第 4 章　PV 地方電化実施手法（Business Model）案と今後の課題
－PV 地方電化市場整備に向けて－

ここで提案する Business Model は、事業実施体制（Project Formation）と財務モデル（Financial Model）で構成される。前者の事業実施体制での主要関係者（ASER, Operator, VUA & 村落住民）の役割と責務が全うされた結果が、後者の財務モデルに反映される。したがって、各関係者のパフォーマンスが良好であれば、キャッシュフローが改善されることになり、初期の財務モデルも修正され、結果的に、Tariff の見直し、低減が可能になる。当然、逆の事態に直面し、Tariff の上昇もありうることになる。すなわち、事業関係者のパフォーマンスの良否によって、財務モデルが柔軟に修正可能なように作成されている。特に、外部的影響を受けるシステム機器（バッテリー等）の更新費も、その時点での実勢価格を財務モデルに適宜反映し、2 年後ごとの料金見直し（契約条項による）を実施することになる。このような透明性のある事業運営と資金管理を基本とした考え方を関係者が共有することによって、Sustainable な運営維持管理が可能となる。

Business Model によって採用された「サービスへの対価」は、コストの回収までにより長い時間を要し、商業的なリスクも大きい。したがって、ここで提案する Business Model は、前章で説明した Business Model を踏まえ、中心的プレーヤーである民間セクター及び村落コミュニティーの視点、すなわち、PV 地方電化市場整備により軸足を置いたものとなっている。プロジェクト開始から最初の 10 年間のパフォーマンスがよく、またこれを ASER や VUA が評価すれば、資金の回収率もよくなり、オペレータは約 10 年で初期投資を回収することが可能と想定している。このように、10 年のうちに運営管理体制の目処がたてば、将来的には、村落コミュニティーがこのシステムを独自に運営・管理していくことも可能になるであろう。しかし、このような状況を作り出すためには、オペレータと VUA 間の信頼関係をまずは確立しなければならない。

関係実施機関（Supplier/Operator、ASER/MMEH/JICA、VUA）間の信頼関係が現在のパイロット・プロジェクトの成否と大いに関係あることは明らかであり、この実績はパイロット・プロジェクトの何よりも大きな成果であった。第一の教訓は、まさにこの信頼関係の構築にあった。ここで提案する Business Model の有効性は、この教訓の良好な信頼関係なしにはあり得ないことを関係者は充分認識すべきである。

以下、事業実施体制（Project Formation）、そして財務モデル（Financial Model）構築にあたっての基本的考え方を記述する。

事業実施体制（Project Formation）の基本的前提条件　（Annex B 参照）

1. コンセッション期間：20 年間
2. 最初の 10 年間 (Stage 1)：民間事業会社が、運営維持管理及び資金管理等を、全責任をもって実施する。同時に、村落住民に対し、PV 機器の使用方法を徹底的に教育し（*1）、かつ、Local Technician が External Technician 程度の技術を身に付けるための訓練（ダカールの訓練施設で、教育訓練を受講させ、将来的には、民間事業会社がその人間を他のプロジェクトの External Technician として使えるように育成する）を行なう。また、後半の 10 年間の日常保守作業に対し、新たな Local Technician を育成する。
3. 後半の 10 年間　(Stage 2)：民間事業会社と VUA との間の"機器更新と修理契約"を、ASER 承認の下で締結する。同時に、資金管理は、民間事業会社から VUA に移管される。当然、地域コミュニティー主導の運営維持管理体制への移行は、前半 10 年間の民間事業会社と VUA との間の良好なパートナーシップの形成が前提条件である。

（*1）

ユーザーの事業参加意識と経費削減

PV 事業を成功させるにはユーザーへの教育が必須である。特に、システムへの一義的な責任を持つ各世帯へはシステムの安全・管理に関する簡単な情報普及とトレーニングを行なう必要がある。システムの良好な運営とは、経常費用を最小限に食い止めて、バッテリーの寿命を伸ばすことであるということを 1 人 1 人のユーザーが認識できるようになることである。

財務モデル（Financial Model）

財務モデル構築のための主要な前提条件は、以下の通りである。

- 諸税金の免除措置（輸入税※、付加価値税、法人税の免除等）
  （※財務モデルでのユニット・コストには輸入税込みである。）
- 補助金と融資・保証等の資金源の確保
- 主要関係者の役割と責務の遂行（以下のマトリックス）

	ASER	民間事業会社	村落組織（VUA）
ASER	—	—	適宜モニタリング
民間事業会社	透明な会計報告	—	良質なサービス提供
村落組織（VUA）	—	料金支払	—

これらの単純なことが、継続的に実行に移されるためには、事業実施前（サービスの内容、Tariff、支払期間等の説明）段階及び事業実施（PV 機器据付期間）段階での関係三者間の信頼関係の醸成が何よりも重要であることを銘記する必要がある。

“事業実施体制”との関係で、以下の条件と表 4.1 Pre-Conditions for Financial Model を踏まえ、財務モデルが構築されている。

提案 Project Formation

	最初の 10 年間	後半の 10 年間	20 年目以降
コンセッション	民間事業会社	民間事業会社	民間事業会社
所有権	民間事業会社	VUA (ASER)	VUA (ASER)
資金管理	民間事業会社	VUA	VUA
O&M	民間事業会社	VUA	VUA
機器更新と修理	—	民間事業会社*1	民間事業会社*1

コンセッション：事業権益
所有権：PV システム機器
*1：民間事業会社と VUA との契約

財務分析結果

財務分析結果は、表 4.1 財務分析結果 及び表 4.3 Sensitivity Analysis に示す通りである。この結果からも判るように、村落住民のエネルギー支出、支払能力等を踏まえ、Fee for Service の支払月額は、5,000 CFA/月から 6,500 CFA/月の範囲が想定される。ただし、この試算には、今後、確認すべき多くのパラメーターがあり、後述するように、ASER 主導で民間セクターとの対話が求められる。

表 4.1　財務分析結果

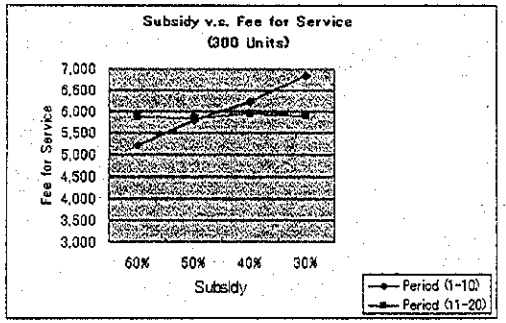
Summary Results

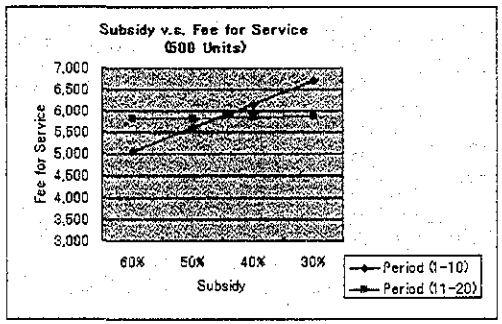
Assumption 1 : 50,000 CFA/system be secured at the time of sale for the operator
Assumption 2 : 5% for equity be secured for 10 years' operation
Assumption 3 : Renewal cost after 20 years' operation be secured.

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

500	Units		ROE	Cash Position
	Period (1-10)	Period (11-20)		after 20 years
60%	5,050	5,808	15.3%	1.1
50%	5,800	5,824	15.3%	1.3
40%	6,150	5,843	17.9%	1.7
30%	6,700	5,863	19.5%	2.1

100	Units		ROE	Cash Position
	Period (1-10)	Period (11-20)		after 20 years
60%	5,600	6,384	15.1%	0.7
50%	6,200	6,524	16.9%	0.7
40%	6,700	6,365	17.6%	0.1
30%	7,300	6,351	20.0%	0.7





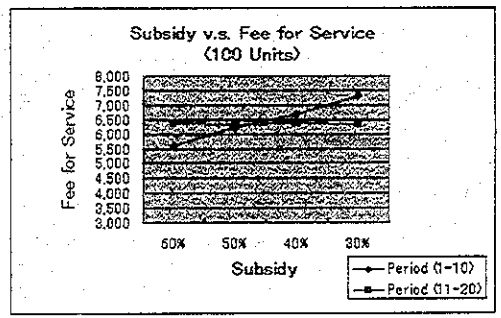


表 4.2 Pre-conditions for Financial Model

Minimum Requirement

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.

Conditions for Financial Model

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

表 4.3 財務分析

Sensitivity Analysis

Initial Cost		**Fee**	
450,000	CFA/system	5,800	CFA/month
400,000	CFA/system	5,500	CFA/month
System Units		**Fee**	
300	Units	5,800	CFA/month
500	Units	5,600	CFA/month
100	Units	6,200	CFA/month
Deposit %		**Fee**	
80%		5,800	CFA/month
60%		5,900	CFA/month
Operator's Equity	**Up to 10 Fee**	**11 to 20 Fee**	
20%	5,800	5,800	CFA/month
30%	5,700	5,871	CFA/month
Operator Profit %			
5%	5,800	CFA/month	
3%	5,690	CFA/month	
Fee Collection Rate in %			
100%	5,800	CFA/month	
95%	6,100	CFA/month	
90%	6,450	CFA/month	

Annex B

提案 Business Model

Project Formation (Stage 1) B-1

Project Formation (Stage 2) B-2

Summary of Financial Analysis B-3

Financial Model (Standard: Subsidy 50%) B-4

Financial Model (Case: Subsidy 30%) B-5

Financial Model (Case: Subsidy 45%) B-6

Financial Model (Case: Subsidy 70%) B-7

Chart B-1 Business Model – Project Formation -

ERIL: Electrification Rural d'Initiative Local

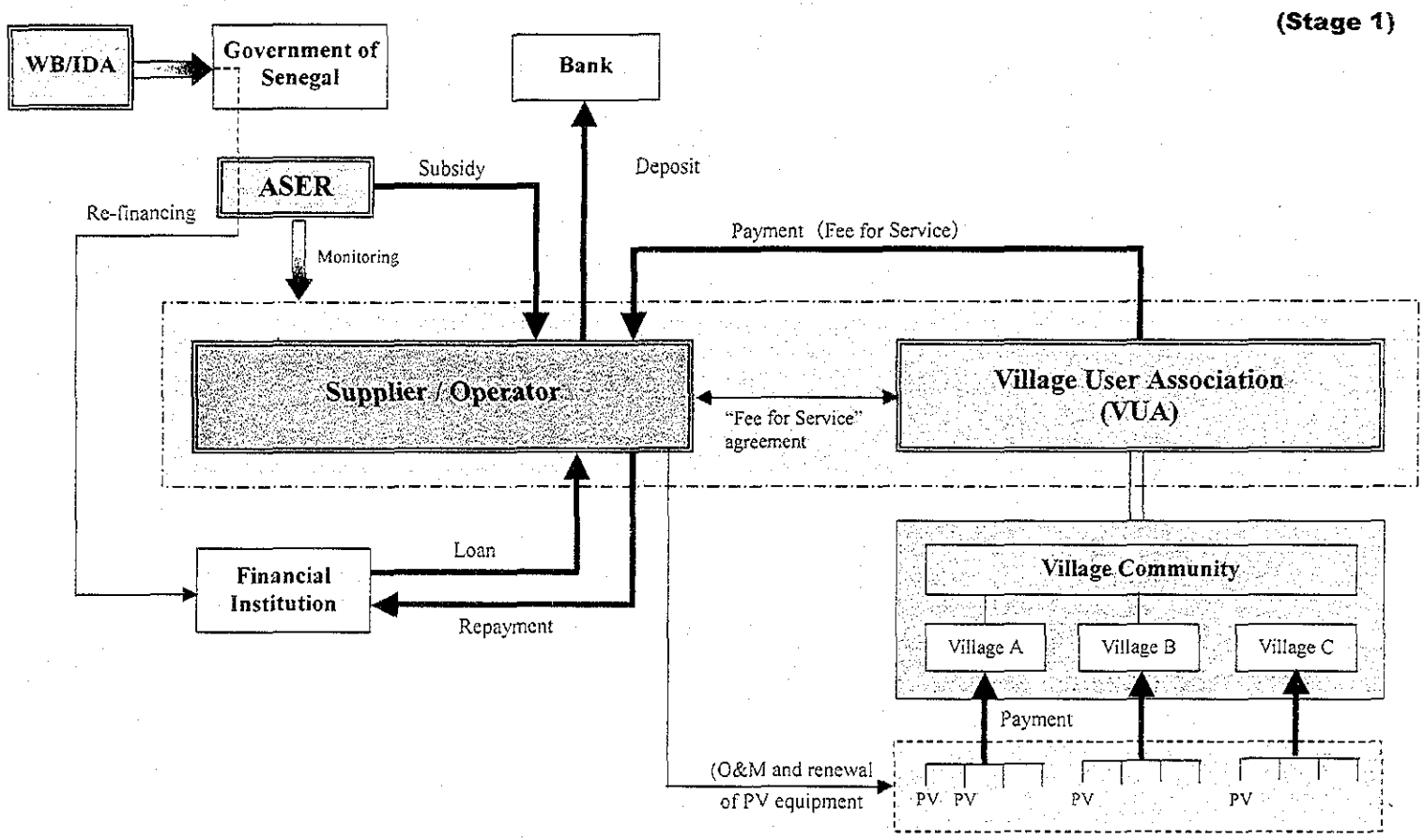


Chart B-2 Business Model – Project Formation -

ERIL: Electrification Rural d'Initiative Local

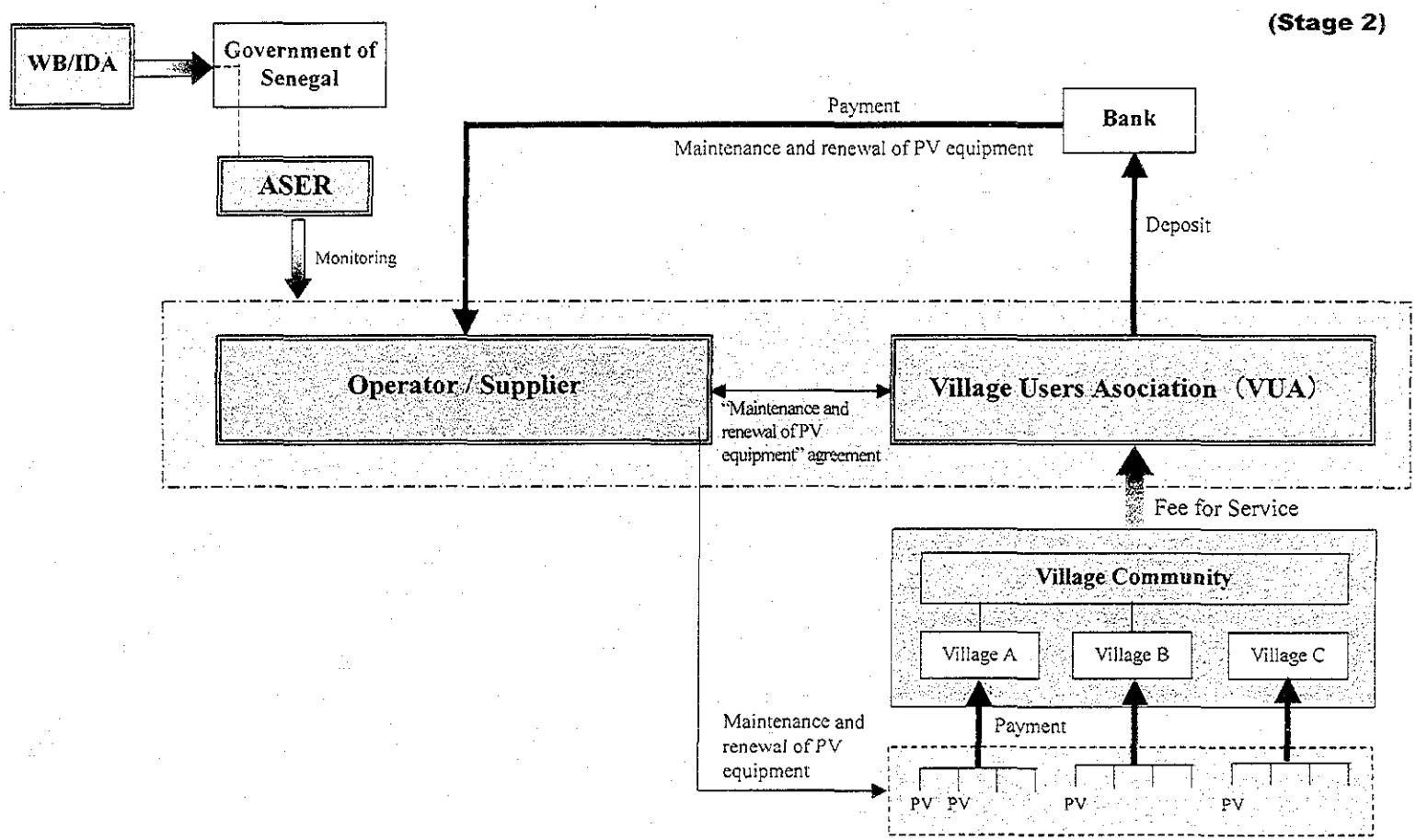


Chart B-3 Summary of Financial Analysis

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

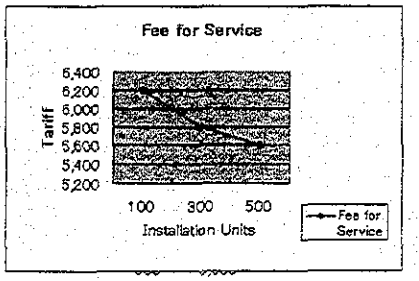
Fee for Service

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

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

300 Units	Period (1-10)	Period (11-20)	ROE	Cash Position after 20 years
60%	5,200	5,876	15.5%	1.6
50%	5,800	5,858	17.7%	4.8
40%	6,250	5,938	17.4%	0.1
30%	6,850	5,891	19.6%	0.5

500 Units	Period (1-10)	Period (11-20)	ROE	Cash Position after 20 years
60%	5,050	5,808	15.3%	1.1
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100 Units	Period (1-10)	Period (11-20)	ROE	Cash Position after 20 years
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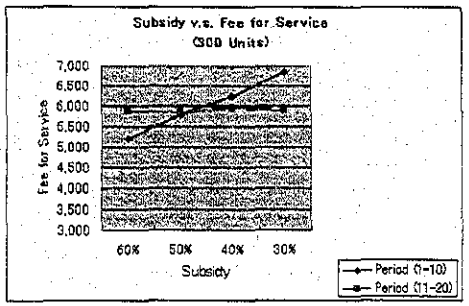
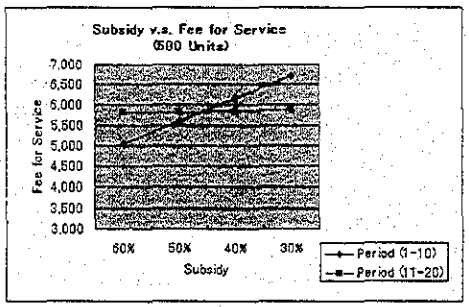
40%	6,700	6,365	17.6%	0.1
30%	7,300	6,351	20.0%	0.7





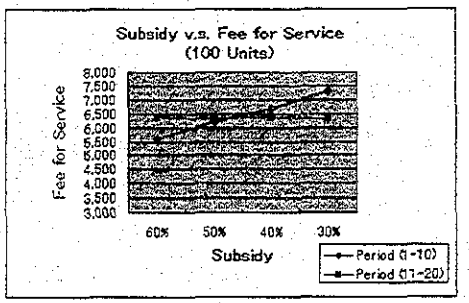


Chart B-4 (1) Proposed Business Model: Financial Model (Standard: Subsidy 50%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

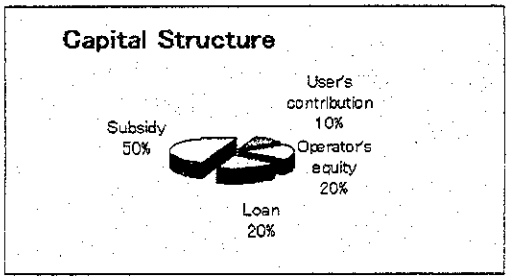
Pre-Conditions

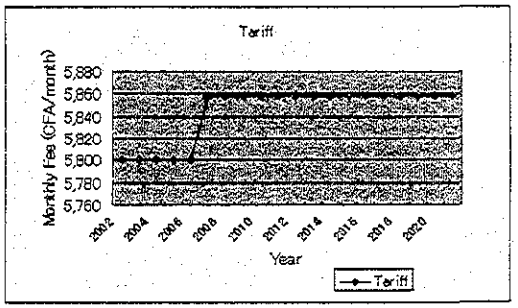
1 System Unit Cost (55 Wp) **450** (1,000 FCFA)

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	20%	27,000	
Interest	7.0%		
Repayment	5,400	x 1,000 CFA/year	
Grace period	5 years		
Repayment period	10 years		





94,500 Amount (= Subsidy + Loan)

Subsidy 50% 67,500 **ROE =** **13.9%** over a period of 10 years for the operator's profitability 15,000 Profit at sales

4 Others **ROE =** 17.7% over a period of 20 years for the operator's profitability without liquidation

Depreciation method A straight-line method

Income tax rate 0%

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

Tariff setting after 10 years

Increase in tariff after 10 years

5 **Tariff**

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

OK **5,800** FCFA/Unit/month For the monthly payment

741,000 (Total amount of user's payment for 10 years)

5,924	Minimum Accu. Cashflow
5,924	Cash Position after 10 years
-43,980	For equity liquidation

4,787	Minimum Acc. Cashflow
4,787	Cash Position after 20 year

after reduction of the replacement cost 139.8

6 No. of Subscribers

300 Units

,where the amount required for replacement be secured, say, **135.0** Million CFA

18,177 to secure the cash position on the plus side over a period of 20 years

7 Depreciation (US$ = 650 FCFA)

												1	1	1	1	1	1	1
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 (Standard: Subsidy 50%)

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		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
Gross Profit	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
Net Profit	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
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
Accumulated Profit	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

Debt Financing	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							

	Cash-Flow Stream	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
plus	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	24,900	0	0	15,600	24,900	135,000

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

				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
Net Cashflow	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	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	-6,912	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%			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	-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
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	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
at the beg. of the year 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								Liquidation of the operator's equity =		-43,980								
Profit at sale	15,000								Cash outstandings after the liquidation =		5,924		-16,980						
Operator ROE = 13.9%	-12,000	0	0	0	0	0	0	0	0	0	43,980								
(for 10 years)																			
Equity owner 17.7%	-40,500	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	6,084	-3,009	-110,912
(for 20 years) 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	16,200	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	9,394	13,722	18,043	6,224	9,820	14,037	18,050	22,698	28,003	33,457	58,787
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-4 (4) Proposed Business Model: Financial Model (Standard: Subsidy 50%)

Cashflow Stream & Cash Position	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(In case of liquidation)	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	4,375	-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

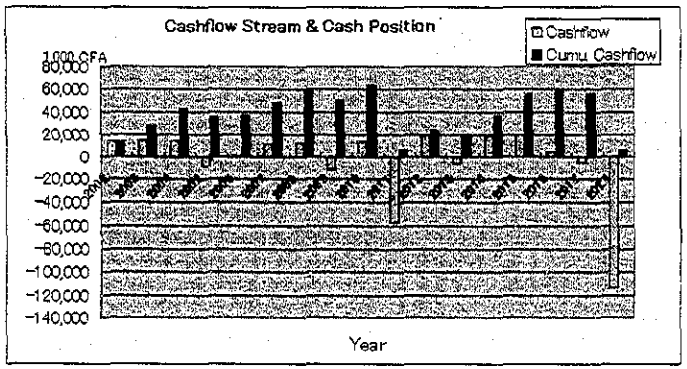


Chart B-4 (5) Proposed Business Model: Operation & Maintenance Cost Stream

1 Renewal of Equipment	1.1	Replacement cost of PV system components	
	1.2	Reasonable life term of the various PV system components	
L.P. 2 Management Cost of Equipment	2.1	User management fee (community empowerment)	
	2.2	Cost for invoicing and fee collection	
	2.3	Profit of the Operator	
3 Maintenance Cost of Equipment	3.1	Salary of the local technician	
	3.2	Salary of the external technician	
	3.3	Possible employee cost	
	3.4	Cost of spare parts	

O	Replacement Cost	1.1 & 1.2	Price (CFA)	Life	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2020	2021	Total
	PV Module (Wp)		180,000	20																	180,000	180,000
	Charge controller (A)		40,000	10										40,000							40,000	80,000
	Battery (Ah)		83,000	4				83,000				83,000				83,000					83,000	415,000
	Lamps		52,000	5					52,000					52,000					52,000		52,000	208,000
	Renewal (1.1 + 1.2)				0	0	0	83,000	52,000	0	0	83,000	0	92,000	0	83,000	0	0	52,000	0	355,000	883,000
No. of installed system	300	Total	(x1,000 CFA)		0	0	0	24,900	15,600	0	0	24,900	0	27,600	0	24,900	0	0	15,600	0	106,500	264,900
														1	for calculation purpose					1	for calculation purpose	
														27,600						106,500		

Monthly Expenses for O & M

300	Installation Units		
This Plan	100	300	500
Local Technician	1.0	2.0	3.0
External Technician	1.0	2.0	2.5

Installation Units = 300		
1 to 3 years	3 to 5 years	5 to 10 years
3.0	2.0	2.0
2.0	1.5	1.0

														1	1	1	1	1	1	1		
					0	1	2	2	4	5	6	7	8	9	10	11	12	13	14	15	19	20
					2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2019	2020	2021
X	2.1	Local Technician	40,000	CFA/month		1,440	1,440	1,440	960	960	960	960	960	960	960	960	960	960	960	960	960	960
Y	2.2	External Technician	80,000	CFA/month		1,920	1,920	1,920	1,440	1,440	960	960	960	960	960	960	960	960	960	960	960	960
Z	2.3	Transportation	25,000	CFA/month		900	900	900	600	600	600	600	600	600	600	600	600	600	600	600	600	600
20%	of (X+Y+Z) equal to (2.3 + 3.3 = 3.) Miscellaneous		29,000	CFA/month		852	852	852	600	600	504	504	504	504	504	504	504	504	504	504	504	504
% could be determined at the discretion of the operator				Total (CFA/month)		426	426	426	300	300	252	252	252	252	252	252	252	252	252	252	252	252
	Initial Investment Cost (1,000 CFA)			1,000 CFA/year		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
	135,000		% of the initial investment cost		3.8%	3.8%	3.8%	3.8%	2.7%	2.7%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
			Cost/system/month (CFA)			1,420	1,420	1,420	1,000	1,000	840	840	840	840	840	840	840	840	840	840	840	840

Community Empowerment Cost
0% of Users' Contribution

The cost for 2.1 is planned to be taken care of by ASER

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2019	2020	2021
Local Technician	0	1,440	1,440	1,440	960	960	960	960	960	960	960	960	960	960	960	960	960	960
External Technician	0	1,920	1,920	1,920	1,440	1,440	960	960	960	960	960	960	960	960	960	960	960	960
Transportation	0	900	900	900	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Miscellaneous	0	852	852	852	600	600	504	504	504	504	504	504	504	504	504	504	504	504

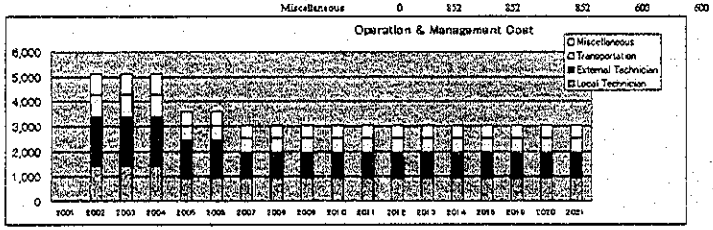


Chart B-5 (1) Proposed Business Model: Financial Model (Subsidy 30%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

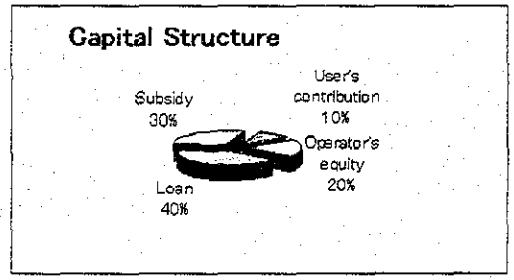
Pre-Conditions

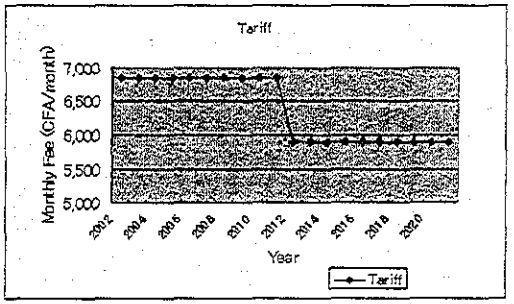
1 System Unit Cost (55 Wp) **450** (1,000 FCFA)

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	40%	54,000	
Interest	7.0%		
Repayment	10,800	x 1,000 CFA/year	
Grace period	5 years		
Repayment period	10 years		





94,500 Amount (= Subsidy + Loan)

Subsidy 30% 40,500 ROE = **13.9%** over a period of 10 years for the operator's profitability 15,000 Profit at sales

4 Others 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

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

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

OK **6,850** FCFA/Unit/month For the monthly payment

867,000 (Total amount of user's payment for 10 years)

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

535	Minimum Acc. Cashflow
535	Cash Position after 20 year

6 No. of Subscribers

300 Units

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)

											1	1	1	1	1	1	1
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 30%)

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		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
Gross Profit	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	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
Net Profit	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
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
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	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
plus	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-5 (3) Proposed Business Model: Financial Model (Subsidy 30%)

Net Cashflow	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	0	15,768	15,768	15,768	-7,620	1,680	7,056	7,812	-16,332	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%		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
% of the outstanding amount 80%			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	-27,000	15,768	15,768	15,768	-7,620	1,680	7,056	7,812	-16,332	9,324	-61,500	18,184	-6,716	18,184	18,184	2,584	-6,716	-116,816
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	536	1,090	1,664	1,461	1,568	1,861	2,190	1,709	2,084	64	685	480	1,114	1,770	1,918	3,859
at the beg. of the year Real Cash-Flow	-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
53%		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

Profitability																			
	5.0%	-27,000							Liquidation of the operator's equity =			-43,980							
	Profit at sale	15,000							Cash outstndings after the liquidation =			1,888		-16,980					
Operator ROE =	13.9%	-12,000	0	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)	Cumu. Cashflow		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	105,370	61,977

Balance Sheets	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
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	0	0	0	0	0	0	0	0
Retained earnings	0	1,098	2,732	4,921	9,194	13,265	18,019	23,822	30,710	37,874	29,188	32,766	36,964	40,957	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
Liabilities & Equity	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
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	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-5 (4) Proposed Business Model: Financial Model (Subsidy 30%)

Cashflow Stream & Cash Position		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(In case of liquidation)		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	8,624	9,673	-14,142	11,033	-59,416	18,248	-6,032	18,663	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

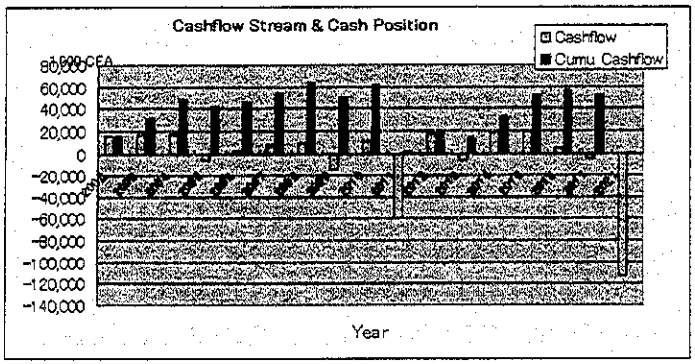


Chart B-6 (1) Proposed Business Model: Financial Model (Subsidy 45%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

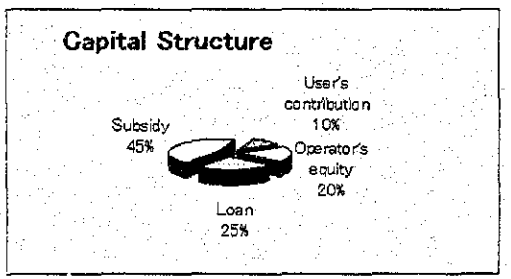
Pre-Conditions

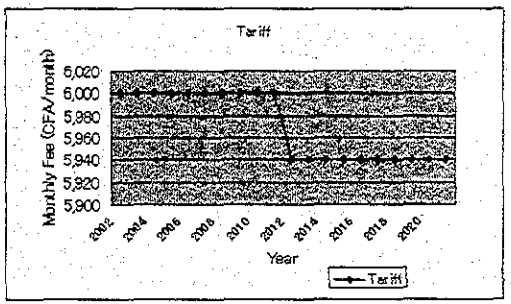
1 System Unit Cost (55 Wp) 450 (1,000 FCFA)

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		





94,500 Amount (= Subsidy + Loan)

Subsidy 45% 60,750 ROE = 13.9% over a period of 10 years for the operator's profitability 15,000 Profit at sales

4 Others 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

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

Tariff setting after 10 years

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

OK 6,000 FCFA/Unit/month For the monthly payment

765,000 (Total amount of user's payment for 10 years)

1,449	Minimum Accu. Cashflow	1,983	Minimum Acc. Cashflow
1,449	Cash Position after 10 years	1,983	Cash Position after 20 year
-43,980	For equity liquidation	13,994	to secure the cash position on the plus side over a period of 20 years

6 No. of Subscribers

300 Units

,where the amount required for replacement be secured, say, 135.0 Million CFA after reduction of the replacement cost 137.0

7 Depreciation (US$ = 650 FCFA)

											1	1	1	1	1	1	1	1
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-6 (2) Proposed Business Model: Financial Model (Subsidy 45%)

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		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
Gross Profit	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
Net Profit	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
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
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

Debt Financing	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							
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							

	Cash-Flow Stream	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
plus	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-6 (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	1,778	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								Liquidation of the operator's equity =	-43,980								
	Profit at sale	15,000								Cash outstandings after the liquidation =	1,449		-16,980						
Operator ROE =	13.9%	-12,000	0	0	0	0	0	0	0	0	0	43,980							
(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	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	-545	-609	-176	2,281	4,475	7,288	10,938	15,453	20,018	8,499	12,239	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	86,489	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-6 (4) Proposed Business Model: Financial Model (Subsidy 45%)

Cashflow Stream & Cash Position	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(In case of liquidation)	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

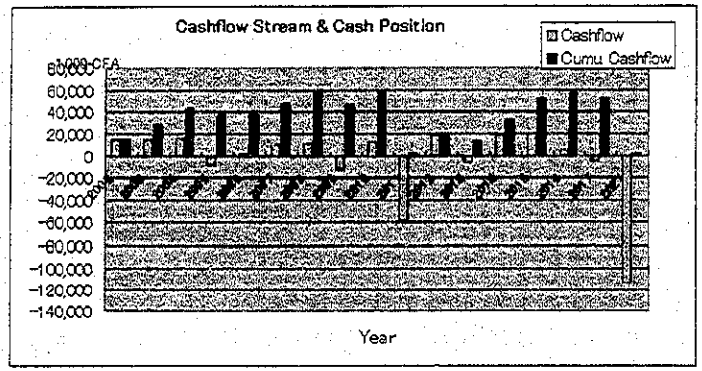


Chart B-7 (1) Proposed Business Model: Financial Model (Subsidy 60%)

1 **Financial Model for PV Rural Electrification**

1 English, 0 French (In case of liquidation)

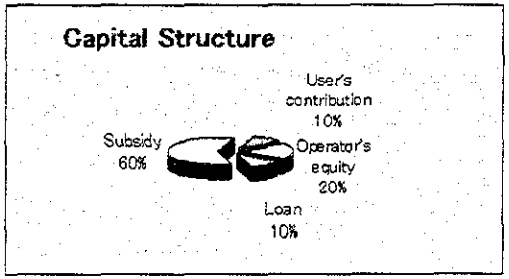
Pre-Conditions

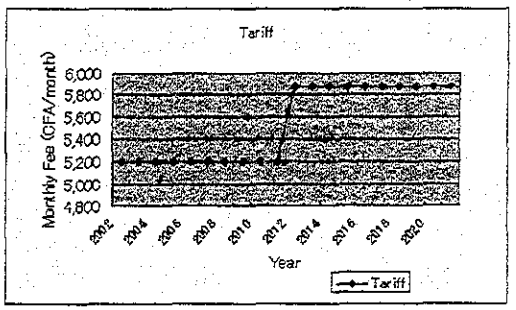
1 System Unit Cost (55 Wp) **450** (1,000 FCFA)

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	10%	13,500	
Interest	7.0%		
Repayment	2,700	x 1,000 CFA/year	
Grace period	5 years		
Repayment period	10 years		





94,500 Amount (= Subsidy + Loan)

Subsidy 60% 81,000 **ROE =** **13.9%** over a period of 10 years for the operator's profitability 15,000 Profit at sales

4 Others **ROE =** 15.5% 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**

up to 2006	up to 2011	after 2012
0%	0%	13%
5,200	5,200	5,876

Tariff setting after 10 years

← Increase in tariff after 10 years

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

OK **5,200** FCFA/Unit/month For the monthly payment

669,000 (Total amount of user's payment for 10 years)

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

6 No. of Subscribers

300 Units

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)

												1	1	1	1	1	1	1
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-7 (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
Gross Profit	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
Net Profit	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
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
Accumulated Profit	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
plus	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	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										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-7 (3) Proposed Business Model: Financial Model (Subsidy 60%)

Net Cashflow	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	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%			2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	-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
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	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
at the beg. of the year 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

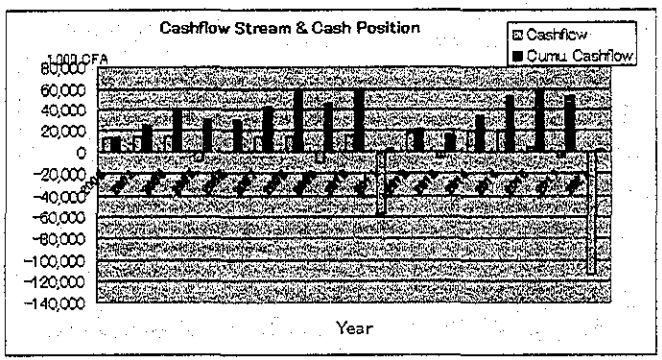
Profitability		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
	5.0%	-27,000																	
	Profit at sale	15,000																	
Operator	ROE = 13.9%	-12,000	0	0	0	0	0	0	0	0	0	43,980							
(for 10 years)																			
Equity owner	15.5%	-40,500	12,663	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	63,058

Liquidation of the operator's equity = -43,980
Cash outstandings after the liquidation = 3,113 -16,980

Balance Sheets	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2021
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
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	-2,007	-3,583	-4,715	-3,874	-3,352	-2,268	-551	1,820	4,021	-10,087	-6,522	-2,336	1,644	6,258	11,527	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

Chart B-7 (4) Proposed Business Model: Financial Model (Subsidy 60%)

Cashflow Stream & Cash Position	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(In case of liquidation)	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



第5章　官・民主導による地方電化実施にあたってのASERへの提言

実施機関の組織能力強化は、単に、議論と書類作成を通してでなく、実地作業でのアウトプット（数値化）と便益者との直接対話を通して、培われるものである。この時期、地方電化庁（ASER）の場合は、ここで提案したBusiness Modelを充分検討し、財務モデルで採用した"Fee for Service"に対する料金設定の適正な範囲を、まず自ら算定する必要がある。その後、現場に出て、できるだけ多くの村落コミュニティーとの直接対話を持つ必要がある。この料金設定のプロセスを通し、実施機関の組織能力が強化され、そして関係民間セクターとの間に信頼関係も醸成されることが期待できる。

特に、料金設定に関して言えば、官・民主導の地方電化を推進する実施機関として、地方電化庁は適正な裁量権を行使できる権限を付与される必要がある。さらに、JICA のマール島でのパイロット・プロジェクトの継続的モニタリングの機会を利用して、村落の組織能力強化にも積極的に関与し、地域によって異なる村落社会のさまざまな経済社会状況に応じ、適切かつ柔軟な対応を取ることにも慣れるべきである。料金設定の最終決定は、電力規制委員会の承認が必要である故、電力規制委員会も、この重要な料金設定の問題には、当初から関与することが望まれる。

この意味から、パートナーシップと協調関係を創出し、そして、長期的な成功を目指すための布石を築くためには、"参加型開発"（開発ニーズの決定、優先順位の設定、将来計画の策定に住民を参加させるプロセス）に比し、勝るものはないということを銘記すべきである。

民間主導の地方電化計画を実施に移すにあたり、民間主導の地方電化市場を早急に整備することが、今、何より重要であり、また、求められている。数ある短期、中期、長期的提言の中で、以下の3目は、まず優先されるべきだと考える。この3目のうち、項目1.及び2.は、早急に対処すべきであるが、まず、項目1．については、ASERが主導的に実施する必要がある。その結果も踏まえ、項目3.を早期に実施するべきである。

(1)　潜在オペレーターと定期的対話の機会

"村落住民のため、電気を含むエネルギーへのアクセスを促進することを期待するのであれば、民間セクターは村落開発において必須のパートナーと認識する必要がある。"

潜在オペレーターと想定される企業（PV サプライヤー、電力関連事業会社、開発コンサルタント、NGO s 等）に対し、補助金及び融資保証等の資金源確保の裏づけを明確にし、かつ、前述した"Financial Model"を叩き台に、現実的な議論と対話を通し、相互の信頼関係を構築する必要がある。

(2) ASER の地方電化実施推進のキャンペーン

"再生エネルギー機器やサービス提供関連企業は、現状の市場経済とのコンタクトがほぼ遮断されている潜在的顧客が非常に多く存在するという現実を認識している。一方、村落社会、NGOs そして地方の企業家は、これらの需要を集合させ、必要とされているサービスを提供する事業体に関心を持たせることが可能である。"

電気へのアクセスが、マール島での電灯中心の電化によって、より容易になったことは特筆すべきである。すなわち、村落社会と首都ダカールの民間事業会社との間に、意志疎通のパイプが築かれたことになった。このことは、すでに構築された信頼関係の継続によって、更なる経済発展に寄与することが期待される。この経済発展も、当然ながら、村落住民の熱意と必要性と民間セクターのビジネス活動に大いに依存する。

この現象は重要で、事業実施での立上、そして軌道に乗せる（on track）までの期間おいて、ダカールの民間事業会社が関与することの重要性を示唆している。したがって、事業実施体制（Project Formation）も、最初の 10 年間は、民間事業会社主導で、その後は地域コミュニティー主導の体制が、将来の村落開発を目指す以上、ベターであろう。それぞれの期間は、柔軟に対応できるように、ASER 及び CRSE がモニタリングする責務がある。

(3) ASER's Procedure Manual に沿ったパイロット事業の早期実施

従来の村落電化計画は、村落住民の個人的かつ社会的行動様式を無視した組織体制のため、しばしば苦境に立つことが見られることになっている。この点からも、マール島での継続的モニタリングは、上記の社会的行動様式を認識するにあたり、有用となろう。事業の実施においては、ASER の裁量権を認め、ASER 主導でパイロット事業を早期に実施することが望まれる。このパイロット事業の実施プロセスを通じ、事業関係者間で共有すべき枠組みを ASER が率先し構築することが、地方電化（ここでは、PV を対象）市場整備の最重要課題であろう。

以上の 3 項目に、以下の項目を追加し、項目 3．を補完していくことが必要となる。

<u>JICA パイロット・プロジェクトの継続的モニタリング</u>

JICA パイロット・プロジェクトのその後のモニタリングを、ASER が主導的に行ない、そのための必要な予算を確保する。このモニタリングは、PV システムの運営管理のみならず、その後のマール島での（民間主導による）村落開発の進展の動向にも着目し、そのプロセスを ASER パイロット事業と今後の地方電化にも反映させる。特に、村落組織強化（Community Empowerment）は、この進展のプロセスで留意すべき重要事項の一つと認識すべきである。

JICA