	63,073	49,904	69,666	65,199	85,481	106,452	112,536	109,527	66,228

Balance Sheets	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
Loan	27,000	27,000	27,000	27,000	27,000	27,000	21,600	14,200	10,800	5,400	0	0	0	0	0	0	0	0
User's contribution	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500
Additional equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	0	0	0	0	0	0	0	0
Retained earnings	0	792	-1,112	944	1,240	3,151	5,879	9,294	13,722	18,045	6,224	9,820	14,037	18,050	22,692	28,003	33,497	38,787
Subsidy	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500
Liabilities & Equity	135,000	134,208	133,888	134,056	136,240	138,151	135,479	133,594	132,522	131,443	87,224	90,820	95,037	99,050	103,698	109,003	114,457	139,787
Cash	0	13,878	28,228	43,066	35,020	36,001	47,999	60,784	49,482	63,073	5,924	24,190	18,177	36,860	56,178	60,553	55,777	4,787
Assets	135,000	120,330	105,660	90,990	101,220	102,150	87,480	72,810	83,040	68,370	81,300	66,630	76,860	62,190	47,520	48,450	58,680	135,000
Assets	135,000	134,208	133,888	134,056	136,240	138,151	135,479	133,594	132,522	131,443	87,224	90,820	95,037	99,050	103,698	109,003	114,457	139,787

Chart B-3 (5) Proposed Business Model: Financial Model (Subsidy 50%)

Cashflow Stream & Cash Position (In case of liquidation)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
Cashflow	13,878	14,350	14,838	-8,046	981	11,999	12,785	-11,303	13,591	-57,149	18,266	-6,013	18,683	19,318	4,275	-4,776	-112,933
Cumu. Cashflow	13,878	28,228	43,066	35,020	36,001	47,999	60,784	49,482	63,073	5,924	24,190	18,177	36,860	56,178	60,553	55,777	4,787

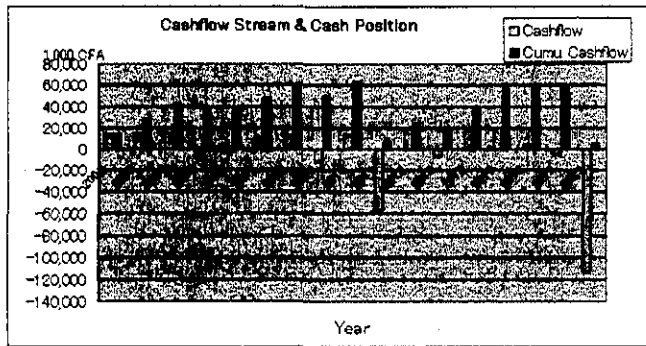


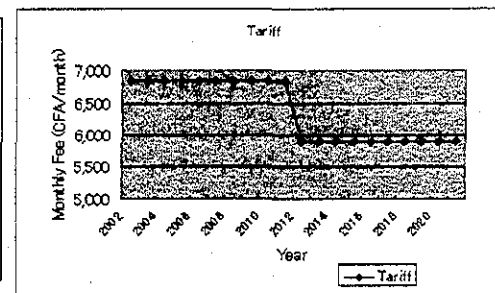
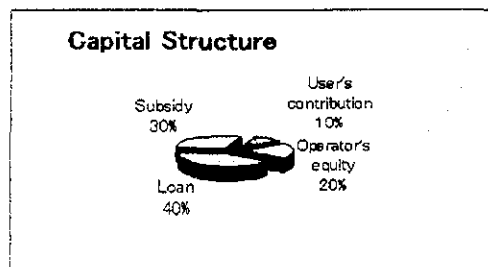
Chart B-4 (1) Proposed Business Model: Financial Model (Subsidy 30%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

**Pre-Conditions**

1 System Unit Cost (\$5 Wp)	450	(1,000 FCFA)
2 O & M Cost for Private Operator	See "O & M and Renewal"	
<b>3 Capital Structure</b>		
Initial Investment Cost	135,000	0.21 US\$ million
User's contribution	10%	13,500
Operator's equity	20%	27,000
Loan	40%	54,000
Interest	7.0%	
Repayment	10,800	x 1,000 CFA/year
Grace period	5	years
Repayment period	10	years



4 Others	Subsidy 30%	40,500	ROE = 13.9%	94,500 Amount (= Subsidy + Loan)	15,000 Profit at sales
			ROE = 19.6%		over a period of 20 years for the operator's profitability without liquidation

Depreciation method A straight-line method  
Income tax rate 0%

5 Tariff 45,000 FCFA For the initial payment which may be regarded as 'User's Contribution'

up to 2006	up to 2011	after 2012
0%	0%	-14%
6,850	6,850	5,891

Tariff setting after 10 years  
Increase in tariff after 10 years

OK 6,850 FCFA/Unit/month  
867,000 (Total amount of user's payment for 10 years)

For the monthly payment	1,888	Minimum Accu. Cashflow
	1,232	Cash Position after 10 years
	-43,980	For equity liquidation

535 Minimum Acc. Cashflow  
535 Cash Position after 20 years after reduction of the replacement cost 135.5  
where the amount required for replacement be secured, say, 135.0 Million CFA.  
14,104 to secure the cash position on the plus side over a period of 20 years

7 Depreciation	(US\$ = 650 FCFA)																		
Depreciation		14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670



Chart B-4 (2) Proposed Business Model: Financial Model (Subsidy 30%)

Projection of Income		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Fee Collection Rate		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Revenue	24,660	24,660	24,660	24,660	24,660	24,660	24,660	24,660	24,660	24,660	24,660	21,208	21,208	21,208	21,208	21,208	21,208	21,208
	Expenses Direct cost		5,112	5,112	5,112	3,600	3,600	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024
	<b>Gross Profit</b>	0	19,548	19,548	19,548	21,060	21,060	21,636	21,636	21,636	21,636	21,636	18,184	18,184	18,184	18,184	18,184	18,184	18,184
	Depreciation		14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
	Interest		3,780	3,780	3,780	3,780	3,780	3,780	3,024	2,268	1,512	756	0	0	0	0	0	0	0
	<b>Net Profit</b>	0	1,098	1,098	1,098	2,610	2,610	3,186	3,942	4,698	5,454	6,210	3,514	3,514	3,514	3,514	3,514	3,514	3,514
	Income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Minimum income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Net Income</b>	0	1,098	1,098	1,098	2,610	2,610	3,186	3,942	4,698	5,454	6,210	3,514	3,514	3,514	3,514	3,514	3,514	3,514
	Accumulated Profit	0	1,098	2,196	3,294	5,904	8,514	11,700	15,642	20,340	25,794	15,024	18,537	22,051	25,565	29,078	32,592	36,105	50,160

Debt Financing		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20
	Loan at beg.		54,000	54,000	54,000	54,000	54,000	54,000	43,200	32,400	21,600	10,800	0	0	0	0	0	0	0
	Repayment								10,800	10,800	10,800	10,800							
	Interest	0	3,780	3,780	3,780	3,780	3,780	3,780	3,024	2,268	1,512	756	0	0	0	0	0	0	0
	Loan at end	54,000	54,000	54,000	54,000	54,000	54,000	43,200	32,400	21,600	10,800	0							

Cash-Flow Stream		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Net income	0	1,098	1,098	1,098	2,610	2,610	3,186	3,942	4,698	5,454	6,210	3,514	3,514	3,514	3,514	3,514	3,514	3,514
	Depreciation	0	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
plus	User's contribution	13,500																	
plus	Equity	27,000									27,000								
plus	Additional equity (Work	0									16,980				0				
plus	Loan	54,000																	
plus	Subsidy	40,500																	
minus	Repayment	0	0	0	0	0	0	10,800	10,800	10,800	10,800	10,800	0	0	0	0	0	0	0
minus	Initial Investment	135,000										100%							
minus	Replacement		0	0	0	24,900	15,600	0	0	24,900	0	27,600	0	24,900	0	0	15,600	24,900	135,000

Chart B-4 (3) Proposed Business Model: Financial Model (Subsidy 30%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
<b>Net Cashflow</b>																		
	0	15,768	15,768	15,768	-7,620	1,680	7,056	7,812	-14,332	9,324	-61,500	18,184	-6,716	18,184	18,184	2,584	-6,716	-116,816
Accu. Cashflow	0	15,768	31,536	47,304	39,684	41,364	48,420	56,232	39,900	49,224	-12,276	5,907	-809	17,375	35,558	38,142	31,425	-30,840
Deposit bank rate	4.25%																	
% of the outstanding amount	80%																	
		15,768	32,072	48,931	42,974	46,115	54,739	64,412	50,270	61,304	1,888	20,136	14,104	32,767	52,065	56,418	51,620	535
<b>Equity Portion</b>	-27,000	15,768	0	0	0	0	0	0	0	0	0	-18,184	-6,716	18,184	18,184	2,584	-6,716	-116,816
Bank deposit effect for 80% of the outstandings at the beg. of the year		0	536	1,090	1,864	1,461	1,568	1,861	2,190	1,709	2,084	64	685	480	1,114	1,770	1,918	3,859
<b>Real Cash-Flow</b>	-27,000	15,768	16,304	16,858	-5,956	3,141	8,624	9,673	-14,142	11,033	-59,416	18,248	-6,032	18,663	19,298	4,354	-4,798	-112,958
	5.3%	15,768	32,072	48,931	42,974	46,115	54,739	64,412	50,270	61,304	1,888	20,136	14,104	32,767	52,065	56,418	51,620	535

<b>Profitability</b>	5.0%	-27,000																	
Profit at sale		15,000																	
Operator ROE =	13.9%	-12,000	0	0	0	0	0	0	0	0	43,980								
(for 10 years)																			
Equity owner	19.6%	-40,500	15,768	16,304	16,858	-5,956	3,141	8,624	9,673	-14,142	11,033	-15,436	19,743	-4,486	20,262	20,951	6,063	-3,031	-110,937
(for 20 years)																			
<b>Cumu. Cashflow</b>		15,768	32,072	48,931	42,974	46,115	54,739	64,412	50,270	61,304	45,868	65,611	61,125	81,387	102,338	108,401	105,570	61,977	

Liquidation of the operator's equity = -43,980  
 Cash outstandings after the liquidation = 1,888 -16,980

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
<b>Balance Sheets</b>																		
Loan	54,000	54,000	54,000	54,000	54,000	54,000	43,200	32,400	21,600	10,800	0	0	0	0	0	0	0	0
User's contribution	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500
Additional equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	0	0	0	0	0	0	0
Retained earnings	0	1,099	2,732	4,921	9,194	13,265	18,019	23,322	30,710	37,874	29,188	32,766	36,964	40,937	45,585	50,868	56,300	81,535
Subsidy	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500
<b>Liabilities &amp; Equity</b>	135,000	136,098	137,732	139,921	144,194	148,265	142,219	137,222	133,310	129,674	83,188	86,766	90,964	94,957	99,585	104,868	110,300	135,535
Cash	0	15,768	32,072	48,931	42,974	46,115	54,739	64,412	50,270	61,304	1,888	20,136	14,104	32,767	52,065	56,418	51,620	535
<b>Assets</b>	135,000	120,330	105,660	90,990	101,220	102,150	87,480	72,810	83,040	68,370	81,300	66,630	76,860	62,190	47,520	48,450	58,680	135,000
<b>Assets</b>	135,000	136,098	137,732	139,921	144,194	148,265	142,219	137,222	133,310	129,674	83,188	86,766	90,964	94,957	99,585	104,868	110,300	135,535

**Chart B-4 (4) Proposed Business Model: Financial Model (Subsidy 30%)**

Cashflow Stream & Cash Position (In case of liquidation)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
Cashflow	15,768	16,304	16,858	-5,956	3,141	8,524	9,673	-14,142	11,033	-59,416	13,248	-6,032	13,663	19,298	4,354	-4,798	-112,958
Cumu. Cashflow	15,768	32,072	48,931	42,974	46,115	54,739	64,412	50,270	61,304	1,888	20,136	14,104	32,767	52,065	56,418	51,620	535

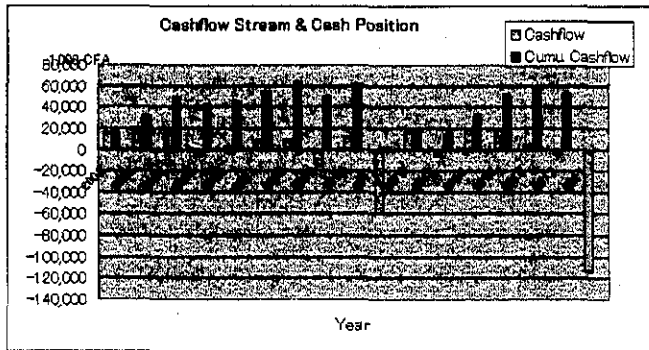


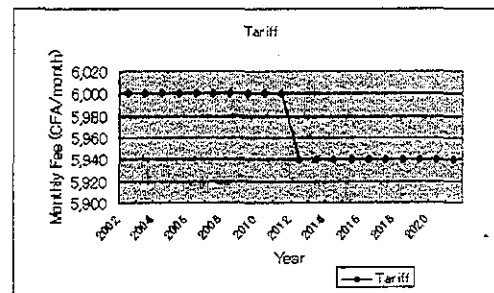
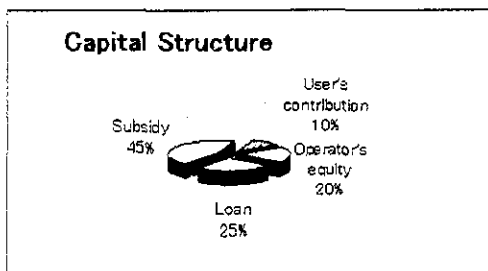
Chart B-5 (1) Proposed Business Model: Financial Model (Subsidy 45%)

**Financial Model for PV Rural Electrification**

(English, 0 French) (In case of liquidation)

**Pre- Conditions**

1 System Unit Cost (\$5 Wp)	450	(1,000 FCFA)
2 O & M Cost for Private Operator	See "O & M and Renewal"	
3 Capital Structure		
Initial Investment Cost	135,000	0.21 US\$ million
User's contribution	10%	13,500
Operator's equity	20%	27,000
Loan	25%	33,750
Interest	7.0%	
Repayment	6,750 x 1,000 CFA/year	
Grace period	5 years	
Repayment period	10 years	



4 Others	Subsidy 45%	60,750	94,500 Amount (= Subsidy + Loan)	ROE = 13.9%	over a period of 10 years for the operator's profitability	15,000 Profit at sales
				ROE = 17.1%	over a period of 20 years for the operator's profitability without liquidation	

Depreciation method	A straight-line method
Income tax rate	0%

5 Tariff	45,000 FCFA	For the initial payment which may be regarded as 'User's Contribution'
	6,000 FCFA/Unit/month	For the monthly payment

up to 2006	up to 2011	after 2012	← Tariff setting after 10 years Increase in tariff after 10 years
0%	0%	-1%	
6,000	6,000	5,940	

763,000 (Total amount of user's payment for 10 years)	1,449 Minimum Accu. Cashflow	1,983 Minimum Acc. Cashflow	137.0
6 No. of Subscribers	1,449 Cash Position after 10 years	1,983 Cash Position after 20 years	after reduction of the replacement cost
300 Units	-43,980 For equity liquidation	13,994	where the amount required for replacement be secured, say, 135.0 Million CFA

7 Depreciation (US\$ = 650 FCFA)	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
Depreciation	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670

Chart B-5 (2) Proposed Business Model: Financial Model (Subsidy 45%)

3 Projection of Income		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Per Collection Rate		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Revenue		21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,384	21,384	21,384	21,384	21,384	21,384	21,384
	Expenses Direct cost		5,112	5,112	5,112	3,600	3,600	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024
	<b>Gross Profit</b>	0	16,488	16,488	16,488	18,000	18,000	18,576	18,576	18,576	18,576	18,576	18,360	18,360	18,360	18,360	18,360	18,360	18,360
	Depreciation		14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
	Interest	0	2,363	2,363	2,363	2,363	2,363	2,363	1,890	1,418	945	473	0	0	0	0	0	0	0
	<b>Net Profit</b>	0	-545	-545	-545	968	968	1,544	2,016	2,489	2,961	3,434	3,690	3,690	3,690	3,690	3,690	3,690	3,690
	Income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Minimum income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Net Income</b>	0	-545	-545	-545	968	968	1,544	2,016	2,489	2,961	3,434	3,690	3,690	3,690	3,690	3,690	3,690	3,690
	Accumulated Profit	0	-545	-1,089	-1,634	-666	302	1,845	3,861	6,350	9,311	-4,236	-546	3,144	6,834	10,524	14,214	17,904	32,664
<b>Debt Financing</b>		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20
	Loan at beg.		33,750	33,750	33,750	33,750	33,750	33,750	27,000	20,250	13,500	6,750	0	0	0	0	0	0	0
	Repayment							6,750	6,750	6,750	6,750	6,750	0	0	0	0	0	0	0
	Interest	0	2,363	2,363	2,363	2,363	2,363	2,363	1,890	1,418	945	473	0	0	0	0	0	0	0
	Loan at end	33,750	33,750	33,750	33,750	33,750	33,750	27,000	20,250	13,500	6,750	0	0	0	0	0	0	0	0
<b>Cash-Flow Stream</b>		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Net income	0	-545	-545	-545	968	968	1,544	2,016	2,489	2,961	3,434	3,690	3,690	3,690	3,690	3,690	3,690	3,690
	Depreciation	0	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
plus	User's contribution	13,500																	
plus	Equity	27,000										-27,000							
plus	Additional equity (Work)	0										-16,980			0				
plus	Loan	33,750																	
plus	Subsidy	60,750																	
minus	Repayment	0	0	0	0	0	0	6,750	6,750	6,750	6,750	6,750	0	0	0	0	0	0	0
minus	Initial investment	135,000										100%							
minus	Replacement		0	0	0	24,900	15,600	0	0	24,900	0	27,600	0	24,900	0	0	15,600	24,900	135,000

Chart B-5 (3) Proposed Business Model: Financial Model (Subsidy 45%)

Net Cashflow		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
		0	14,126	14,126	14,126	-9,263	38	9,464	9,936	-14,492	10,881	-60,227	18,360	-6,540	18,360	18,360	2,760	-6,540	-116,640
	Accu. Cashflow	0	14,126	28,251	42,377	33,114	33,152	42,615	52,551	38,060	48,941	-11,286	7,074	534	18,894	37,254	40,014	33,474	-28,086
	Deposit bank rate	4.25%	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983
	% of the outstanding amount	80%																	
			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
		-27,000	14,126	14,126	14,126	-9,263	38	9,464	9,936	-14,492	10,881	-60,227	18,360	-6,540	18,360	18,360	2,760	-6,540	-116,640
	Equity Portion	-27,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80%	Bank deposit effect for 80% of the outstandings		0	480	977	1,490	1,226	1,269	1,634	2,027	1,604	2,028	49	675	476	1,116	1,773	1,933	3,901
	at the beg. of the year																		
	Real Cash-Flow	-27,000	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-58,199	18,409	-5,865	18,836	19,476	4,538	-4,607	-112,739
		5.9%	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983

Profitability	5.0%	-27,000																	
	Profit at sale	15,000																	
Operator	ROE =	13.9%	0	0	0	0	0	0	0	0	0	45,980							
(for 10 years)																			
Equity owner	17.1%	-40,500	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-14,218	19,905	-4,319	20,435	21,129	6,248	-2,840	-110,719
(for 20 years)	Cumu. Cashflow		14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	45,429	65,334	61,015	81,450	102,579	108,827	105,987	62,424

Balance Sheets		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Loan	33,750	33,750	33,750	33,750	33,750	33,750	27,000	20,250	13,500	6,750	0	0	0	0	0	0	0	0
	User's contribution	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500
	Additional equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Equity	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	0	0	0	0	0	0	0	0
	Retained earnings	0	-545	-609	176	2,281	4,475	7,268	10,938	15,493	20,018	8,499	12,239	16,604	20,770	25,276	31,044	36,667	62,733
	Subsidy	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750
	Liabilities & Equity	135,000	134,456	134,391	134,824	137,281	139,475	135,538	132,438	130,203	128,018	82,749	86,489	90,854	95,020	99,826	105,294	110,917	136,983
	Cash	0	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983
	Assets	135,000	120,330	105,660	90,990	101,220	102,150	87,480	72,810	83,040	68,370	81,300	66,630	76,860	62,190	47,520	48,450	58,680	135,000
	Assets	135,000	134,456	134,391	134,824	137,281	139,475	135,538	132,438	130,203	128,018	82,749	86,489	90,854	95,020	99,826	105,294	110,917	136,983

**Chart B-5 (4) Proposed Business Model: Financial Model (Subsidy 45%)**

Cashflow Stream & Cash Position (In case of liquidation)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
Cashflow	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-58,199	18,409	-5,865	18,836	19,476	4,538	-4,607	-112,739
Cumu. Cashflow	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983

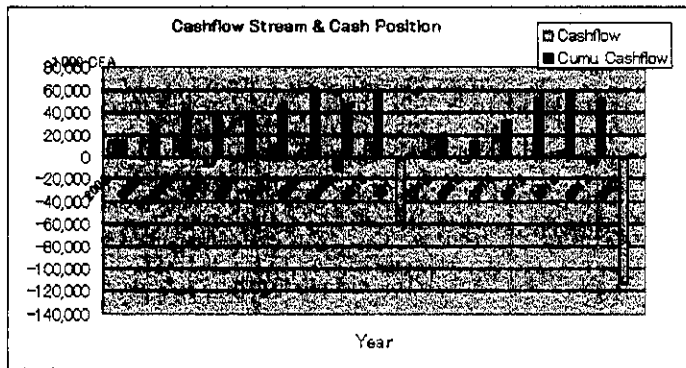


Chart B-5 (3) Proposed Business Model: Financial Model (Subsidy 45%)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
Net Cashflow		0	14,126	14,126	14,126	-9,263	38	9,464	9,936	-14,492	10,881	-60,227	18,360	-6,540	18,360	18,360	2,760	-6,540	-116,640	
Accu. Cashflow		0	14,126	28,251	42,377	33,114	33,152	42,615	52,551	38,060	48,941	-11,286	7,074	534	18,894	37,254	40,014	33,474	-28,586	
Deposit bank rate		4.23%	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983	
% of the outstanding amount		80%		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
Equity Portion		-27,000	14,126	14,126	14,126	-9,263	38	9,464	9,936	-14,492	10,881	-60,227	18,360	-6,540	18,360	18,360	2,760	-6,540	-116,640	
Bank deposit effect for 80% of the outstandings at the beg. of the year		-27,000	0	480	977	1,490	1,226	1,269	1,534	2,027	1,604	2,028	49	675	476	1,116	1,778	1,933	3,901	
Real Cash-Flow		-27,000	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-58,199	18,409	-5,865	18,836	19,476	4,538	-4,607	-112,739	
5.0%		14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983		
Profitability		5.0%	-27,000																	
Profit at sale		15,000																		
Operator ROE =		13.9%	-12,000	0	0	0	0	0	0	0	0	43,980								
(for 10 years)																				
Equity owner		17.1%	-43,500	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-14,218	19,905	-4,319	20,435	21,129	6,248	-2,840	-110,719
(for 20 years)																				
Cumul. Cashflow		14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	45,429	65,334	61,015	81,450	102,579	108,827	105,987	63,424		
Balance Sheets		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
Loan		33,750	33,750	33,750	33,750	33,750	33,750	27,000	20,250	13,500	6,750	0	0	0	0	0	0	0	0	
User's contribution		13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	
Additional equity		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Equity		27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	0	0	0	0	0	0	0	0	
Retained earnings		0	-345	-609	-176	2,201	4,475	7,288	10,938	15,453	20,018	8,499	12,339	16,604	20,770	25,576	31,044	36,667	62,733	
Subsidy		60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	60,750	
Liabilities & Equity		135,000	134,456	134,391	134,824	137,281	139,475	135,538	132,438	130,203	128,018	82,749	86,485	90,854	95,020	99,825	105,294	110,517	136,583	
Cash		0	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,648	1,449	19,859	13,994	32,830	52,306	56,844	52,237	1,983	
Assets		135,000	120,330	105,660	90,990	101,220	102,150	87,480	72,810	83,040	68,370	81,300	66,630	76,860	62,190	47,520	48,450	58,680	135,000	
Assets		135,000	134,456	134,391	134,824	137,281	139,475	135,538	132,438	130,203	128,018	82,749	86,485	90,854	95,020	99,825	105,294	110,917	136,583	



Chart B-5 (4) Proposed Business Model: Financial Model (Subsidy 45%)

Cashflow Stream & Cash Position (In case of liquidation)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
Cashflow	14,126	14,606	15,102	-7,772	1,264	10,733	11,570	-12,464	12,485	-58,199	18,439	-5,265	18,826	19,476	4,538	-4,607	-112,739
Cumu. Cashflow	14,126	28,731	43,834	36,061	37,325	48,058	59,628	47,163	59,548	1,449	19,859	13,994	32,820	52,306	56,844	52,237	1,983

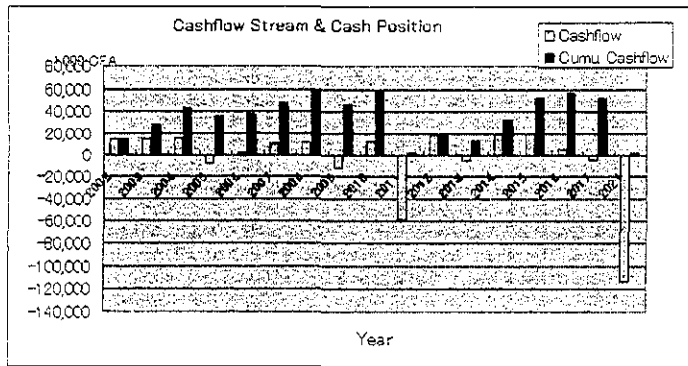


Chart B-6 (1) Proposed Business Model: Financial Model (Subsidy 60%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

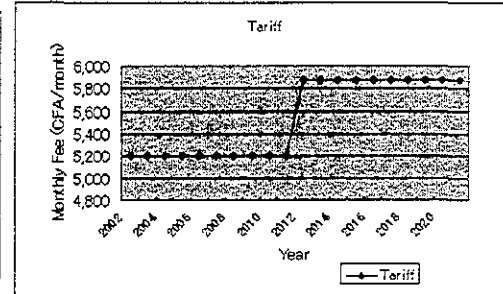
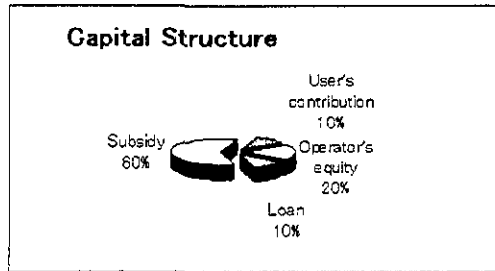
**Pre-Conditions**

1 System Unit Cost (\$5 Wp)  (1,000 FCFA)

2 O & M Cost for Private Operator See "O & M and Renewal"

**3 Capital Structure**

Initial Investment Cost	135,000	0.21	US\$ million
User's contribution	10%	13,500	
Operator's equity	20%	27,000	
Loan	10%	13,500	
Interest	7.0%		
Repayment	2,700 x 1,000 CFA/year		
Grace period	5 years		
Repayment period	10 years		



4 Others  
 Depreciation method A straight-line method  
 Income tax rate   
 Subsidy  81,000  
 ROE =  over a period of 10 years for the operator's profitability  
 ROE =  over a period of 20 years for the operator's profitability without liquidation  
 Amount (= Subsidy + Loan) 94,500  
 Profit at sales 15,000

5 Tariff  
 45,000 FCFA For the initial payment which may be regarded as 'User's Contribution'  
 5,200 FCFA/Unit/month For the monthly payment  
 up to 2006 up to 2011 after 2012  
 0% 0% 13% Tariff setting after 10 years  
 5,200 5,200 5,876 Increase in tariff after 10 years

6 No. of Subscribers  
 669,000 (Total amount of user's payment for 10 year)  
 300 Units  
 3,113 Minimum Accu. Cashflow  
 3,113 Cash Position after 10 years  
 -43,980 For equity liquidation  
 1,616 Minimum Acc. Cashflow  
 1,616 Cash Position after 20 year after reduction of the replacement cost 136.6  
 ,where the amount required for replacement be secured, say, 135.0 Million CFA  
 15,304 to secure the cash position on the plus side over a period of 20 years

7 Depreciation (US\$ = 650 FCFA)

Depreciation	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
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**Chart B-6 (2) Proposed Business Model: Financial Model (Subsidy 60%)**

8 Projection of Income		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Fee Collection Rate		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Revenue		18,720	18,720	18,720	18,720	18,720	18,720	18,720	18,720	18,720	18,720	21,154	21,154	21,154	21,154	21,154	21,154	21,154
	Expenses Direct cost		5,112	5,112	5,112	3,600	3,600	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024
	<b>Gross Profit</b>	0	13,608	13,608	13,608	15,120	15,120	15,696	15,696	15,696	15,696	15,696	18,130	18,130	18,130	18,130	18,130	18,130	18,130
	Depreciation		14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
	Interest	0	945	945	945	945	945	945	756	567	378	189	0	0	0	0	0	0	0
	<b>Net Profit</b>	0	-2,007	-2,007	-2,007	-495	-495	81	270	459	648	837	3,460	3,460	3,460	3,460	3,460	3,460	3,460
	Income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Minimum income tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>Net Income</b>	0	-2,007	-2,007	-2,007	-495	-495	81	270	459	648	837	3,460	3,460	3,460	3,460	3,460	3,460	3,460
	<b>Accumulated Profit</b>	0	-2,007	-4,014	-6,021	-6,516	-7,011	-6,930	-6,660	-6,201	-5,553	-21,696	-18,237	-14,777	-11,317	-7,858	-4,398	-939	12,900

Debt Financing		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20
	Loan at beg.		13,500	13,500	13,500	13,500	13,500	13,500	10,800	8,100	5,400	2,700	0	0	0	0	0	0	0
	Repayment							2,700	2,700	2,700	2,700	2,700							
	Interest	0	945	945	945	945	945	945	756	567	378	189	0	0	0	0	0	0	0
	Loan at end	13,500	13,500	13,500	13,500	13,500	13,500	10,800	8,100	5,400	2,700	0							

Cash-Flow Stream		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	Net income	0	-2,007	-2,007	-2,007	-495	-495	81	270	459	648	837	3,460	3,460	3,460	3,460	3,460	3,460	3,460
	Depreciation	0	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670	14,670
plus	User's contribution	13,500																	
plus	Equity	27,000																	
plus	Additional equity (Work	0																	
plus	Loan	13,500																	
plus	Subsidy	81,000																	
minus	Repayment	0	0	0	0	0	0	2,700	2,700	2,700	2,700	2,700	0	0	0	0	0	0	0
minus	Initial Investment	135,000																	
minus	Replacement		0	0	0	24,900	15,600	0	0	24,900	0	27,600	0	24,900	0	0	15,600	24,900	135,000

plus  
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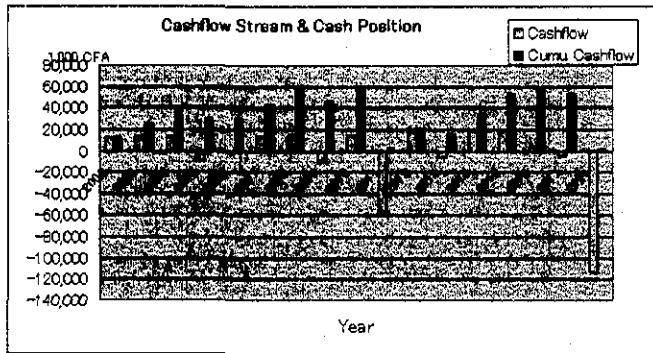
Chart B-6 (3) Proposed Business Model: Financial Model (Subsidy 60%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
<b>Net Cashflow</b>		0	12,663	12,663	12,663	-10,725	-1,425	12,051	12,240	-12,471	12,618	-58,773	18,130	-6,770	18,130	18,130	2,530	-6,770	-116,870
Accu. Cashflow	0	12,663	25,326	37,989	27,264	25,839	37,890	50,130	37,659	50,277	-8,496	9,633	2,863	20,993	39,122	41,652	34,881	-27,600	
Deposit bank rate	4.25%		12,663	25,757	39,295	29,906	29,498	42,552	56,239	45,680	59,851	3,113	21,348	15,304	33,954	53,238	57,577	52,765	1,616
% of the outstanding amount	80%																		
Equity Portion	-27,000	12,663	12,663	12,663	-10,725	-1,425	12,051	12,240	-12,471	12,618	-58,773	18,130	-6,770	18,130	18,130	2,530	-6,770	-116,870	
80% Bank deposit effect for 80% of the outstandings at the beg. of the year	-27,000	0	431	876	1,336	1,017	1,003	1,447	1,912	1,553	2,035	106	726	520	1,154	1,810	1,958	3,896	
Real Cash-Flow	-27,000	12,663	13,094	13,539	-9,389	-408	13,054	13,687	-10,559	14,171	-56,738	18,235	-6,045	18,650	19,284	4,340	-4,813	-112,974	
7.0%		12,663	25,757	39,295	29,906	29,498	42,552	56,239	45,680	59,851	3,113	21,348	15,304	33,954	53,238	57,577	52,765	1,616	
<b>Profitability</b>	5.0%	-27,000																	
Profit at sale	15,000																		
Operator ROE =	13.9%	-12,000	0	0	0	0	0	0	0	0	43,980								
(for 10 years)																			
Equity owner	15.5%	-40,500	12,663	13,094	13,539	-9,389	-408	13,054	13,687	-10,559	14,171	-12,758	19,731	-4,498	20,249	20,937	6,049	-3,045	-110,954
(for 20 years)																			
Cumu. Cashflow		12,663	25,757	39,295	29,906	29,498	42,552	56,239	45,680	59,851	47,093	66,824	62,325	82,574	103,511	109,560	106,515	63,038	
<b>Balance Sheets</b>																			
Loan	13,500	13,500	13,500	13,500	13,500	13,500	10,800	8,100	5,400	2,700	0	0	0	0	0	0	0	0	0
User's contribution	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500	13,500
Additional equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	27,000	0	0	0	0	0	0	0	0
Retained earnings	0	-2,007	-3,583	-4,715	-3,874	-3,352	-2,268	-531	1,820	4,021	-10,087	-6,522	-2,336	1,644	6,238	11,522	16,945	42,116	
Subsidy	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	
Liabilities & Equity	135,000	132,993	131,417	130,285	131,126	131,648	130,032	129,049	128,720	128,221	84,413	87,978	92,164	96,144	100,758	106,027	111,445	136,616	
Cash	0	12,663	25,757	39,295	29,906	29,498	42,552	56,239	45,680	59,851	3,113	21,348	15,304	33,954	53,238	57,577	52,765	1,616	
Assets	135,000	120,330	105,660	90,990	101,220	102,150	87,480	72,810	83,040	68,370	81,300	66,630	76,860	62,190	47,520	48,450	58,680	135,000	
Assets	135,000	132,993	131,417	130,285	131,126	131,648	130,032	129,049	128,720	128,221	84,413	87,978	92,164	96,144	100,758	106,027	111,445	136,616	

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**Chart B-6 (4) Proposed Business Model: Financial Model (Subsidy 60%)**

Cashflow Stream & Cash Position (In case of liquidation)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021	
Cashflow	12,663	13,094	13,539	-9,389	-408	13,054	13,687	-10,559	14,171	-56,738	18,235	-6,045	18,650	19,284	4,340	-4,813	-112,974	
Cumu. Cashflow	12,663	25,757	39,295	29,906	29,498	42,552	56,239	45,680	59,851	3,113	21,348	15,304	33,954	53,238	57,577	52,765	1,616	



## **CHAPTER 5 RECOMMENDATIONS TO ASER FOR PROMOTING PUBLIC-PRIVATE INITIATIVE RURAL ELECTRIFICATION**

The institutional capacity building could be constructed, not through discussion and document writing, but through producing the outputs and direct contacts with the beneficiaries. In case of ASER, at this moment, the staff should produce appropriate range of tariff for "fee for service" to be adopted for the financial proposal by working on the proposed Business Model and after that have contact with as many rural community as possible at the field. Through such process of tariff setting, the institutional capacity will be built up and the reliable relationship will be hopefully created among the private sector.

Concerning "tariff setting", ASER as an executing agency for the rural electrification under the public-private sector initiative, should be allowed to exercise a proper discretion. In addition, taking the opportunity of continuous monitoring in Mar Island, ASER should be positively involved in the local capacity building (community empowerment) and be accustomed to take proper and flexible actions in cope with variable socio-economic situation of the local community by area. The final decision on tariff setting will be subject to the approval of Electricity Sector Regulation Commission (CRSE). Therefore, CRSE is also advised to be involved in this critically important subject from the outset.

In this context, it should be reminded that there is no better way to create partnerships and collaboration and lay the foundation for long-term success than through participatory development, that is the process that involves local people in determining needs, setting priorities, and planning for the future.

ASER is now tackling a challenging and urgent task for the market arrangement for public-private initiative rural electrification. To facilitate the task, among others, the first priority should be placed on the following three (3) items. The execution shall be carried out in the order of number through communication and dialogue among the parties concerned.

### **(1) Regular Dialogue with the Private Sector**

“The private sector needs to be recognized as a critical partner in rural development, if we hope to accelerate the pace at which rural people can obtain access to energy services.”

More dialogue will be required at this moment to be held in order to make more practicable the Financial Model proposed in the previous section, which fund source for subsidy and loan shall be clarified to the private sector.

### **(2) Global Campaign for Rural Electrification**

Few renewable energy equipment and service suppliers are aware of the tremendous potential of millions of customers who have little contact with the formal market economy. Communities, NGOs and local entrepreneurs can aggregate this demand to attract suppliers of much-needed services.

It should be noted that access to market has become easier by implementing lighting-oriented electrification in Mar Island, because the communication pipe has been established, connecting the rural community to the private business entity located in Dakar. This fact indicates that continuous reliable relationship already established will be pre-requisite in contributing to further economic development, but depending on population's desire and needs for development and business interests of the private sector. In construction of financial model, such future business opportunities should be well taken into consideration, in relation to the profitability of the operator. That is why more dialogue between ASER and the private sector will be required at this moment. The global campaign should be carried out after mutual understanding between ASER and the private sector.

### **(3) Early Execution of a Real Project under the initiative of ASER**

Conventional rural electrification programs are often mired in stagnant institutional model, which ignores the individual and social behavioural patterns of the rural population. In this respect, the continuous monitoring in Mar Island will be useful in learning such social behavioural patterns through direct contact with the rural population, the results of which will be hopefully fed back to the socio-economic survey for other projects. The survey should be made from the standpoint of the rural population, in other term, the demand-side approach. Through this kind of process,

particularly in the present initial stage, all the staff of ASER will be advised to have common viewpoints, paying due attention to the awareness of the rural population. Through the implementation, the financial model should be modified

### **Continuous Monitoring of JICA Pilot Project**

When the study is completed, the monitoring activity of the JICA pilot project will be transferred to ASER. The budget for monitoring should also be arranged by ASER. The result of monitoring should be reflected not only on the O & M of PV electrification, but also on the progress of rural development and the pilot project in Mar Island. In particular, it should be recognized that the community empowerment is one of the most important aspects in this process.



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