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# BHUTAN POWER CORPORATION LIMITED

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## FIVE YEAR INVESTMENT PLAN (2009 – 2013)

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## EXECUTIVE SUMMARY

The programs to be implemented by the Bhutan Power Corporation Limited (BPC) in the next five years, as outlined in this document, is generally in line with the plans and programs of the Energy sector as set out in the 10 FYP of the RGoB. These activities will mainly be geared towards provision of electricity for socio-economic development of the nation.

The programs to be implemented have been classified into two major areas – Plan works and those that will be outside the Plan (works that will be taken up by BPC on behalf of other agencies primarily the mega hydro power projects of Punatsangchhu-I, Punatsangchhu-II and Mangdechhu).

Under the Plan works, the activities have been categorized into six programs based on the nature of the works. The major program areas will consist of the following –

SL #	Program	Outlay in million Nu
1	Transmission program	3,084.894
2	Distribution program	6,964.204
3	System operation & ICT program	769.630
4	Embedded generation program	1,922.380
5	Rehabilitation/replacement of assets	1,207.251
6	Other infrastructure development program	1,027.595
	<b>TOTAL</b>	<b>14,975.954</b>

The total budget requirement to implement the Plan works is Nu. 14,975.954 million for the next five years (2009-2013). The year wise budget requirement (in million Nu.) is as follows –

	2009	2010	2011	2012	2013	Total
<b>Budget outlay for Plan works (million Nu.)</b>	1,834.046	3,445.596	3,919.159	3,558.167	2,218.986	<b>14,975.954</b>
<b>% of Total</b>	12.25%	23.01%	26.17%	23.76%	14.82%	<b>100.00%</b>

Works amounting to a total of Nu. 12,884.690 million is to be implemented as out of Plan program. The activities to be taken up under this program are as follows –

SL #	Program	Outlay in million Nu
1	Punatsangchhu-I 400 kV double circuit lines	7,759.800
2	Mangdechhu 400 kV double circuit lines	3,066.969
3	Punatsangchhu-II 400 kV double circuit lines	1,200.921
4	ICT 400/220 kV, 200 MVA at Lhamoyzingkha	722.500
5	ICT 400/220 kV, 200 MVA at Jigmeling	134.500
	<b>TOTAL</b>	<b>12,884.690</b>

Although the total cost for the above activities is Nu. 19,085.580 million, only Nu. 12,884.690 million worth of works or 67.51% of the total outlay will be done during the next five years with the balance works spilling over to the 11 FYP.

The year wise budget requirement (in million Nu.) is as follows –

	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
<b>Budget outlay for out of Plan works (million Nu.)</b>	31.071	1,551.960	2,405.538	3,403.616	5,492.505	<b>12,884.690</b>
<b>% of Total</b>	0.24%	12.04%	18.67%	26.42%	42.63%	<b>100.00%</b>

Accordingly, BPC will be implementing works worth Nu. 27,860.644 million (Plan as well as out of Plan) during the next five years.

The status of funds with regard to the plans to be implemented in the next five years is as follows –

<b>Program</b>	<b>To be funded by RGoB/DHI</b>	<b>To be funded by BPC</b>	<b>Total</b>
<b>Plan works (million Nu.)</b>	6,093.494	8,882.460	<b>14,975.954</b>
<b>Out of Plan works (million Nu.)</b>	12,884.690	0.000	<b>12,884.69</b>
<b>TOTAL</b>	<b>18,978.184</b>	<b>8,882.460</b>	<b>27,860.644</b>

**1. Project code**

I/1

**2. Project Name**

East-West transmission link (220 kV double circuit Tsirang-Jigmeling, 132(220) kV double circuit Jigmeling-Gelephu, 220 kV single circuit Dagachhu-Tsirang) and 2x63/80 MVA, 220/132 kV ICT substation with feeder bays at Jigmeling

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

This program will establish the much needed East-West interconnection and is expected to result in stable system operation with reliable power supply to the Eastern/Central regions.

The establishment of the East-West interconnection would necessitate construction of a 220 kV substation at Tsirang, which would then be fed through the 220 kV line from Rurichhu (presently charged at 220 kV). Further, this 220 kV substation would also be interconnected to Dagachhu Hydro power plant at Dagana.

The interconnection between Tsirang and Jigmeling will be through a 28.536 km, double circuit 220 kV transmission line. Jigmeling is selected as the interconnecting substation between the two grids due to the nearness to the planned Gelephu industrial estate (in future) and also the space constraints at Gelephu for establishing the 220 kV substation. The 220 kV double circuit line is envisaged considering the likely requirement of extending a 66 kV line to Sarpang and considering RoW issues in the future.

The 132 kV system of the Eastern grid would be interconnected through a 220/132 kV substation (2x63/80 MVA) and 132 kV transmission line between Jigmeling and Gelephu. The present feed to Gelephu from Tintibi is through a 132 kV line passing through Lodrai, which is 12.1 km from Jigmeling. This line will be LILoed at Jigmeling. Towards this, the present 132 kV line will be isolated (by removing the jumpers) at Lodrai and building a 12.1 km, 132 kV double circuit line between Jigmeling and Lodrai.

The 220/132 kV substation at Jigmeling will consist of (i) 220 kV substation with 4 line bays (for Tsirang, one for Dagana and two spares), two ICT bays (2 x 63/80 MVA, 220/132 kV) and one bus-coupler bay; and (ii) 132 kV substation with four line bays (one for Tintibi, one for Gelephu, one for 132/33 kV transformer and one spare), two ICT bays and one transfer bay.

## 5. Project Cost, Financing Plan and Capital Drawdown Schedule

Start Year	2009
End Year	2012

### i. Project Cost

(All amounts in Million Nu.)

Total project cost:

1,294.214

What is the basis for the project cost?

Management estimate and actual contract value

### ii. Financing Plan:

Cash Reserves (Equity):

428.619

Amount: 865.597  
(without IDC)

Tenure: 10 years

Interest Rate: 10% pa

Moratorium: -

External Loans:

Grants:

-

Other Sources:

-

**Total**

1,294.214

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	100.000	143.997	161.169	23.453	0.000	<b>428.619</b>
Debt	0.000	437.103	382.225	46.267	0.000	<b>865.595</b>
<b>Total Capital Drawdown</b>	<b>100.000</b>	<b>581.100</b>	<b>543.394</b>	<b>69.720</b>	<b>0.000</b>	<b>1,294.214</b>

## 6. Benefits/Returns from the Project

With the construction of this line in conjunction with the 132 kV transmission line from Jigmeling to Gelephu along with the associated interconnecting substation, the Western grid will

be connected to the Eastern grid enhancing the energy security situation for the country. It will also allow a route for evacuation of power for Dagachhu Hydro Power plant and an alternative route for export of power from Kurichhu during the event of transmission line failure of the conventional export route.

This line will also enhance the reliability of the transmission system and enable supply of power to the industries in the Jigmeling Industrial estate from the Western grid during the event of a failure of Kurichhu. It will also be possible to supply power to the Jigmeling industrial estate during winter when Kurichhu will not be able to cater to the power supply requirement.

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 640 million (for 2008 at a discount rate of 10%) and 14.49% respectively.

**1. Project code**

I/2

**2. Project Name**

132 kV LILO substation at Motanga, Samdrup Jongkhar.

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

This program will establish a Loop-In Loop-Out (LILO) arrangement in Motanga, Samdrup Jongkhar.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2010

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

61.000

*What is the basis for the project cost?**Management estimate and actual contract value***ii. Financing Plan:***Cash Reserves (Equity):*

18.931

*Amount:*42.069  
*(without IDC)**Tenure:*

10 years

*External Loans:**Interest Rate:*

10% pa

*Moratorium:*

-

*Grants:*

-

*Other Sources:*  
**Total**

-
<b>61.000</b>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	6.000	12.931	0.000	0.000	0.000	<b>18.931</b>
Debt	0.000	42.069	0.000	0.000	0.000	<b>42.069</b>
<b>Total Capital Drawdown</b>	<b>6.000</b>	<b>55.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>61.000</b>

## 6. Benefits>Returns from the Project

With the construction of this arrangement in Motanga, an alternative route for export of power from Kurichhu will be available during the event of transmission line failure of the conventional export route.

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 782.082 million (for 2008 at a discount rate of 10%) and 38.94% respectively. This is including Nu. 100 million for the cost of the line for which the investment is not shown above.

**1. Project code**

I/3

**2. Project Name**

2x10 MVA, 220/66 kV Tsirang substation with feeder bays.

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

Presently, Tsirang is connected to the Western Transmission Grid through a 220 kV line from Rurichhu (charged at 66 kV) and a 2 x 5 MVA, 66/33 kV substation. With the construction of the Tsirang-Gelephu East-West transmission link, this substation will have to be upgraded to a 220/66 kV substation in order to cater to the power requirements of Tsirang.

The 220/66 kV substation at Tsirang will consist of 3 line bays (One each for Rurichhu, Jigmeling and Dagachu), two ICT bays (1x25MVA, 220/66 kV and one spare) and one bus-coupler bay.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year	2010
End Year	2012

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

205.000

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

205.000

*Amount:*

-

*External Loans:**Tenure:*

-

<i>Grants:</i>	<i>Interest Rate:</i>	-
<i>Other Sources:</i>	<i>Moratorium:</i>	-
	-	
<b>Total</b>		<i>205.000</i>

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	0.000	84.500	100.000	20.500	0.000	<b>205.000</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>84.500</b>	<b>100.000</b>	<b>20.500</b>	<b>0.000</b>	<b>205.000</b>

## 6. Benefits>Returns from the Project

Although this project has no financial returns/benefits, it has to be undertaken in order to provide the East-West transmission link. The only source of alternative power supply in the Dzongkhag besides the grid supply is from the 200 kW Chanchey mini hydel, which is not able to meet the peak demand during the winter months. Accordingly, load shedding has to be resorted to if grid power supply is not available.

The project will ensure that adequate power is available to the Dzongkhag at all times (including the winter months) leading to socio-economic development as a spin-off and also translating into better customer services as un-interrupted and reliable power supply can be delivered without having to resort to load shedding.

## **1. Project code**

I/4

## **2. Project Name**

Transmission system in Samtse. The scope of this project will include construction of :

- (i) 220 kV single circuit Malbase-Samtse transmission line
- (ii) 66 kV single circuit Samtse-Gomtu transmission line on WOLF conductor
- (iii) 2x15 MVA, 66/33 kV substation at Samtse with bays
- (iv) 66 kV single circuit Samtse-Sibus transmission line

## **3. Asset Class**

Transmission lines and equipment.

## **4. Project Description**

This program is aimed at providing greater power flow capability to and from Samtse keeping in view the proposed industrial estate and hydropower plants that are envisaged to come up.

The Malbase-Samtse transmission line will initially be charged at 66 kV (pending development of the proposed industrial estate at Samtse which is expected once firm power restrictions of the present system are overcome) through the already available spare bays at Malbase. In the future, a 220/66 kV substation is expected at Samtse to provide a power evacuation route for the proposed hydropower plants in the region (Druk Bindu, Amochhu, etc) as well as provide requisite capacity to cater to the impending industrial estate. In addition to this, the proposed 220 kV line will provide the interconnection to the present grid.

Further, considering that Gomtu already has low voltage problems, it is necessary that the present infeed through 66 kV (DOG conductor from Phuentsholing) needs to be augmented. Accordingly, a 15 km 66 kV line (on WOLF conductor) from Samtse is proposed.

The 2 x 15 MVA, 66/33kV substation will have six line bays (One for Gomtu, two for Malbase, one for Sibus, and two spare), two transformer bays (for 66/33kV transformers including a spare bay), one bus-section bay and extension to the 33kV indoor switchgear with nine breakers.

Under urban electrification expansion plans, Sibus is planned to be supplied through 33 kV. Considering the terrain, RoW and the possible logistic issues, it is considered prudent to have a 66 kV tower line for this link of about 30 km. This line can also be used for evacuation of power from the proposed Druk Bindu hydropower plant.

## 5. Project Cost, Financing Plan and Capital Drawdown Schedule

Start Year	2010
End Year	2013

### i. Project Cost

(All amounts in Million Nu.)

Total project cost:

796.000

What is the basis for the project cost?

Management estimate

### ii. Financing Plan:

Cash Reserves (Equity):

270.165

Amount:	525.835 (without IDC)
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Tenure:	10 years
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Interest Rate:	10% pa
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Moratorium:	-
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External Loans:

Grants:

-

Other Sources:

-

**Total**

796.000

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	0.000	19.212	87.804	136.132	27.016	270.165
Debt	0.000	36.788	170.021	266.443	52.584	525.835
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>56.000</b>	<b>257.825</b>	<b>402.575</b>	<b>79.600</b>	<b>796.000</b>

## 6. Benefits/Returns from the Project

With the addition of these infrastructure, power will be available for the proposed industrial estate at Samtse which will boost the economy of the country. The power supply situation in

Gomtu will also be improved by means of a higher degree of reliability and better system voltage. Power evacuation from the proposed hydropower plants can also be possible with the addition of these infrastructure.

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 713.439 million (for 2008 at a discount rate of 10%) and 15.78% respectively.

**1. Project code**

I/5

**2. Project Name**

Transmission system in Dagana. The scope of this project will include construction of :

- (i) 220 kV Dagachhu-Dagapela Line extension (5.5 km)
- (ii) Substation at Dagapela 220/33 kV, 2x10 MVA

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

This program is aimed at providing greater power reliability to Dagana.

Under this project, 5.5 km of 220 kV line will be extended from Dagachhu to Dagapela and a 2x10 MVA, 220/33 kV receiving substation will be constructed in Dagapela.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2011

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

260.060

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

260.060

*Amount:*

-

*Tenure:*

-

*External Loans:**Interest Rate:*

-

*Moratorium:*

-

<i>Grants:</i>	-
<i>Other Sources:</i>	-
<b>Total</b>	<b>260.060</b>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	0.000	0.000	70.054	169.506	20.500	<b>260.060</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>0.000</b>	<b>70.054</b>	<b>169.506</b>	<b>20.500</b>	<b>260.060</b>

## 6. Benefits>Returns from the Project

Although this project has no financial returns/benefits, it has to be undertaken in order to provide a more reliable power system in Dagana.

Presently, Dagana receives grid power supply from the 2 x 5 MVA, 66/33 kV substation in Tsirang through a double circuit 33 kV line. Apart from this, a 200 kW hydropower plant at Darachhu exists. The power plant however is not able to meet the demand of the Dzongkhag during the winter months and load shedding/demand suppression has to be resorted to during winter in the event of grid failure.

However, with the extension of a 220 kV line (which is planned for evacuation of power from Dagachu hydropower plant) to Dagapela along with the construction of a 220/33 kV receiving substation, the power supply situation in Dagana will be improved greatly.

**1. Project code**

I/6

**2. Project Name**

66 kV Thimphu/Lobeysa-Gasa transmission link Project.

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

This program will entail the construction of 25 km of 66 kV line to Gasa either from Thimphu (Dechencholing/Begana) or from Lobesa which can be initially charged at 33 kV and later upgraded to 66 kV as the load grows.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2012

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

137.500

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

137.500

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*Moratorium:*

-

*Grants:*

-

*Other Sources:*

-

**Total**

137.500

**iii. Capital Drawdown Schedule**

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	0.000	0.000	0.000	68.750	68.750	<b>137.500</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>68.750</b>	<b>68.750</b>	<b>137.500</b>

**6. Benefits>Returns from the Project**

Although this project has no financial returns/benefits, it has to be undertaken in order to provide a more reliable power system in Gasa.

Presently Gasa receives power supply through a 33 kV line from Lobeysa which is almost 65 km long. This line has many tap-off points as the line also services many villages in Punakha Dzongkha along the way to Gasa. Accordingly, any fault on this line results in a power outage in Gasa. As of now, the reliability of the power supply in Gasa is very low. In order to improve the situation, a dedicated line to Gasa is the only solution. A tower line is preferred as the outages of the line can be reduced considerably.

A line either from Lobesa or Beygana/Dechencholing can be constructed as the line length will almost be the same. A detailed study including route survey will however have to be conducted in order to finalize the line route.

**1. Project code**

I/7

**2. Project Name**

Spillover Project activities (Tsirang, Trongsa, Malbase and Bumthang).

**3. Asset Class**

Transmission lines and equipment.

**4. Project Description**

This program will entail completion of ongoing projects presently being wound up in Tsirang, Trongsa, Malbase and Bumthang. These will mostly be for finishing off minor pending works in Tsirang (220 kV line from Rurichhu to Tsirang and a 2 x 5 MVA, 66/33 kV substation in Tsirang), Trongsa (66 kV single circuit transmission line from Yurmoo to Kewathang and 33/11 kV, 2 x 2.5 MVA substation in Trongsa), Malbase (66 kV quadruple circuit line and 1 x 50/63 MVA, 220/66 kV transformer works) and Bumthang (66 kV single circuit transmission line from Yurmoo to Garpang and 33/11 kV, 2 x 2.5 MVA substation in Bumthang)

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2010

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

331.120

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

331.120

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*External Loans:*

	<i>Moratorium:</i>	-
<i>Grants:</i>		-
<i>Other Sources:</i>		-
<b>Total</b>		<b>331.120</b>

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	234.120	97.000	0.000	0.000	0.000	<b>331.120</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>234.120</b>	<b>97.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>331.120</b>

## 6. Benefits>Returns from the Project

Although most of these projects have no financial returns/benefits, it has to be undertaken keeping in view BPC's social mandates.

With the completion of these projects, Trongsa, Tsirang, Dagana and Bumthang Dzongkhags now have access to grid power supply leading to a more reliable and robust power system. This will translate into better customer services as less power interruptions will be experienced by customers in these Dzongkhags. In addition to this, availability of power will lead to socio-economic developments in these Dzongkhags. Prior to the commissioning of these projects, power demand in these Dzongkhags outstripped the generation capacity in the winter months and therefore the demand had to be suppressed.

Completion of the project in Malbase also means that power supply is now available to industries in the Pasakha Industrial Estate. This invariably has led to greater volume of energy sales to the industrial sector resulting into greater revenue for BPC. Besides this, the economy as a whole, has also benefited as a result of providing power to the industries as these industries contribute substantially to the Bhutanese economy.

**1. Project code**

II/1

**2. Project Name**

Rural Electrification Project. This project will entail the following components –

- (i) Rural Electrification under JICA Project
- (ii) Rural Electrification under ADB RE-IV Project
- (iii) Fill in Rural Electrification Project
- (iv) Electrification of Phobjikha valley
- (v) Accelerated Rural Electrification Project

**3. Asset Class**

Distribution lines and equipment.

**4. Project Description**

Under the JICA financing component, the project will be implemented in 10 Dzongkhags to electrify 15,712 households.

Under the ADB financing component, the project will be implemented in 9 Dzongkhags to electrify 8,767 households.

Under the Government of Austria financing component, about 800 households in Phobjikha valley in Wangdue Dzongkhag will be electrified.

Under the BPC financing component, approximately 6,019 households will be electrified as a fill in electrification scheme. These will be undertaken by the various Electricity Services Divisions (ESD) of the Distribution and Customer Services Department, in the Dzongkhags.

Under the Accelerated Rural Electrification program, all households that were initially planned to be taken up in the 11 FYP (8,959 households), will be electrified. This is in line with the Royal Government's vision of electricity for all by 2012. This will ensure that the entire country is electrified by the end of the 10 FYP.

All in all, under the Rural Electrification program, BPC will be electrifying 40,257 rural households through grid extension.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

5,834.808

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*535.546 (BPC's own equity)  
5,195.954 (RGoB's equity)

<i>Amount:</i>	<i>RGoB equity will be transferred as loan after the completion of the project</i>
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*Tenure:**Interest Rate:**Moratorium:* -*External Loans:**Grants:*

103.308 (by Austrian Government for electrification of Phobjika valley)

*Other Sources:*

-

**Total**

5,834.808

**iii. Capital Drawdown Schedule**

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	631.615	1,380.165	1,618.702	1,374.320	830.006	<b>5,834.808</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>631.615</b>	<b>1,380.165</b>	<b>1,618.702</b>	<b>1,374.320</b>	<b>830.006</b>	<b>5,834.808</b>

**6. Benefits/Returns from the Project**

The RE program is being taken up by the BPC as a social mandate in line with the Royal Government's vision of providing electricity for all by 2013. Although the program cannot be justified from a financial perspective, it has economic benefits for the nation. This program is therefore being taken up as a socio-economic development initiative and also from the perspective of BPC being a socially conscious entity, as outlined in the vision statement of the company.

**1. Project code**

II/2

**2. Project Name**

Urban Electrification.

**3. Asset Class**

Distribution lines and equipment.

**4. Project Description**

Due to the intrinsic growth in the demand for electricity in urban areas and the geographical extension of urban centers, the existing power infrastructure will have to be augmented and enhanced to meet this growing demand. The program will entail upgradation of MV lines, LV lines and distribution transformers. In some cases, the backbone sub transmission network will also have to be enhanced/augmented.

Without the regular upgradation of the urban distribution network, in addition to increased system losses, the power delivery capacity and capability will deteriorate leading to its collapse ultimately. In order to prevent this from happening, upgradation and enhancement works on the distribution infrastructure have to be taken up on a regular basis.

An Urban Electrification Master Plan was prepared in 2006 and as of now all works related to urban electrification and upgradation activities are being taken up based on this Master Plan. The UE Master Plan clearly spells out the scope of works to be implemented every year until 2020 for every Dzongkhag. These works will pertain to improvement and upgradation works at the distribution level predominantly in urban areas to meet the growing need for electricity.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year	2009
End Year	2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

1,129.396

*What is the basis for the project cost?**Management, engineering and master-plan estimates***ii. Financing Plan:**

<i>Cash Reserves (Equity):</i>	1,129.396	
	<i>Amount:</i>	-
	<i>Tenure:</i>	-
<i>External Loans:</i>	<i>Interest Rate:</i>	-
	<i>Moratorium:</i>	-
<i>Grants:</i>	-	
<i>Other Sources:</i>	-	
<b>Total</b>	<b>1,129.396</b>	

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	179.090	331.093	261.346	224.902	132.965	<b>1,129.396</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>179.090</b>	<b>331.093</b>	<b>261.346</b>	<b>224.902</b>	<b>132.965</b>	<b>1,129.396</b>

## 6. Benefits>Returns from the Project

The financial analysis/justification for taking up this program is based on the fact that BPC must in any case improve/upgrade the required MV infrastructure based on the projected power demands and reliability requirements. The investment is thus based on identifying the bare minimum functional requirement that the planned power infrastructure are to fulfill and identifying the least cost option from the technically viable options that meet the functional requirements adequately.

However, it is pertinent to mention here that the identification of the bare minimum functional requirement is often complex since the load growths and power demand cannot be predicted precisely. Proposing larger infrastructure capacities than necessary results in over investment but proposing smaller infrastructure capacity than necessary could turn out even more expensive later due to infrastructure upgradations, power supply outages, and loss of RoW opportunities, etc. These aspects have been considered carefully in developing and proposing the plans commensurate with the load growth and economic development.

These expansion plans being bare minimum from a technical standpoint of view, would anyway be considered in the investment program for tariff revisions and thus justify themselves.

**1. Project code**

III/1

**2. Project Name**

Establishment of National Load Dispatch Center and SCADA.

**3. Asset Class**

Telecommunication Equipment

**4. Project Description**

This program is aimed at ensuring that all the transmission substations in the country are interfaced with the National Load Dispatch Centre (NLDC) in the offing for monitoring and control, as well as ensuring BPC's preparedness for entering into communication sector by better utilization of its infrastructure.

Establishment of a NLDC is an offshoot of BPC's mandate to function as system operator for the country. The various major transmission substations and generating stations will be monitored and/or controlled by the NLDC for co-ordinated system operation and ensuring grid discipline

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2012

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

150.000

*What is the basis for the project cost?**Management estimate and actual contract value***ii. Financing Plan:***Cash Reserves (Equity):*

51.179

*External Loans:**Amount:*98.821  
*(without IDC)**Tenure:*

10 years

<i>Grants:</i>	<i>Interest Rate:</i>	<i>10% pa</i>
<i>Other Sources:</i>	<i>Moratorium:</i>	-
<b>Total</b>		<i>150.000</i>

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	16.550	19.462	11.275	3.892	0.000	<b>51.179</b>
Debt	0.000	55.538	32.175	11.108	0.000	<b>98.821</b>
<b>Total Capital Drawdown</b>	<b>16.550</b>	<b>75.000</b>	<b>43.450</b>	<b>15.000</b>	<b>0.000</b>	<b>150.000</b>

## 6. Benefits>Returns from the Project

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 586.120 million (for 2008 at a discount rate of 10%) and 26.54% respectively.

**1. Project code**

III/2

**2. Project Name**

Replacement of ground wire by OPGW in Eastern and Western grid.

**3. Asset Class**

Telecommunication Equipment

**4. Project Description**

Replacement of conventional ground-wire with Optical Ground Wire (OPGW) provides the media for communication and all major transmission network in the western grid is already provided with OPGW. The replacement of approximately 474 km of ground-wire with OPGW will ensure that all the substations will have communication capability for interfacing to the NLDC.

Besides this, the OPGW network can also be utilized for BPC's own internal communication purposes.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2011

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

234.630

*What is the basis for the project cost?**Management estimate***ii. Financing Plan:***Cash Reserves (Equity):*

234.630 (RGoB's equity)

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*External Loans:*

	<i>Moratorium:</i>	-
<i>Grants:</i>	-	
<i>Other Sources:</i>	-	
<b>Total</b>		<b>234.630</b>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	23.463	152.510	58.658	0.000	0.000	<b>234.630</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>23.463</b>	<b>152.510</b>	<b>58.658</b>	<b>0.000</b>	<b>0.000</b>	<b>234.630</b>

## 6. Benefits>Returns from the Project

The Ministry of Information and Communication (MoIC) will be funding this project entirely and the same can be treated as RGoB's equity injection. Accordingly, there will be no costs that BPC will have to bear for this project. The benefits however are tremendous not only for BPC but for the nation as a whole as the OPGW has a very high data transfer rate. This will accordingly translate into the possibility of having numerous opportunities for business development.

**1. Project code**

III/3

**2. Project Name**

All Dielectric Self Supporting (ADSS) project.

**3. Asset Class**

Telecommunication Equipment

**4. Project Description**

It is required to have fibre connectivity in all the Dzongkhags for interlinking the same (where required with appropriate interfaces with the transmission fibre network) to the Dzongkhag headquarters to enable centralized operations/on-line-MIS, as planned as part of IT initiatives.

Where necessary, ADSS cables will be laid on 33 kV and 11 kV poles for this purpose with associated terminal equipment.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2010

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

150.000

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

150.000 (RGoB's equity)

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*Moratorium:*

-

*External Loans:*

<i>Grants:</i>	-
<i>Other Sources:</i>	-
<b>Total</b>	<i>150.000</i>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	0.000	45.000	60.000	22.500	22.500	<b>150.000</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>45.000</b>	<b>60.000</b>	<b>22.500</b>	<b>22.500</b>	<b>150.000</b>

## 6. Benefits/Returns from the Project

The Ministry of Information and Communication (MoIC) will be funding this project entirely and the same can be treated as RGoB's equity injection. Accordingly, there will be no costs that BPC will have to bear for this project. The benefits however are tremendous not only for BPC but for the nation as a whole as the ADSS network will enable connectivity to all the Dzongkhags. This will accordingly translate into the possibility of having numerous opportunities for business development.

**1. Project code**

III/4

**2. Project Name**

Lighting of Fibers and Terminal Equipment in 20 Dzongkhags.

**3. Asset Class**

Telecommunication Equipment

**4. Project Description**

This program pertains to installation of terminal equipment at the termination points of the OPGW and ADSS network in order to enable ICT connectivity. The OPGW and the ADSS network will provide only the medium for transfer but the terminal equipment will provide the actual communication capabilities.

Accordingly, terminal equipment will be installed in the transmission substations where the OPGW will terminate and also at BPC's offices where the ADSS will terminate.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2012

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

55.000

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

55.000 (RGoB's equity)

*Amount:*

-

*Tenure:*

-

*External Loans:**Interest Rate:*

-

*Moratorium:*

-

<i>Grants:</i>	-
<i>Other Sources:</i>	-
<b>Total</b>	<i>55.000</i>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	21.500	0.000	30.000	3.500	0.000	<b>55.000</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>21.500</b>	<b>0.000</b>	<b>30.000</b>	<b>3.500</b>	<b>0.000</b>	<b>55.000</b>

## 6. Benefits>Returns from the Project

The Ministry of Information and Communication (MoIC) will be funding this project entirely and the same can be treated as RGoB's equity injection. Accordingly, there will be no costs that BPC will have to bear for this project. The benefits however are tremendous not only for BPC but for the nation as a whole as the terminal equipment will enable connectivity to all the Dzongkhags. This will accordingly translate into the possibility of having numerous opportunities for business development.

**1. Project code**

III/5

**2. Project Name**

Other ICT Services Projects (WAN, BPL)

**3. Asset Class**

Telecommunication Equipment

**4. Project Description**

This program pertains to setting up a Wide Area Network (WAN) to interconnect all office of BPC throughout the country. With such a set-up, BPC can use its own internal communication facilities (OPGW, ADSS, etc) for inter-office communication even across different Dzongkhags. This will invariably lead to cost savings for the company as a whole in the long run as communication cost will decrease.

Furthermore, new emerging technologies such as Broadband Over Power Line (BPL) will be tried and tested as a pilot project. If this project is successful, it can be deployed at a larger scale leading to the opportunities for BPC in the telecommunication sector with very little incremental cost.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

50.000

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

55.000

*External Loans:**Amount:*

-

*Tenure:*

-

*Grants:*

*Other Sources:*

**Total**

<i>Interest Rate:</i>	-
<i>Moratorium:</i>	-
-	
-	
<i>55.000</i>	

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	6.500	20.000	0.000	20.000	3.500	<b>50.000</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>6.500</b>	<b>20.000</b>	<b>0.000</b>	<b>20.000</b>	<b>3.500</b>	<b>50.000</b>

## 6. Benefits>Returns from the Project

Investment in this technology will lead to less communication costs for BPC in the long run. In addition, various communication media such as video conferencing, centralized PABX system, etc, will be possible, leading to greater operational efficiencies in BPC.

The success of the BPC pilot project will also open up the doors for BPC to venture into the telecom sector. Such a technology will give BPC an edge over other companies as BPC already has it LV and MV infrastructure in place and thereby eliminating the need to install copper cable/telecom towers to facilitate communication. Furthermore, by 2013, all houses will be connected to the grid and thereby the customer base for the telecom business will already be with BPC. Accordingly, incremental costs will be drastically reduced leading to cheaper communication alternative for the citizens of the country.

**1. Project code**

III/6

**2. Project Name**

Enterprise Resource Planning (ERP) and data centre project.

**3. Asset Class**

Computers and Accessories.

**4. Project Description**

The Corporate Strategic Plan (CSP) – 2007 of the BPC implies the adoption of an ERP platform although not explicitly. The CSP states that a Management Information System (MIS) be adopted for proper material management, have an HR information system integrated with other IT systems, implementation of a general ledger system with an appropriate software and in general to streamline our business processes. All these come under the purview of an ERP system and in general can be implemented through the adoption of an ERP platform.

BPC along with DHI and DGPC will be installing an SAP ERP platform. This was approved by the DHI and BPC's Board.

A data centre for the centralized database of the ERP platform will also be set up under this program. With more companies under the DHI umbrella envisaged to adopt the SAP ERP platform, BPC can provide shared services in the context of the ERP to these companies.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2011

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

130.000

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

130.000

<i>External Loans:</i>	<i>Amount:</i>	-
	<i>Tenure:</i>	-
	<i>Interest Rate:</i>	-
	<i>Moratorium:</i>	-
<i>Grants:</i>	-	
<i>Other Sources:</i>	-	
<b>Total</b>	<i>130.000</i>	

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	48.200	68.800	13.000	0.000	0.000	<b>130.000</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>48.200</b>	<b>68.800</b>	<b>13.000</b>	<b>0.000</b>	<b>0.000</b>	<b>130.000</b>

## 6. Benefits/Returns from the Project

With the adoption of an SAP ERP platform, the following benefits are envisaged as a result :

- Improved operational efficiency
- Reduction in outages
- Improved customer service
- Single window contact centre for customer care
- Better quality and reliability of supply
- Quick complaint redressal
- Reduction in billing cycle time

Apart from this, the ERP platform will also enable BPC to do the following :

- (i) Enabling the core business operations with an ERP platform at the transaction/operational level could lay the foundation for sustainable reforms
- (ii) An ERP platform could also enable sustainable changes in the operations by increasing controls at transaction level, improving the efficiency of the operations and increasing transparency across the organization
- (iii) An ERP platform could also provide advantages like in-built process controls, workflow enabled transactions, single repository of organizational data and support for timely strategic decision making

- (iv) An ERP platform could also help minimize human interface in commercial processes to avoid human errors and chances of willful mistakes

The intangible benefits of an ERP platform are manifold and cannot be monetized. For e.g., the annual accounts of the company can be closed much faster, information will be readily available enabling better and faster decision making, a paperless environment will be fostered, processes will be streamlined resulting in greater efficiency, billing errors will reduce, etc.

**1. Project code**

IV/1

**2. Project Name**

Begana Small Hydroelectric Project.

**3. Asset Class**

Generation equipment.

**4. Project Description**

The scope of this program will include development of a 20 MW run-of-the-river small hydropower project at Begana, Thimphu.

The salient features of the proposed plant as follows –

River	Thimphu Chhu
Type of plant	Run-of-river small hydropower plant
Plant capacity	20 MW
Catchment area	396.3 km <sup>2</sup>
Reservoir capacity	80,177 m <sup>3</sup>
Length of water conductor	4,582 m
Powerhouse	Surface type
Annual energy output	101.870 GWh
Transmission line	66 kV (Begana - Pangrizampa)

The plant will be located upstream of Central Maintenance and Training Division, Begana covering the area near Tango and Cheri Monastery and along the Thimphu Chhu. The catchments area and the dam site fall inside the Jigme Dorji National Park.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year	2009
End Year	2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

1,113.350

What is the basis for the project cost?

Feasibility study report

## ii. Financing Plan:

Cash Reserves (Equity):

363.138

Amount: 750.212  
(without IDC)

Tenure: 10 years

External Loans:

Interest Rate: 10%

Moratorium: -

Grants:

-

Other Sources:

-

**Total**

1,113.350

## iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	3.200	1.142	56.751	153.193	148.852	<b>363.138</b>
Debt	0.000	2.358	117.243	316.485	314.126	<b>750.212</b>
<b>Total Capital Drawdown</b>	<b>3.200</b>	<b>3.500</b>	<b>173.994</b>	<b>469.678</b>	<b>462.978</b>	<b>1,113.350</b>

## 6. Benefits>Returns from the Project

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 1,059.184 million (for 2008 at a discount rate of 10%) and 18.18% respectively.

The power generated from the project would enhance the power system reliability for Thimphu city. Furthermore, it is also expected that installation of a water treatment plant downstream at the discharge will augment the economic benefits due to the availability of potable/drinking water to be supplied to Thimphu city.

**1. Project code**

IV/2

**2. Project Name**

Druk Bindu Small Hydroelectric Project.

**3. Asset Class**

Generation equipment.

**4. Project Description**

The scope of this program will include development of a 13 MW run-of-the-river small hydropower project at Bindu, Samtse.

A more detailed description of the project can be drawn up once the feasibility study of the proposed project is completed.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2010

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

723.678

*What is the basis for the project cost?**Same per MW cost as that of Begana***ii. Financing Plan:***Cash Reserves (Equity):*130.693 *(BPC's own equity)**Amount:*238.383  
*(without IDC)**Tenure:*

10 years

*External Loans:**Interest Rate:*

10%

*Moratorium:*

-

*Grants:*

-

*Other Sources:*

354.602

**Total**

723.678

**iii. Capital Drawdown Schedule**

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity (only BPC's own equity)	0.000	0.903	20.425	55.134	54.231	<b>130.693</b>
Debt (only BPC's own debt)	0.000	1.647	37.254	100.564	98.917	<b>238.383</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>2.550</b>	<b>57.679</b>	<b>155.698</b>	<b>153.148</b>	<b>369.076</b>

**6. Benefits/Returns from the Project**

Based on the economic life of the assets to be added (30 years), the Net Present Value (NPV) and the Internal Rate of Return (IRR) for the project has been computed to be Nu. 938.992 million (for 2008 at a discount rate of 10%) and 20.99% respectively.

The power generated from the project would enhance the power system reliability for the country and add economic benefits arising as a result of power exports.

**1. Project code**

IV/3

**2. Project Name**

Grid connection of 3 Mini hydels (Tintibi, Darachhu &amp; Chanchey).

**3. Asset Class**

Generation equipment.

**4. Project Description**

The three mini hydro power plants at Dagana (Darachhu), Tsirang (Chanchey) and Zhemgang (Tintibi) all of which are 2 x 100 kW in capacity will be interconnected to the existing grid.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2010

End Year

2011

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

1.500

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

1.500

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*Moratorium:*

-

*Grants:*

-

*Other Sources:*

-

**Total**

1.500

### iii. Capital Drawdown Schedule

Year	2009	2010	2011	2012	2013	Total
Equity	0.000	0.750	0.750	0.000	0.000	<b>1.500</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.000</b>	<b>0.750</b>	<b>0.750</b>	<b>0.000</b>	<b>0.000</b>	<b>1.500</b>

## 6. Benefits/Returns from the Project

These three hydro power plants generate power continuously at their full capacity with the unutilized energy being wasted in the dummy load at the plants. With grid supply available/being made available at these locations, it is considered prudent to utilize the full generated energy by connecting these plants to the grid, thereby ensuring increased revenues to the nation by export of additional energy to India. This will also ensure that the cost of purchase of power to BPC will reduce to the extent of energy injected into the grid.

**1. Project code**

IV/4

**2. Project Name**

Rehabilitation of mini/micro hydro power plants.

**3. Asset Class**

Generation equipment.

**4. Project Description**

This project pertains to the rehabilitation and refurbishment of existing mini and micro hydro power plants owned by BPC and spread across the country. BPC currently owns and operates 19 mini/micro hydro plants with a total installed capacity of 7.92 MW ranging in capacity from 30 kW to 2.2 MW.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year	2009
End Year	2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

83.853

*What is the basis for the project cost?**Management estimate***ii. Financing Plan:***Cash Reserves (Equity):*

83.853

*Amount:*

-

*Tenure:*

-

*External Loans:**Interest Rate:*

-

*Moratorium:*

-

*Grants:*

-

*Other Sources:*

-

**Total**

83.853

**iii. Capital Drawdown Schedule**

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	0.500	51.000	26.026	6.000	0.326	<b>83.853</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>0.500</b>	<b>51.000</b>	<b>26.026</b>	<b>6.000</b>	<b>0.326</b>	<b>83.853</b>

**6. Benefits>Returns from the Project**

Most of the mini/micro hydro power plants were installed in the 1970s and 1980s and as such have become very old. These plants therefore have to be rehabilitated either by changing some equipment or by maintaining the civil infrastructure so that these plants continue to generate electricity as per the initial design.

With most of the plants connected to the grid, these investments will pay off for themselves in the form of revenue from the generated electricity.

**1. Project code**

V/1

**2. Project Name**

Rehabilitation and replacement of assets.

**3. Asset Class**

Transmission and distribution lines and equipment.

**4. Project Description**

This is part of the regular upgradation and/or replacement of outlived/unserviceable components of the power system network. This will include upgradation of transmission assets, distribution assets, repair of plants & equipment and replacement of customer's meters.

This is primarily to ensure that the network is kept in proper condition by replacement of unserviceable portions as well as meeting requirement of replacing obsolescent assets.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

1,207.250

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

1,207.250

*Amount:*

-

*Tenure:*

-

*External Loans:**Interest Rate:*

-

*Moratorium:*

-

<i>Grants:</i>	-
<i>Other Sources:</i>	-
<b>Total</b>	<i>1,207.250</i>

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	343.185	197.658	290.232	162.505	213.670	<b>1,207.250</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>343.185</b>	<b>197.658</b>	<b>290.232</b>	<b>162.505</b>	<b>213.670</b>	<b>1,207.250</b>

## 6. Benefits>Returns from the Project

The transmission and distribution assets including meters which are old and obsolete need to be maintained and replaced. Without doing such activities, it would not be possible to have a reliable and robust transmission and distribution system. The investments on these infrastructure would pay off for itself by means of wheeling revenue and energy sales to BPC's customers. If these assets are not maintained properly, it would not be possible to generate revenues from wheeling and energy sales.

**1. Project code**

VI/1

**2. Project Name**

Buildings and Land.

**3. Asset Class**

Buildings and Land.

**4. Project Description**

This program consists of Acquisition of land, establishment of service centers/office buildings, construction of Stores yard/shed, construction of Staff Quarters/Colonies and Construction of approach road/other civil infrastructure.

With massive power system expansion works in the offing as well as logistic necessities of establishing infrastructure to meet project as well as customer needs, it is necessary to carry out this program in line with the developmental activities.

**5. Project Cost, Financing Plan and Capital Drawdown Schedule**

Start Year

2009

End Year

2013

**i. Project Cost***(All amounts in Million Nu.)**Total project cost:*

1,027.595

*What is the basis for the project cost?*

Management estimate

**ii. Financing Plan:***Cash Reserves (Equity):*

1,027.595

*Amount:*

-

*Tenure:*

-

*Interest Rate:*

-

*External Loans:*

	<i>Moratorium:</i>	-
<i>Grants:</i>	-	
<i>Other Sources:</i>	-	
<b>Total</b>	<i>1,027.595</i>	

### iii. Capital Drawdown Schedule

<b>Year</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>
Equity	220.123	241.520	258.632	223.420	83.900	<b>1,027.595</b>
Debt	0.000	0.000	0.000	0.000	0.000	<b>0.000</b>
<b>Total Capital Drawdown</b>	<b>220.123</b>	<b>241.520</b>	<b>258.632</b>	<b>223.420</b>	<b>83.900</b>	<b>1,027.595</b>

## 6. Benefits>Returns from the Project

With the growth in the power system, associated facilities such as office buildings, housing for the employees, etc, for delivering services also have to be provided. Without making such investments, it will not be possible to deliver services in a manner that is desirable.