Journal of Artificial Intelligence in Electrical Engineering, Vol. 3, No. 12, March 2015

# Economic (Cost-Benefit) Analysis of Power Generation from Commercial Reinforced Concrete Solar Chimney Power Plant Built in the Desert Regions of Iran

Farhad Saleki Baghban<sup>1</sup>, Hosein Nasir Aghdam<sup>2</sup>

<sup>1</sup> Student of M.Sc., Department of Electrical Engineering. Ahar Branch, Islamic Azad University, Ahar, Iran Email: f\_saleki\_b@yahoo.com

<sup>2</sup> Department of Electrical Engineering. Ahar Branch, Islamic Azad University, Ahar, Iran

Email: h\_nasir59@yahoo.com

#### ABSTRACT

This paper expands a model different from existing models to analyze the cost and benefit of a reinforced concrete solar chimney power plant (RCSCPP) built in the desert regions of Iran. Based on the model and some assumptions for values of parameters, this paper calculates total net present value (TNPV) and the minimum electricity price in each phase by dividing the whole service period into four phases. The results showed that the minimum electricity price in the first phase is higher than the current market price of electricity, but the minimum prices in the other phases are far less than the current market price. The analysis indicated that huge advantages of the RCSCPP over coal-fired power plants could be embodied in phases 2–4. In addition, the sensitivity analysis performed in this paper discovered that TNPV is very sensitive to changes in the solar electricity price and inflation rate, but responds only slightly to changes in carbon credits price, income tax rate and interest rate of loans. Our analysis predicts that RCSCPPs have very good application prospect.

**KEYWORDS**: Cost-benefit analysis, Power generation, Reinforced concrete solar chimney, Sensitivity analysis.

## **1. INTRODUCTION**

In recent years, rapid developments of global economy and increase in population and living standards have been posing great pressure on natural resources (Fig. 1) and the environment. Fossil fuels are being exhausted at a fast rate, and utilization of fossil fuels together with net deforestation has induced considerable climate change in

warming the atmosphere by releasing greenhouse gases (GHG) [1].

Stern estimated that the economic losses caused by global warming go beyond 20% of world GDP. For this reason, more and more countries begin to take measures to reduce the emission of greenhouse gases

reduce the emission of greenhouse gases. One of these measures is to develop the technologies utilizing renewable and clean energy sources. As a renewable and clean energy. solar energy is carbon-free, inexhaustible, sustainable, cost free and practically unlimited. It is able to satisfy the power demand of mankind at present and in the future if some of the solar radiation radiating on the Earth's surface is utilized. In recent years, how to turn the abundant solar energy into the energy that human can directly utilize has become a popular and difficult problem. With the diminishing of fossil fuels and the exacerbation of greenhouse effect, many countries provide economic incentives for the development of solar power plants, including non-returnable subsidies, soft loans, favorable tax policies and so on [2].



Fig.1.Annual global energy consumption during the time between 1850 and 2000

The solar chimney power plant (SCPP) combines three familiar components: a solar collector, a SC situated in the center of the collector, and power conversion unit (PCU) which includes one or several turbine generators. The turbines are driven by airflow produced by buoyancy resulting from greenhouse effect inside the collector (Fig. 2) [1].



Fig. 2. Schematic diagram of SCPP

The most suitable construction sites of largescale SCPPs are located in vast desert regions where land may be free. The technologies for the SCPP components are simple and reliable, accessible to the technologically less developed countries, which are sunny and often have limited raw material resources. Little maintenance and no combustible fuel and cooling water are needed for SCPPs [1].

By now, no one commercial SCPP have been built in the world. A comprehensive economic analysis is very necessary to show the competitiveness of the SCPP technology before its commercial application.

Recently, several economic models were developed to assess the economic competitiveness of the commercial SCPPs.

Schlaich and Bernardes estimated the component cost for various plant sizes,

evaluated the levelized electricity cost (LEC), and analyzed the sensitivity of the LEC to some economic parameters. Be sides, Bernardes derived a parametric cost model for the main plant components. Schlaich et al. estimated the cost of plants and the LEC with different power capacities. The collector roofs of the plants were assumed to be made of plastic membrane in the studies by Schlaich and Schlaich et al., and of glass in the study by Bernardes. Fluri et al. presented a more detailed cost model to estimate the cost of two commercial plants whose configurations were similar to the 100 MW plants, respectively proposed by Schlaich et al. and Bernardes. In their economic analysis, the impact of carbon credits on the LEC was also considered. These studies mentioned above considered reinforced commercial concrete solar chimney power plants (RCSCPPs).

By now, little work on economic analysis of SCPPs has been reported by taking into consideration the cash flows. Zhou et al. performed economic analysis of power generation from a 100 MW FSCPP by analyzing cash flows during their whole service period and compared the economics of the 100 MW FSCPP and a 100 MW RCSCPP. Later, Cao et al. performed economic analysis of conventional SCPPs and sloped-collector SCPPs with three power capacities of 5.1 MW, 35.1 MW, and 104.7 MW proposed in Northwest China by analyzing cash flows during their whole service periods. The service periods of the proposed plants were assumed to be 30

years. In Zhou et al's. and Cao et al's. views, the revenue of carbon credits need not be taxed, and the income tax cost has not been calculated.

In this paper, a detailed cost-benefit model is developed to estimate the cost and benefit of power generation from a 100 MW RCSCPP in the desert regions of Iran. There are several differences between this paper and the previous studies. Firstly, we develop a more comprehensive model than the ones built by others. Our model considers the benefit of carbon credits excluded by Schlaich and Bernardes, as well as the income tax cost omitted by Fluri et al., Zhou et al. and Cao et al. Secondly, we use riskadjusted discount rate method for the first time to discount net cash flow. Compared to conventional discount method employed by Fluri et al, Zhou et al., Cao et al. and so on, risk-adjusted discount rate method can consider the huge risk of RCSCPPs whose service period exceed 100 years. Thirdly, we consider an RCSCPP which can be used for 120 years and divide the whole service periods into four phases to calculate total net present value of each phase. By doing so, we can compare RCSCPPs with coal-fired power plants which can usually serve 30 years. Finally, unlike previous studies, we use elasticity method to make sensitivity analysis. Accordingly, we can see the responsiveness of total net present value to many parameters [2].

# 2. PERFORMANCE OF REINFORCED CONCRETE SCPP

The working principle of SCPPs is simple: A huge chimney in an arid area with

sufficiently high solar irradiation is surrounded by a large glass roof, the collector. The warm air collected under the roof flows towards the chimney. There, on its way, it drives turbines connected to generators which create electric power.

The high SCs for most commercial SCPP proposals were proposed to be built with reinforced concrete. The main advantage of RCSCPPs is that it has a long life span and can bring cash flows continually. Generally, RCSCPPs can be used for more than 100 years. Since the floating chimneys of FSCPPs need to be replaced every once in a while, RCSCPPs are more economic compared to FSCPPs owing to much less maintenance required.

An RCSCPP consists of three parts as shown in Fig. 3: chimney, collector and power conversion unit (PCU).



Fig.3.Schematic diagram of a solar chimney power plant.

The chimney is usually made of reinforced concrete. In order to improve the efficiency of SCPP, the chimney is needed to be as high as possible. With the development of construction technology, it is not very difficult to build more than 1000 m high chimneys. The collector is simply made up of collector cover, column system and support matrix. By and large, the collector cover is built with glass or plastic materials. The PCU includes turbines, generators, electronic control equipment and grid feedin apparatus [2].

# **3. THE MODEL**

# 3.1. Benefit analysis

The benefits of an SCPP include two parts: the benefit of electricity sale and the additional benefit resulted from carbon credits because of lessening GHG emissions.

# 3.1.1. Benefit of electricity sale

The benefit of electricity sale depends on the price of solar electricity  $(P_s)$  and annual electricity output (E<sub>s</sub>). In order to promote the development of solar power plants, the government usually gives economic incentives by setting higher sale price than the market level of solar electricity. And the price goes up with the constant inflation rate  $(\theta)$  every year. The electricity output is usually sold to the utility or used by the plant itself. Because the proportion of electricity used by the plant itself in the electricity output is very low, this paper supposes all the electricity is sold to the utility. Therefore, the benefit of electricity sale in the kth year  $(B_E^k)$  can be given by

$$B_E^k = E_s \cdot P_s (1+\theta)^{k-1}$$
(1)

Where n represents the life span of the plant and k=1, ..., n [2].

#### 3.1.2. Benefit of carbon credits

One main advantage of a solar power plant over a conventional coal-fired power plant is that it never releases greenhouse gases. The data published by China Development and Reform Commission shows that burning one ton of standard coal can approximately generate 3000 kW of electricity and release 2.66–2.72 tons of carbon dioxide. Here takes the average value, namely 2.69. Then we can conclude the carbon dioxide released by coal-fired power plants is about 0.72 kg/kWh. We suppose that the price of carbon credits  $(P_c)$  annually increases with constant inflation rate **(θ)**. Consequently, the benefit resulted from cutting down emissions of carbon dioxide in the  $k^{th}$  year  $B_C^k$  can be expressed as [2]:

$$B_{C}^{k} = (0.72) E_{s} P_{c} (1+\theta)^{k-1}$$
(2)

### 3.1.3. Total Benefits

Total benefits of a solar power plant are the sum of the benefit of electricity sale and the benefit of carbon credits. Let  $B^k$  denote total benefits in the k<sup>th</sup> year, then [2]

$$B^{k} = B^{k}_{E} + B^{k}_{C}$$
(3)

# 3.2. Cost analysis

Total costs of an SCPP in the whole service consist of the principal and interest of loans in the repayment period, the operation and maintenance cost, and the tax cost.

#### 3.2.1. Initial investment

Let C<sub>c</sub> denote the initial investment cost during the construction period. Suppose that all the investment cost is borrowed from banks and the loans will be repaid in the mth year. In general, there are two means of repaying loans, namely matching interest repayment law and equal principal repayment method. The former allows borrowers to repay the same amount of loans every period. However, the latter demands that borrowers repay equal principal and different amount of interest every period. Because borrowers repay constant principal every period, the interest cost becomes less and less. For this reason, total interest cost of equal principal repayment method is less than that of matching interest repayment law. Zhou et al. [3] adopt matching interest repayment law to evaluate the cost of solar power plants. In order to reduce the interest cost, this paper uses equal principal repayment method. Therefore, the principal

repaid in the ith year  $(C_p^l)$  is given by:

$$C_{p}^{i} = \frac{C_{c}}{m}$$
(4)

And the debt after paying back the principal and interest in the  $i^{th}$  year ( $C_D^i$ ) becomes

$$C_{D}^{i} = C_{c} - (i-1)C_{p}^{i}$$
(5)

So the interest in the ith year  $(C_1^i)$  can be expressed as:

$$C_{l}^{i} = C_{D}^{i} \cdot r$$
 (6)

Where i=1, ..., m and r represents the interest rate of loans [2].

### 3.2.2. Operation and maintenance cost

The solar power plant need spend money to maintenance and repair the collector, chimney and PCU during the whole service period. All these costs are known as the operation and maintenance cost. Let  $C_o^1$  denote the operation and maintenance cost in the first year and suppose that the cost increases with the constant inflation rate ( $\theta$ ). Then the operation and maintenance cost in the k<sup>th</sup> year is given by

$$C_{o}^{k} = C_{o}^{1} \left(1 + \theta\right)^{k-1} \tag{7}$$

Where k=1, ..., n [2].

# 3.2.3. Tax cost

According to the tax law of China and Iran, depreciation and interest of loans can be excluded from the taxable benefit. In this work, the service period of the plant goes beyond 100 years. Therefore, the residual values approach zero when the plant comes to an end. In the case of proportional tax, it is favorable for the plant to use the accelerated depreciation method. Popular accelerated depreciation methods include the double-declining-balance method and the annual summation method of depreciation. Different from the depreciation method applied by Zhou et al. [3], this paper considers the latter. The depreciation rate in the kth year can be expressed as

$$d^{k} = \frac{n \cdot (k \cdot 1)}{\frac{n \cdot (n \cdot 1)}{2}} = \frac{2 \cdot (n \cdot k + 1)}{n \cdot (n + 1)}$$
(8)

Consequently, the depreciation expense in the  $k^{th}$  year can be given by

$$D^{k} = C_{c} \cdot d^{k} \tag{9}$$

Let t and  $C_T^k$  denote the income tax rate and the tax cost in the k<sup>th</sup> year, respectively. Based on the above analysis, we have the following

$$C_T^k = \left(B_T^k - C_l^k - D^k\right)t$$
(10)

Where k=1, ..., n, and if k>m, then  $C_1^k = 0$  [2].

3.2.4. Total cost

Let  $C^k$  represent total costs of the solar power plant. Then

$$C^{k} = C_{p}^{k} + C_{l}^{k} + C_{o}^{k} + C_{T}^{k}$$
 (11)

Where k=1, ..., n, and if k>m,  $C_l^k = 0$  and  $C_p^k = 0$  [2].

### 3.3. Cost-benefit analysis

In order to perform economic analysis of the solar power plant, it is necessary to discount the net cash flow of every year during the whole service period. Whether investment projects are profit-able partly depends on the choice of the discount rate. Zhou et al. [3] used the conventional discount method considering the inflation rate. One major shortcoming of this method is that it does not consider the risk of the project. In the light of huge risk of RCSCPPs whose service periods exceed 100 years, this work uses the risk-adjusted discount rate method (RADRM). By combining the net present value method with the capital asset pricing model, the RADRM adjusts the standard discount rate in term of the degree of risk. Let  $\mu$ , b and Q denote the risk free discount rate, the risk return rate and the risk degree, respectively. Then the risk-adjusted discount rate ( $\rho$ ) can be expressed as [2]

$$\rho = \mu + bQ \tag{12}$$

Where b is calculated by the difference between the investment return rate demanded by the project and the minimum return rate dividing the coefficient of medium risk, and Q is measured by the standard deviation of present value dividing total present value of benefits during the whole service period. Thus, the net present value (NPV) of RCSCPPs in the k<sup>th</sup> year can be given by [2]

$$N P V^{k} = \frac{B^{k} - C^{k}}{(1 + \rho)^{k}}$$
(13)

Accordingly, total NPV(TNPV) becomes[2]

$$T N P V = \sum_{k=1}^{n} N P V^{k}$$
(14)

# 4. COST ESTIMATION OF AN RCSCPP BUILT IN THE DESERT REGIONS OF IRAN

Solar radiation varies in different parts of the world and in the sun belt of the earth is highest. Iran is located in areas of the High radiation and Studies show that the use of solar equipment in Iran is suitable and may provide part of the energy needed. Iran is a country which according to specialists wit

more than two-thirds of its 300 days of sunshine and an average exposure of  $4.5 - 5.5 \text{ kWh/m}^2$  per day, one of the countries with high potential in solar energy has been introduced. Some Solar experts step further and claim that the desert regions of Iran if fitted to the radiant energy system can satisfy the energy needed of a wide range of regional as well and be active in exporting

electricity. So the SCPP system has large potential of application in the desert regions of Iran [4]. This paper considers a 100 MW RCSCPP whose dimension (chimney height is 1000 m, chimney diameter is 110 m and collector diameter is 4300 m) is similar to the configuration Weibing Li et al [2].

#### 4.1. Initial investment estimation

Total initial investment of the RCSCPP consists of the investment on the collector, chimney and PCU.

# 4.1.1. Cost of the collector

The collector consists of transparent roof, column system and support matrix. Glass or plastic film is often used as collector cover material. Schlaich et al. and Bernardes evaluated the cost of different solar power plants which have plastic roofs. In comparison with a glass cover, a plastic film is easily age and readily destroyed in terrible environment. Here considers a glass cover. The collector cost includes the cost of materials. transportation cost and construction cost. In the estimation by Weibing Li et al. [2], construction cost and transportation cost were 20% and 2% of the cost of materials, respectively. This work employs the same in Iran. The prices of steel and 4 mm thick tempered glass are 23 million Rials/t and 185000 Rials/m<sup>2</sup>. respectively. Here neglects the land cost because solar power plants are usually built in the vast wastelands or mountainous regions. Based on the estimation by Li et al. [2], we can easily calculate the cost of the collector presented in Table 1.

# 4.1.2. Chimney cost

Collector

The chimney cost consists of the cost of materials, construction cost, transportation cost and hoisting cost. Considering the height of the chimney and the weather conditions, here supposes the chimney is built with the high performance concrete (C80) whose price is 4.3 million Rials  $/m^3$ .

The price of the reinforcement used in the plant is 23 million Rials/t and every cubic meter needs 120 kg of reinforcements. The construction cost including the concrete cover and labor cost is assumed 10 million Rials  $/m^3$  . The material hoisting cost of the high chimney is assumed to be 20% of

10179.65

the concrete and ring stiffener costs, excluding the transport cost. Based on the analysis of Weibing Li et al. [2] and the relevant prices in Iran, the cost of the chimney can be estimated in Table 2.

# 4.1.3. PCU cost

The PCU includes turbines, generators, electronic control equipments, grid-in apparatus and power plant infrastructure. At present, unit power investment of PCU is about 48 million Rials /kW. With a peak power of 66 MW this equals a total cost of 3168 milliard Rials for the PCU, which based on the analysis of Weibing Li et al. [2] unit equipment and infrastructure account for 75% and 20%, respectively. Table 3 presents the corresponding results.

	Table 1.	Cost of the collecto	r (milliard Rials).	
Component	Material cost	Construction cost	Transportation cost	Total cost
Glass	2686.57	537.31	53.73	3277.61
Column system	477.17	95.43	9.54	582.14
Support matrix	7015.91	1403.18	140.32	8559.41

Table 2. Cost of the chimney	(milliard Rials).
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203.59

12419.16

2035.92

Component	Material cost	Construction cost	Hoisting cost	Transportation cost	Total cost
Chimney shell	1188.38	1683.25	574.33	23.77	3469.73
Ring stiffeners	118.47	23.70	23.70	2.37	168.24
Chimney foundation	449.41	636.55	0.00	8.99	1094.95
Chimney	1756.26	2343.50	598.03	35.13	4732.92

Component	Unit equipment	Infrastructure	Others	Total
Cost	2376	634	158	3168

Table 3. Cost of the PCU (milliard Rials).

Table 4. Co	ost structure	of initial	investment

Component	Cost (milliard Rials)	Percent of total cost (%)
Collector	12419.16	61.12
Chimney	4732.92	23.29
PCU	3168	15.60
Total	20320.1	-

Table.5. Values of economic parameters used in carrying out cost-benefit analysis.

Economic parameter	Value
Inflation rate, $\theta$	20%
Interest rate of loans, r	4%
Income tax rate, t	25%
Repayment period of loans, m	30 years
The whole service period, n	120 years
Initial investment, C <sub>c</sub>	20320.1 milliard Rials
Annual electricity output, E <sub>s</sub>	255.2 GW h/a
Solar electricity sale price, P <sub>s</sub>	6900 Rials/kW h
Price of carbon credit, $P_c$	284900 Rials/t
Risk free discount rate, $\mu$	8%
Risk-adjusted discount rate, p	28.52%

## 4.1.4. Total investment

On the basis of the above analysis, total investment of the RCSCPP considered in this work amounts to 20320.1 milliard Rials, largely made up by the collector (61.12%) and the chimney (23.29%). The PCU makes a minor contribution (15.60%). Table 4 displays the cost of each component and its proportion of totalcost.

# 4.2. Operation and maintenance cost

Weibing Li et al. [2] specified the operation and maintenance cost of a 100 MW RCSCPP to be 1.9 million Euros in the first year of operation. Similar with Li et al., this paper employs the cost of 1.9 million Euros, namely 70.3 milliard Rials and supposes this cost increases with inflation rate.

# 5. COST-BENEFIT ANALYSIS OF THE RCSCPP BUILT IN THE DESERT REGIONS OF IRAN

# 5.1. Parameter value

The cost and benefit of the RCSCPP are determined by many parameters, including the inflation rate, the interest rate of loans, the income tax rate, the life span, the initial investment, the operation and maintenance cost and so on. Iran's average inflation rate in recent 10 years is about 20%. Therefore, this work takes 20% of inflation rate. Also here supposes that the RCSCPP can get a 4% interest rate loan whose repayment period is 30 years. Similar with Weibing Li et al. [2], this paper supposes the RCSCPP is legal entity to an income tax rate of 25% according to article 105 of Iran's direct taxes (income tax for legal entities) [5]. The base

rate approved by the Ministry of Energy to buy electricity from renewable power plants in 1393 under Article 4, paragraph B of Article 133 of the law of the Fifth Development Plan of the Islamic Republic of Iran (Act No. 100/37732 dated 91/05/08 Economic Council) determined the equivalent of 4628 Rials per kWh [4]. This paper will calculate the NPV of the RCSCPP according to the price of 6900 Rials/kW h. Similar with Weibing Li et al. [2], here takes GW h/a. a electricity output of 320

The minimum attractive rate of return (MARR) of the solar power industry is usually 8% [2]. Here supposes that the risk free discount rate () is equal to MARR. When the price of solar electricity () is set to 6900 Rials/kW h, it is easy to calculate the present value of benefits during the whole service period and its combined standard deviation, respectively 8845.73 and 22689.31 milliard Rials. Accordingly, the risk degree (Q) is 2.565. If the investment return rate demanded by the RCSCPP is set to 12%, and the coefficient of medium risk is 0.5, then the risk return rate (b) amounts to 0.08. Using Eq. (12), we can get the 28.52% of the risk-adjusted discount rate ( ). At present, the price of carbon credits pre tone is 7.7 Euros, namely 284900 Rials [2]. In the light of the above references and analysis, the values of economic parameters used in carrying out cost-benefit analysis are given in Table 5.

### 5.2. Cost-benefit analysis

Based on the economic model developed in this paper and relevant data, the detailed cost and benefit of the 100 MW RCSCPP are presented in Table 6. Conventional coal-

fired power plants are assumed to serve 30 years. To compare with coal-fired power plants, the whole service period of the RCSCPP is divided into four phases and TNPV of each phase is calculated and shown in Table 6. Because of the influence of the discount rate, TNPV decreases from 7775.1 milliard Rials in the first phase to 27.52 milliard Rials in the last phase. It is necessary to evaluate TNPV of the RCSCPP excluding the benefit of carbon credits. From Table 7, it can be seen that if the benefit of carbon credits is not included in the total benefit, TNPV will decrease from 9704.34 to 9243.65 milliard Rials, namely a 4.7% drops. The reason why the benefit of carbon credits has little influence on the TNPV is because the price of carbon credit is too low at present. TNPV estimated here shows the RCSCPP is economical under the strict assumptions.

price can reflect the advantages of the RCSCPP over coal-fired power plants. By analyzing the cost and benefit of the RCSCPP, we can derive the minimum solar electricity sale price which can make TNPV of the RCSCPP equal zero.

Table 7. TNPV of different	phase (	(milliard	Rials).
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Phase	TNPV (Include benefit of carbon credits)	TNPV (exclude benefit of carbon credits)
Phase 1	7775.117418	7373.164804
Phase 2	1686.284519	1634.940396
Phase 3	215.427847	208.869316
Phase 4	27.518063	26.680298
Total	9704.347848	9243.654814

The service period of the RCSCPP is three times longer than that of coal-fired power plants. For this reason, one RCSCPP is equivalent to four coal-fired power plants. After the RCSCPP pays off the loans in the first phase, it only incurs the operation and maintenance cost, depreciation cost and tax cost which are very low. At the same time, when a coal-fired power plant comes to an end after 30 years, there is a need to invest again to build a new plant which costs a lot. Under the circumstances, RCSCPPs can show huge advantages over coal-fired power plants. Applying similar method, we can calculate the minimum electricity sale prices of each phase which are displayed in Table 8. Table 8 shows the minimum electricity sale price in the whole service period is 2579 Rials/kW h if the benefit of carbon credits is included in thewhole benefits. Even though the benefit of carbon credits is excluded, the minimum price is still 2784 Rials/kW h. Both of the minimum prices are less than ongrid price of solar renewable power generation (4628 Rials/kW h), which shows the electricity from RCSCPPs is competitive with solar renewable power generation. The minimum electricity sale price of the first phase (2932 or 3137 Rials/kW h) is very close to 4628 Rials/kW h whether the benefit of carbon credits is included or not. The price maybe exceed the current market price of electricity (560 Rials/kW h), but if looking at the minimum price of the other phases, we will find that it (below 368 Rials/kW h) is far less than the current market price.

Phase M	Minimum electricity price in each phase					
	(Include benefit of carbon credits)	(exclude benefit of carbon credits)				
Phase 1	2932.000000	3137.000000				
Phase 2	163.000000	368.000000				
Phase 3	162.000000	367.000000				
Phase 4	162.000000	367.000000				
The whole service period	2579.000000	2784.000000				

# Table 8. Minimum electricity sale price of each phase (milliard Rials).

The above analysis indicates that the huge advantages of the RCSCPP over coal-fired power plants can be embodied in phase 2–4. The reason is that the RCSCPP need not make initial investment after the end of phase 1 and only incurs a low cost, but coalfired power plants need cost a lot to invest again so as to build a new plant after 30 years. The above estimation is based on a very low price of carbon credits. We expect the price of carbon credits will rise rapidly in the future, thus the competitiveness of RCSCPPs with coal-fired power plants will be more and more remarkable.

From Table 8, we also find that the minimum electricity price during the whole service period is very close to that of phase 1. The reason is that the RCSCPP need additional cost to repay huge loans in the first phase, but only incur a low cost in other phases. This analysis suggests that the government should set a higher price than the market electricity price for the RCSCPP in the first phase, but appropriately lower the price in other phases.

# 5.3. Sensitivity analysis

It can be seen from the above analysis that many parameters have effects on TNPV of the RCSCPP, such as the price of solar electricity, the price of carbon credits, the inflation rate, the interest rate of loans, and the income tax rate. To examine the effect of a certain parameter on TNPV, we will estimate TNPV by changing the value of one parameter in turn and keeping the values of other parameters unchanged.

# 5.3.1. Effect of the solar electricity price on TNPV

TNPV displayed in Table 6 is calculated at the solar electricity price of 6900 Rials/kW h. To make a sensitivity analysis, here supposes the maximum price of solar power electricity is 25 times as the market price of electricity (560 Rials/kW h) in Iran, namely 14000 Rials/kW h. Fig. 4 presents the computing result when the price ranges from 4628 to 14000 Rials/kW h.

From Fig. 4, it can be seen that a 103% increase in the price of electricity (from 6900 to 14000 Rials/kW h) causes TNPV during the whole service period to increase by 164.3% (from 9704.34 to 25650.1 milliard Rials). We can calculate the electricity price elasticity of TNPV is 1.59. This elasticity is greater than 1, so that TNPV responds substantially to changes in the price. To put it different, a slight change in the solar electricity price will lead to a big change in the TNPV.

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Fig. 4. Relation between TNPV with the solar electricity price.



Fig. 5. Relation between TNPV with the prices of carbon credits

# 5.3.2. Effect of the price of carbon credits on TNPV

Faced with the reduction of the price of carbon credits, the European Union started to take measures to reduce the supply of carbon emission permit. A report issued by European Commission predicts that the price of carbon credits during 2013-2020 will reach 30 Euros/t (namely 1200000 Rials/t). Seeing that the European carbon trading volume accounts for more than 85% of global carbon trading volume, this work uses this price to make sensitivity analysis. Fig. 5 shows the corresponding result under the condition that the price of carbon credits ranges from 200000 to 1200000 Rials/t.As can be seen from Fig. 5, a 140% increase in the price of carbon credits (from 500000 to 1200000 Rials/t) gives rise to a 11.26% increase in TNPV (from 10052.17 to 11184.09 milliard Rials), which means a carbon credits price elasticity of TNPV of 0.08. This elasticity is far less than 1, thus TNPV responds only slightly to changes in the price of carbon credits. In other words, a big change in the price of carbon credits only result in a slight change in TNPV.

# 5.3.3. Effect of income tax rate on TNPV

The income tax rate of an individual in article 131 of direct taxes in Iran (income tax of businesses) is to 35%. In the previous analysis, we suppose the RCSCPP is regarded as a legal entity and taxed according to the income tax rate of 25%. Using the model developed earlier, we can calculate TNPV at the two income tax rates (Table 9). Table 9 shows TNPV decreases with increases in the income tax rate because the tax is one cost of the RCSCPP. The income tax rate elasticity of TNPV is -0.45, which means a big increase in the income tax rate only leads to a small decrease in TNPV.

# 5.3.4. Effects of inflation rate and interest rate of loans on TNPV

This work supposes the values of many parameters increase with the inflation rate. So TNPV will increase with the inflation rate. Fig. 6 depicts the relation between TNPV during the whole service period with the inflation rate from 10% to 35%. The interest rate is the opportunity cost of loans. The annual interest payment of loans depends on the interest rate. Therefore, TNPV will decrease with the increase in the interest rate of loans in theory. Fig. 7 displays the variations of TNPV during the whole service period with different interest rates from 1% to 9%. Fig. 6 shows that TNPV is very sensitive to the change of inflation rates. For example, TNPV increases from 2378.4 to 90111.42 milliard Rials with increase in the inflation rate from 12% to 28% which means an elasticity of 27.67. Meanwhile Fig. 7 shows that TNPV responds only slightly to changes in the interest rate of loans, which can be proved by the fact that TNPV decreases from 10176.29 to 8760.46 milliard Rials with increase in the interest rate of loans from 3% to 6%.



# Table 9. TNPV during the whole service period at different income tax rates.

Fig. 5. Relation between TNPV with the prices of carbon credits.



Fig. 6. Relation between TNPV with the inflation rate.



Fig. 7. Relation between TNPV with the interest rate.

#### 6. CONCLUSIONS

This paper develops an economic model to analyze the cost-benefit of the RCSCPP built in the desert regions of Iran. The model uses risk-adjusted discount rate method which considers the huge risk of SCPPs. Another feature of this model is that it applies equal principal repayment method which can save the interest cost, but existing studies usually use annuity method. In addition, this model considers the annual summation method of depreciation which is different from existing studies. The initial investment estimated in this paper is 20320.1 milliard Rials. Based on the model presented in this work, we calculate that TNPV during the whole service period is 9704.34 milliard Rials under some assumptions on parameter

values including loans at an interest rate of 4%, an income tax rate of 25%, and collection of additional benefit generated from carbon credits. By dividing the whole service period into four phases and calculating the minimum price of electricity, we find the minimum price of phase 1 is very close to 4628 Rials/kW h which is higher than the current market price of electricity. But if looking at the minimum price of the other phases, we become aware of that it is below 368 Rials/kW h which is far lower than the price of coal-fired power generation. The analysis predicts that huge advantages of the RCSCPP over coal-fired power plants can be embodied in the phase 2–4. The policy implication here is that the government should provide subsidy for RCSCPPs by setting higher electricity price

in the first phase, then lower electricity price in the other phases. By sensitivity analysis, this paper discovers TNPV is very sensitive to changes in the electricity sale price and inflation rate, but responds only slightly to changes in carbon credits price, income tax rate and interest rate of loans. The costbenefit analysis of the RCSCPP built in the desert regions of Iran shows that the RCSCPP has very good application prospect.

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Year	Benefit				Cost					
	Electricity sale	Carbon credits	Principal repayment	Interest repayment	O & M cost	Annual depreciation	Tax	Net benefit	NPV	
hase 1										
000000	1760 880000	2 249666	677 226667	012 004000	70 200000	457.061002	25 940016	240 112020	264 6290	004
.000000	2113.056000	2.818399	677.336667	785.710533	84.360000	453.252161	234.227926	-59.012889	-35.727731	1 1
8.000000	2535.667200 7	5.382078	677.336667	758.617067	101.232000	449.443320	350.747223	273.67300	2 128.9198	54
000000	3042.800640 9	08 550103	677 336667	731.523600	121.478400	445.634478	489.025264	668.26072	5 244.9418	93
5.000000	4381.632922 1	30.260232	677.336667	677.336667	174.92889	6 438.016795	849.13492	3 1695.139	206 376.16	7324
.000000	5257.959506 1	56.312278	677.336667	650.243200	209.91467	5 434.207953	1082.4551	58 2360.11	4131 407.5	09734
3.000000	6309.551407 1	87.574733	677.336667	623.149733	251.89761	0 430.399111	1360.8943	24 3153.44	8695 423.6	62510
0.000000	9085,754026	270,107616	677.336667	596.056267	302.27/13	2 426.590270 59 422.781428	2091.029	354 5233.0	4825 428.6	642641
1.000000	10902.904831	324.129139	677.33660	57 541.8693	33 435.279	070 418.97258	2566.54	8013 6587.	028301 416	5.880560
12.000000	13083.485798	388.954967	677.33666	57 514.7758	57 522.334	885 415.16374	5 3135.62	5288 8207.	204314 404	4.153778
13.000000	15700.182957	466.745961	677.33666	487.6824	00 626.801	862 411.35490	3 3816.97	2904 10146	.780183 38	88.784491
15.000000	22608.263459	672.114184	677.3366	400.5689	67 902.594	681 403.73721	9 5610.78	6239 15252	427370 35	53.816606
16.000000	27129.916150	806.537020	677.33666	406.4020	00 1083.11	3617 399.9283	6782.5	30698 1858	7.141811 3	335.491207
17.000000	32555.899380	967.844424	677.33666	379.3085	33 1299.73	6340 396.1195	36 8187.0	78934 2258	4.163795 3	317.177103
18.000000	39067.079256	1161.41330	677.3360	67 352.215	067 1559.6	83608 392.310	694 9870.	991701 273	75.954829	299.155073
20.000000	56256.594129	1672.43516	677.336	67 298.028	133 2245.9	44396 384.693	011 14311	1.577038 40	011.450050	264,709759
21.000000	67507.912955	2006.92219	677.336	67 270.934	667 2695.1	33275 380.884	169 17215	5.754079 48	274.792297	248.505131
22.000000	81009.495546	2408.30663	8 677.3366	67 243.841	200 3234.1	59930 377.075	328 20699	9.221414 58	186.167646	233.057982
23.000000	9/211.394655	2889.96/96	677 336	216./4/	/33 3880.9	91916 3/3.266	7644 2000	.83/100 /0	0/5.182/19	218.392515
25.000000	139984.408304	4161.5538	677.330	667 162.56	0800 5588.	628358 365.64	8803 3590	04.438143 1	01447.349404	4 191.413596
26.000000	167981.289964	4993.8646	677.336	667 135.46	7333 6706.	354030 361.83	9961 4311	19.461829 1	21974.694789	9 179.073409
27.000000	201577.547957	5002 6275				CD 400C 000 00	1110 517	75.945136 1	46602.873906	6 167.468499
	241002 057540	3992.037	6/1.330	108.37	386/ 804/.	624836 358.03	277 6216	170000 17	C1 53 053400	156 560671
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28.000000 29.000000 30.000000	241893.057548 290271.669058 348326.002870	7191.1650 8629.3981 10355.277	074         677.330           088         677.330           06         677.330           0727         677.330	667         108.37           667         81.280           667         54.186           6667         27.09	400 9657.1 933 11588. 3467 13906	49803 354.222 579764 350.41 5.295717 346.6	277 62162 3436 7462 04594 895	2.179990 17 24.116699 2 576.895634	6152.053499 11606.433666 254147.05451	156.569671 6 146.345064 19 136.761411
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29.00000 29.000000 20.000000 TNPV 1 'ear Phase 2	241893.057548 290271.669058 348326.002870 Benefit Electricity sale	Carbon credits	07/3 677.33 188 677.33 06 677.33 727 677.33 727 677.33	108.37 108.37 1667 81.280 1667 54.186 16667 27.09 Interest repaymen	8067 8047. 900 9657.1 933 11588. 3467 13906 Cost- Cost- 0 & M t cost	624836 3386.03 94903 354.222 579764 350.41 3295717 346.6 Annual deprecial	277 62162 3436 7462 04594 899	2.179990 17 24.116699 2 376.895634	r6152.053499 11606.433666 254147.05451 77 et enefit	156.569671 6 146.345064 19 136.761411 775.117418 NPV
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28.00000 30.00000 30.00000 TNPV 1 //ear Phase 2 31.00000 32.000000 33.000000 34.000000 35.000000 36.000000 38.000000 38.000000 39.000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 266746.559461 1040095.871355 1248113.04562 2180742.798833 2156742.798833	Carbon credits 12426.333 14911.599 17893.915 21472.703 25767.244 3 30920.65 4 37104.83 44525.75 5 53430.95 5 76940.55	Principal repayment 272 0.0000 9912 0.0000 9912 0.0000 9912 0.0000 9915 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9916 0.0000 9917 0.0000 9918 0.00000 9918 0.0000 9918 0.00000 9918 0.00000 9918 0.00000 9918 0.00000 9918 0.00000 9918 0.00000 9918 0.00000 9918 0.00000000000000000000000000000000000	108.37         108.37           10667         128.30           15667         13.280           15667         54.186           16667         27.09           16667         27.09           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000           1000         0.00000	0 16687.55 0 16687.55 0 20025.06 0 24030.07 0 24030.07 0 34603.31 00 41523.9 00 49828.7 00 59794.5 00 71753.4 00 103324.	Annual 4860 157.8512 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 58999 154.3434 4798 152.5895 76510 149.081 71811 147.327 31408 143.820 17690 142.066 149.081 71810 145.573 31408 143.820 17690 142.066 140.31	tion T 75 107566 169 15491 169 15491 166 185902 176 223090 176 26771 1857 32122 1954 38552 1051 4626 1148 55511 2245 6662	.179990 17 24.116699 2 576.895634 	6152.053499 111606.433666 254147.05451 77 	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 19 79.293556 14 74.038236 27 69.131008 782 64.548864
28.000000 39.000000 30.000000 TNPV 1 //ear Phase 2 31.000000 32.000000 33.000000 35.000000 36.000000 38.000000 41.000000 41.000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.32959 722288.799551 1040095.871353 1248115.04562 1197738.054746 1797285.665699 2156742.798833 2588091.358609	Carbon credits 12426.333 14911.595 2177 25767.244 30920.66 37104.83 44525.77 53430.99 576940.55 576940.55 57692328.66	1/4         6/7.33           86         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         0.000           1/27         0.000           1/27         0.000           1/27         0.000           1/27         0.000           1/27         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/2632         0.000           1/2632         0.000           1/2632	108.37         108.37           6667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           000         0.00000           000         0.000000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000	0         16687.55           0         28836.09           0         16687.55           0         28836.09           0         24836.09           0         24030.07           0         28836.09           0         44603.07           0         49828.7           00         49828.7           00         39794.5           00         71753.4           00         103324.           00         123989.	4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 929474 138.55	tion T 275 107564 175 107564 175 107564 172 129088 169 154911 166 185902 163 223090 163 223090 163 223090 163 223090 163 223090 163 22309 163	2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .228470 52 .742118 63 .228470 52 .742118 63 .236672 36 .742118 63 .236672 36 .742118 63 .228470 52 .742118 63 .228470 52 .742118 63 .228470 52 .742118 63 .228470 52 .742118 63 .229.66670 74 .942092	76152.053499 111606.433666 254147.05451 77 	156.569671 156.569671 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307
28.00000 39.000000 30.000000 TNPV 1 Trear Phase 2 31.000000 32.000000 33.000000 35.000000 35.000000 38.000000 41.000000 13.000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.32959 722288.799551 866746.559461 1040095.871353 1248115.045624 199728.665699 2156742.79883 2588091.358609 2156742.79883	Carbon credits 12426.333 19355.277 10357.277 10357.2777 10357.2777 10357.2777 10357.2777 10357.2777 10357.2777 10357	1/4         6/7.33           1/86         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         0.0000           1/27         0.0000           1/27         0.0000           1/27         0.0000           1/27         0.0000           1/27         0.0000           1/272         0.0000           1/272         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000           1/260         0.0000	108.37 5667 108.37 5667 11.280 5667 54.186 5667 27.09 Interest repaymen 000 0.00000 000 0.00000 100 0.00000 100 0.00000 1000 0.000000 1000 0.000000 1000 0.00000000000000000000000000000000	Cost- Cost-	Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 31408 143.820 17690 142.066 941228 140.31 31408 143.820 17690 142.066 31428 143.821 31408 143.820 31408 14	277 62162 3436 7462 504594 895 tion T 275 107564 72 129084 169 154911 566 185902 563 22309 760 26777 7857 32126 954 38552 760 26771 7857 32126 954 38555 12245 6665 5148 55512 2245 6665 5148 55512 5148 55555 5148 55555 5148 55555 5148 55555 5148 55555 5148 5	2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .228470 52 .742118 63 .742118 63 .743118 63 .742118 63 .744118 63 .742118 .7	76152.053499 11606.433660 254147.05451 77 et enefit 16007.209221 17233.644183 18870.590611 14668.912596 1096794.18351 118955.4640761 096794.18351 118955.43.7785 11895343.7785 2724343.8966 2724934.3975	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 47.40.38236 2 90.948662 1 84.921586 19 79.293556 47.40.38236 2 90.948662 2 69.131008 782 64.548864 803 60.270307 5342 56.275252
28.000000 99.000000 19.000000 TNPV 1 TRPV 1 Thase 2 81.000000 82.000000 83.000000 83.000000 83.000000 14.000000 12.000000 13.000000 14.000000 15.000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 866746.559461 1040095.871353 1248115.045624 1497738.054744 1797285.66559 2156742.798833 258091.358605 3105709.630322 3105709.63032 3105709.63020	Carbon credits 12426.333 14911.599 17893.912 21472.703 25767.244 30920.66 37104.83 344525.76 353430.99 64117.11 5 76940.55 92326 910794.4 159543.26	1/4         6/7.33           1/8         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000	108.37 5667 81.280 5667 81.280 5667 54.186 5667 27.09 Interest repaymen 100 0.00000 100 0.00000 100 0.00000 100 0.00000 100 0.00000 100 0.00000 1000 0.00000 1000 0.00000 1000 0.00000 1000 0.00000 1000 0.00000 1000 0.00000 10000 0.00000 1000 0.00000 10000 0.000000 10000 0.00000 10000 0.00000 10000 0.00000 10000 0.00000 10000 0.000000 10000 0.0000000000000000000000000000000	386/         804/.0           400         9657.1           933         11588.           3467         13906           Cost-           0         8.687.55           0         20025.06           0         24836.09           0         43828.7           00         41523.9           00         43528.7           00         86104.1           00         123248.9           000         148787           000         148787           000         144787           000         144787	Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 76510 149.081 76510 149.081 76510 142.066 941228 140.31 76590 142.066 941228 140.31 941228 143.55 9515369 136.8 498442 135.0 598131 133 2	277 62162 3436 7462 304594 895 tion T 275 107564 72 129084 166 185902 166 185902 167 185902 166 185902 167 1857 167 1857	4.921360 30 5.236672 36 5.236672 36 5.236672 36 5.236672 36 5.23677 36 7.228470 52 5.74118 63 16.870800 7 58.138780 7 58.138780 7 59.569898 1 99.470739 1 222.906670 19.470739 1 222.90670 19.470739 1 222.90670 19.470739 1 222.90670 1 19.470739 1 22.90670 1 19.470739 1 22.90739 1 22.90749 1 22.90749 1 22.90749 1 22.90749 1 22.90749 1 22.	77 11606.433660 254147.05451 77 et enefit 16007.209221 17233.644183 10705.103053 18870.590611 14668.912596 16126.63592 16126.63592 16126.63592 16126.640761 096794.18355 16126.640761 096794.18355 16126.43924 16126.440761	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 47 4.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835
rs.000000 90.000000 rNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 866746.559461 1040095.871353 1248115.045624 1997738.054744 1797285.665699 2156742.798833 2588091.358605 3105709.630322 3726851.555393 4472221.867677 5366666.241200 6439999.48944	Carbon credits 12426.333 14911.599 17893.910 21472.703 25767.244 30920.66 37104.83 44525.75 364117.15 576940.55 56940.55 5110794.4 132953.3 4159543.5 5191452.7	Principal repayment Principal repayment 272 0.0000 927 0.00000 927 0.00000 927 0.00000 927 0.00000 927 0.00000000000000000000000000000000000	108.37 5667 108.37 5667 81.280 5667 54.186 5667 27.09 Interest repaymen 100 0.00000 000 0.00000 000 0.00000 000 0.00000 000 0.00000 000 0.00000 0000 0.0000 0000 0.00000 0.000000 0.00000 0.00000 0.00000 0.00000 0.00000000	0 16687.55 0 20025.06 0 24030.07 0 28836.09 0 34603.31 00 41523.90 0 49828.7 00 59794.5 00 49828.7 00 49828.7000000000000000000000000000000000000	Annual 4860 157.8512 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 76501 149.081 76510 149.081 76510 149.081 76510 149.081 941228 140.31 929474 138.55 915369 136.8 .498442 135.0 .598131 133.2 .517757 131.5	277 62162 3436 7462 304594 895 tion T 275 107564 372 129086 166 185902 363 223090 760 2677 1857 32122 1954 38552 1051 46264 38342 7994 148 55511 2245 6662 38342 7994 148 5551 11996633 138 1996633 138 1997 19	A.921360 30 5.236672 36 5.236672 36 5.236672 36 1.727351 44 5.228470 52 5.742118 63 16.870800 7 29.569898 1 43.201051 1 222.906670 43.201051 1 222.906670 474.942092 3377.296903 51260.034982 31519.232981	6152.053499 11606.433666 254147.05451 77 	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 00503 52.544936 00812 49.061835 30896 45.809576
23.000000 29.000000 20.000000 TNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 1040095.871353 1248115.045622 4197738.054744 1797285.66559 2156742.798833 2588091.358603 3105709.630322 3726851.555392 4472221.867670 5366666.24120 6439999.48944 7727999.38733	Carbon credits 12426.333 14911.599 17893.912 21472.703 25767.244 30920.66 437104.83 44525.79 5640.58 964117.15 576940.58 964117.15 576940.58 9110794.4 132953.3 4159543.5 191452.7 5191452.7	Principal repayment Principal repayment 272 0.0000 927 0.0000 923 0.0000 923 0.0000 925 0.00000 925 0.0000 925 0.00000 925 0.0000 925 0.00000 925 0.00000 925 0.00000000000000000000000000000000000	108.37         108.37           10667         108.37           15667         81.280           15667         54.186           15667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           1660         0.0000           100         0.00000           1000         0.0000           10000         0.0000           10000         0.0000           10000         0.0000           10000         0.0000           10000         0.0000           10000         0.0000	0 16687.55 0 20025.06 0 2403.07 0 2883.09 0 16687.55 0 20025.06 0 24030.07 0 28836.09 0 34603.31 00 41523.9 0 34603.31 00 49828.7 00 59794.5 00 49828.7 00 59794.5 00 49828.7 00 59794.5 00 49828.7 00 17753.4 00 49828.7 00 49828.700000000000000000000000000000000000	Annual 49803 354.222 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 150.8356 76510 149.081 150.8356 76510 149.081 150.8356 76510 149.081 1049.081 10590 136.8 591369 136.8 .498442 135.0 .598131 133.2 .517757 131.5 .621308 129.7	277 62162 3436 7462 3436 7462 304594 899 tion T 275 107566 172 129086 169 154911 166 185902 166 185902 166 3223090 7760 26771 1857 32122 1954 38552 1954 38552 1954 38552 115 195633 133 196633 133 196633 135 196633 135 19673 1977 1	A.921360 30 5.236672 36 5.236672 36 1.727351 44 5.228470 52 0.742118 63 16.870800 7 222.906670 17 4.942092 19 222.906670 174.942092 15 13.201051 1 222.906670 174.942092 15 13.201051 1 222.906670 174.942092 15 13.77.296903 51260.034982 1519.232981	6152.053499 11606.433660 254147.05451 77 et enefit 7233.644183 10705.103053 18870.590611 13975.640761 1395743.7787 2274434.8966 272934.3,7787 2274434.8966 272934.3,7787 2272934.975 3275234.60 3930303.11 4716385.02 5659683.00 565959683.00 565959683.00 565959595000000000000000000000000	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 111.715754 104.314587 97.402956 2 90.948662 18 49.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.809576 83912 42.772873
23.000000 29.000000 20.000000 TNPV 1 (ear 20.00000 21.0000000 21.0000000 21.000000 21.0000000 21.0000000 21.000000000000000000000000000000000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 266746.559461 1040095.871353 1248115.04562 2156742.798833 21805709.630326 3105709.63026 3105709.63026 3105709.63026 3105709.63026 3105709.63026 310570000000000000000000	Carbon Carbon credits 12426.333 14911.595 17893.915 21472.702 21472.702 21472.703 30920.66 430920.66 430920.66 44525.77 53430.91 576940.55 592328.66 2110794.4 132953.3 4159543.5 519452.7 429743.3 229743.3 229743.3	1/4         6/7.33           1/8         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000	108.37         108.37           10667         108.37           15667         81.280           15667         54.186           15667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           16667         27.09           1600         0.00000           100         0.00000           100         0.00000           100         0.00000           100         0.00000           1000         0.00000           1000         0.00000           10000         0.00000           10000         0.00000           10000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000	0 16687.55 0 16687.55 0 20025.06 0 24030.07 0 28836.09 0 34603.31 0 41523.9 0 41523.9 0 41523.9 0 41523.9 0 41523.9 0 34603.31 0 41523.9 0 34603.31 0 41523.9 0 34603.31 0 10324.4 0 10324.4 0 10324.4 0 10324.4 0 10324.4 0 123899 0 0 148787 0 0 178545 0 0 214256 0 0 257105 0 0 308526 0 0 308526 0 0 308526 0 0 0 44427 0 0 308526 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Annual 4860 157.8512 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 5899 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 7690 142.066 941228 140.31 929474 138.55 .915369 136.8 .498442 135.0 .598131 133.2 .517757 131.5 .621308 129.7 .945570 128.0 .8334684 126	tion T 2275 62162 3436 7462 504594 895 tion T 275 107566 469 154911 566 185902 469 154911 566 185902 469 232309 469 232309 469 232309 469 232309 469 23230 485551 485551 485551 505536 115 996633 138 442729 165 442729 165 445 445 445 445 445 445 445 4	.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .2576.895634 .2576.895634 .228472 3 5.236672 36 5.236672 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.236670 36 5.23675 36 5.2575 36 5.25755 36 5.2575555 36 5.	6152.053499 11606.433660 254147.05451 77 et enefit 6007.209221 7233.644183 0705.103053 18870.590611 4668.912596 61626.63589 13975.643761 316176.1717 57943.29452 316176.17174 57943.29452 316176.17174 57943.29452 316176.17174 57943.29452 316176.17174 57943.29453 316176.17174 579434.29452 316176.17174 579434.29452 316176.17174 579434.29452 316176.17174 579434.29452 316176.17174 579434.29452 3275234.66 3930303.10 4716385.00 5659683.00 6791640.48 8 1400890	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 00503 52.544936 00812 49.061835 30896 45.809576 83912 42.772873 84446 39.937445 102001 37.2986
23.000000 29.000000 20.000000 TNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.322959 722288.799551 1040095.871353 1248115.04562 2156742.79883 2588091.358600 2156742.79883 2588092.258800 2156742.79883 2588092.258800 2156742.79883 258800 2156742.79883 258800 2156742.79883 258800 2156742.79883 258800 2156742.79883 258800 2156742.79883 215774 215774 215774 215774 2157774 2157774 215777777777777777777777777777777777777	Carbon credits 12426.333 14911.595 17893.913 21472.703 25767.244 30920.66 437104.83 44525.77 5444525.77 55430.93 54430.93 54430.93 54417.115 56 92328.66 2110794.4 132953.3 4 159543.5 5 191452.7 229743.3 275692.0 51 330830	1/4         6/7.33           1/86         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         0.000           1/27         0.000           1/272         0.000           1/272         0.000           1/2730         0.000           1/2300         0.000           1/2300         0.000           1/2300         0.000           1/2300         0.000           1/2300         0.000           1/2300         0.000           1/252793         0.00           1/252793         0.00           1/252793         0.00           1/25320         0.00           1/25320         0.00           1/25320         0.00           1/25320         0.00           1/25320         0.00           1/25320         0.00           1/25430         0.00	108.37         108.37           6667         81.280           5667         81.280           5667         54.186           16667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000	386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0.8 M           0         16687.55           0         20025.06           0         24030.07           0         28836.09           0         44603.31           00         49828.7           00         49828.7           00         13324.           00         149828.7           000         143783.           000         14324.           000         14328.9           000         148783.           000         148783.           000         244254           000         27023.0           000         370231           0000         370231           0000         3412.5	4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 142.06 941228 140.31 929474 135.05 31408 142.06 941228 140.31 329474 135.05 515757 131.5 598131 133.2 5517757 131.5 521308 129.7 .945570 128.0 8.334684 128.1 4.001621 124.1 4.001621 124.1 4.001	tion T 275 107564 504594 895 504594 895 504594 895 504594 895 504594 895 50563 122098 5051 6267 5051 627 5051 6267 5051 627 5051 627 5051 627 5052 627 5	4.921360 30 5.236672 36 5.236672 36 5.23672 36 5.23573 37 5.23672 37 5.23573 37 5.27572 37	6152.053499 111606.433660 254147.05451 77 	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 05503 52.544936 00812 49.061835 30896 45.809576 393912 42.772873 84446 39.937445 102001 37.289959
23.00000 29.000000 20.00000 TNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.32959 722288.799551 866746.559461 1040095.871353 1248115.045624 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2588091.358609 2156742.79883 2999.84834 237599.264801 11128319.1177 13353982.94131 16024779.52955	Carbon credits 12426.333 14911.590 1793.915 21472.703 25767.244 3 30920.64 3 30920.65 4 37104.83 3 44525.75 6 543.55 9 2326.65 9 110794.4 9 132953.3 5 130830 6 4117.15 5 76940.55 9 2326.65 9 110794.4 9 132953.3 5 191452.7 4 29743.3 2 275692.0 3 396996 76 476395	1/4         6/7.33           1/8         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         60000           1/272         0.0000           1/292         0.0001           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/260         0.000           1/261         0.000           1/262         0.000           1/263         0.000           1/264 <td>108.37         108.37           6667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.0000           000000         0.0000</td> <td>386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0           0         8687.55           0         20025.06           0         24030.07           0         28836.09           0         44603.31           00         41523.9           00         44828.7           00         71753.4           00         123989.           000         148787           000         148787           000         148787           000         308526           000         370231           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313  </td> <td>Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 31408 143.820 17690 142.066 941228 140.31 138.5 5.915369 136.8 5.945870 128.0 5.621308 129.7 .945570 128.0 8.334684 126. .04801945 122.</td> <td>277 62162 3436 7462 504594 895 tion T 275 107564 72 129084 169 154911 166 185902 163 22309 164 38552 1760 26771 7857 32126 1654 38552 1051 46264 5051 46264 5052 46264 505</td> <td>4.921360 30 5.236672 33 4.921360 30 5.236672 33 5.236672 33 5.236672 33 5.236672 34 2.228470 52 5.742118 63 5.236672 34 2.228470 52 5.742118 63 5.236672 34 5.236672 34 5.236672 34 5.23672 34 5.23672 34 5.23672 34 5.23672 35 5.23672 35 5.23723 35 5.23725</td> <td>76152.053499 111606.433666 254147.05451 77 et enefit 16007.209221 17233.641183 18870.590611 14668.912596 1096794.18351 18975.640761 096794.18351 1895343.7785 227434.8966 2729343.975 3275234.60 3930303.11 4716385.02 5559683.08 6791640.48 8 8149989.3 1 978007.1 2 11736028</td> <td>156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 111.71574 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 005103 52.544936 00812 49.061835 30896 45.809576 83912 42.772873 84446 39.937445 102001 37.289959 125.0822</td>	108.37         108.37           6667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.0000           000000         0.0000	386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0           0         8687.55           0         20025.06           0         24030.07           0         28836.09           0         44603.31           00         41523.9           00         44828.7           00         71753.4           00         123989.           000         148787           000         148787           000         148787           000         308526           000         370231           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313           0000         53313	Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 31408 143.820 17690 142.066 941228 140.31 138.5 5.915369 136.8 5.945870 128.0 5.621308 129.7 .945570 128.0 8.334684 126. .04801945 122.	277 62162 3436 7462 504594 895 tion T 275 107564 72 129084 169 154911 166 185902 163 22309 164 38552 1760 26771 7857 32126 1654 38552 1051 46264 5051 46264 5052 46264 505	4.921360 30 5.236672 33 4.921360 30 5.236672 33 5.236672 33 5.236672 33 5.236672 34 2.228470 52 5.742118 63 5.236672 34 2.228470 52 5.742118 63 5.236672 34 5.236672 34 5.236672 34 5.23672 34 5.23672 34 5.23672 34 5.23672 35 5.23672 35 5.23723 35 5.23725	76152.053499 111606.433666 254147.05451 77 et enefit 16007.209221 17233.641183 18870.590611 14668.912596 1096794.18351 18975.640761 096794.18351 1895343.7785 227434.8966 2729343.975 3275234.60 3930303.11 4716385.02 5559683.08 6791640.48 8 8149989.3 1 978007.1 2 11736028	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 111.71574 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 005103 52.544936 00812 49.061835 30896 45.809576 83912 42.772873 84446 39.937445 102001 37.289959 125.0822
28.00000 29.000000 30.000000 TNPV 1 Fear Phase 2 31.000000 33.000000 33.000000 33.000000 35.000000 36.000000 37.000000 38.000000 38.000000 39.000000 41.0000000 41.0000000 41.000000 41.00000000000 41.00000000 41	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 866746.559461 1040095.871353 1248115.045624 1497728.665699 2156742.798833 2588091.358609 2156742.798833 2588091.358659 2156742.798834 258691.556392 4472221.867670 3105709.43294 3105299.438444 7727999.38733 2536666.241200 6439999.489445 7727999.264801 11128319.1177 1353982.94131 16024779.52955 19229735.43544	Carbon credits 12426.333 14911.599 1789.3912 21472.703 25767.244 330920.66 37104.83 344525.77 353430.99 64117.11 576940.55 92328.66 2110794.4 353430.99 64117.11 576940.55 92328.66 2110794.4 3159543.3 3459543.3 359543.5 5191452.7 4229743.3 275692.0 51330830 33396996 64 476395 571674	1/4         6/7.33           1/8         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000	108.37         108.37           5667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           0000         0.00000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000	386/         804/.0           400         9657.1           933         11588.           3467         13906           Cost-         0           0         8687.55           0         20025.06           0         24030.07           0         34603.31           00         41523.9           00         43628.7           00         14523.9           00         148787           000         17753.4           000         178544           000         178545           000         178545           000         178545           000         178545           000         144270           0000         53112           0000         44427           0000         63976           00000         63976           00000         63976           00000         63976           00000         63976           00000         63976           00000         63976           00000         63976           00000         63976           00000         63976	Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 76510 149.081 76510 149.081 76510 149.081 76510 149.081 76510 149.081 941228 140.31 9.915369 136.8 4.98442 135.0 5.921757 131.5 5.621308 129.7 13.5 5.621308 129.7 14.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.621308 129.7 15.5 5.5 5.5 5.5 5.5 5.5 5.5 5.	277 62162 3436 7462 304594 895 tion T 275 107564 72 129084 166 185902 166 185902 167 1857 167 1857 1	4.921360 30 5.236672 36 4.921360 30 5.236672 36 5.236672 36 1.727351 44 2.228470 52 5.76.89503 7 58.137524 52 5.742118 63 58.137524 52 5.742118 63 58.137524 52 59.569898 1 9.470739 1 222.906670 7 58.137524 52 57830.18284 39403.235073 57830.18284 39403.235073 57830.18284 39403.235073 57290.810005 564755.81222 437713.72720	6152.053499 11606.433660 254147.05451 77 et enefit 16007.209221 17233.644183 10705.103053 18870.590611 14668.912596 113975.640761 096794.18351 18975.40761 096794.18351 18975.40761 096794.18351 18975.40761 096794.18355 2729343.975 3275234.66 2729343.975 3275234.66 2729343.975 3275234.66 2729343.975 3275234.66 1895007.12 11736028 3 14083254 1 19780007.1 1 11736028 3 14083254 1 19780007.20 1 11736028 3 14083254 1 1978007.20 1 11736028 3 14083254 1 1978007.20 1 11736028 3 14083254 1 1978007.20 1 197807.20 1 19	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 47.40.38236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.809576 33912 42.772873 84446 39.937445 102001 37.289959 179981 34.817961 610472 22.50985
28.00000 29.000000 30.000000 TNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 1040095.87135; 1248115.04559461 1040095.87135; 1248115.04559461 1040095.87135; 1248115.0456445 1797285.66569 2156742.798833 2588091.358600 3105709.630322 4472221.867670 5366666.24120 4727999.38733 9273599.264800 11128319.11777 13353982.94131 16024779.52955 19229735.43544 23075682.52255	Carbon credits 12426.333 10355.277 131.1650 8629.3981 10355.277 10	1/4         6/7.33           1/8         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000           1/2         0.0000 </td <td>108.37         108.37           5667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest repaymen           100         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.00000</td> <td>386/         804/.0           400         9657.1           933         11588.           3467         13906           Cost-         0           0         8.67           13906         11588.           3467         13906           0         8.67           0         8.67           13906         2.0025.06           0         24836.09           0         34603.31           00         49828.7           00         59794.5           00         1753.4           00         123890.           000         178545           000         214254           000         257105           000         3308522           000         330822           0000         53312           0000         53312           0000         53312           0000         63370           0000         76771           0000         92122</td> <td>Annual 49803 354.222 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 76510 149.081 76510 149.081 929474 138.55 921368 143.206 941228 140.31 929474 138.55 921308 129.7 131.5 .51757 131.5 .621308 129.7 .945570 128.0 8.334684 126. 4.0801945 122. 2.962334 121. 5.554801 119. .5.554801 112. .5.554801 121. .5.554801 121. .5.</td> <td>277 62162 3436 7462 3436 7462 304594 895 275 107564 275 107564 272 129086 166 185902 166 185902 166 185902 166 185902 166 185902 167 2129086 168 223090 1760 26771 1857 32126 1857 32126 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1956 33 138 1956 321 1956 32 1957 321 1956 32 1957 32</td> <td>A.921360 30 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-23672 36 5-25672 36 5-25672 36 5-25672 36 5-25672 36 5-25672 36</td> <td>6152.053499 11606.433660 254147.05451 77 et enefit 60007.209221 7233.644183 10705.103053 10705.103053 10705.103053 10870.590611 14668.912596 61626.635892 579434.29452 11895543.778 2274434.8965 2274434.8965 2274434.8965 2729343.075 3275234.60 3930303.11 4716385.03 56559683.00 6791640.46 8 8149989.1 1 9780007.1 1 978007.2 1 117360.28 3 14083254 5 1689992.4 1 4083254 5 1689992.4 1 4083254 5 168992.4 1 4083254 5 16892.5 1 4083254 5 168992.4 1 4083254 5 16892.5 1 4083254 1 4083</td> <td>156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.80957 33912 42.772873 84446 39.937445 102001 37.289599 179981 34.817961 610472 32.5964 3.345095 28.34240 8.419352 26.4573</td>	108.37         108.37           5667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest repaymen           100         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.0000           000000         0.00000	386/         804/.0           400         9657.1           933         11588.           3467         13906           Cost-         0           0         8.67           13906         11588.           3467         13906           0         8.67           0         8.67           13906         2.0025.06           0         24836.09           0         34603.31           00         49828.7           00         59794.5           00         1753.4           00         123890.           000         178545           000         214254           000         257105           000         3308522           000         330822           0000         53312           0000         53312           0000         53312           0000         63370           0000         76771           0000         92122	Annual 49803 354.222 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 76510 149.081 76510 149.081 929474 138.55 921368 143.206 941228 140.31 929474 138.55 921308 129.7 131.5 .51757 131.5 .621308 129.7 .945570 128.0 8.334684 126. 4.0801945 122. 2.962334 121. 5.554801 119. .5.554801 112. .5.554801 121. .5.554801 121. .5.	277 62162 3436 7462 3436 7462 304594 895 275 107564 275 107564 272 129086 166 185902 166 185902 166 185902 166 185902 166 185902 167 2129086 168 223090 1760 26771 1857 32126 1857 32126 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1858 251 1956 33 138 1956 33 138 1956 321 1956 32 1957 321 1956 32 1957 32	A.921360 30 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-236672 36 5-23672 36 5-25672 36 5-25672 36 5-25672 36 5-25672 36 5-25672 36	6152.053499 11606.433660 254147.05451 77 et enefit 60007.209221 7233.644183 10705.103053 10705.103053 10705.103053 10870.590611 14668.912596 61626.635892 579434.29452 11895543.778 2274434.8965 2274434.8965 2274434.8965 2729343.075 3275234.60 3930303.11 4716385.03 56559683.00 6791640.46 8 8149989.1 1 9780007.1 1 978007.2 1 117360.28 3 14083254 5 1689992.4 1 4083254 5 1689992.4 1 4083254 5 168992.4 1 4083254 5 16892.5 1 4083254 5 168992.4 1 4083254 5 16892.5 1 4083254 1 4083	156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.80957 33912 42.772873 84446 39.937445 102001 37.289599 179981 34.817961 610472 32.5964 3.345095 28.34240 8.419352 26.4573
28.000000 29.000000 30.000000 INPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 1040095.87135; 1248115.045622 497738.054744 1797285.665698 3105709.630322 3726851.55639 3105709.630322 3726851.55639 3105709.630322 3726851.55639 3105709.489449 472221.866767 5366666.241200 6439999.489449 47727999.387332 9273599.264801 11128319.11777 13353982.94133 16024779.52955 1922973.43544 23075682.52258	Carbon credits 12426.333 14911.599 17893.910 21472.703 25767.244 30920.66 437104.83 44525.75 364117.15 576940.58 59228.66 110794.4 364117.15 576940.58 59228.66 110794.4 3139553.3 44525.75 5191452.7 4229743.3 5191452.7 4229743.3 5191452.7 5130830 3396996 639696 6476395 571574 239696 6476395 511571674 2397632.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 275672.0 5130830 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       1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000	108.37         108.37           10667         108.37           15667         81.280           15667         54.186           15667         27.09           Interest repaymen           100         0.00000           100         0.00000           100         0.00000           100         0.00000           100         0.00000           100         0.00000           100         0.00000           1000         0.00000           1000         0.00000           10000         0.0000           10000         0.0000           10000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.0000           100000         0.00000	386/         804/.0           400         9657.1           933         11588.           3467         13906           Cost-         0.8.M           0         16687.55           0         20025.06           0         24030.07           0         3860.331           00         44523.00           00         49828.7           00         103324.           000         1753.4           000         178545           0000         178545           0000         370231           0000         53313           0000         53313           0000         53313           0000         76771           0000         13266           0000         13266	Annual 49803 354.222 579764 350.41 .295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 150.8356 76510 149.081 150.8356 76510 149.081 17690 142.066 941228 140.31 929474 138.55 498442 135.0 .591336 136. .498442 135.0 .59131 133.2 .517757 131.5 .621308 129.7 .945570 128.0 .6.8334684 126. 4.001621 124. .9.035761 129.0 .9.455761 129.0 .07.998913 111	tion T 75 107566 169 154911 169 154911 166 185902 170 223090 163 223090 163 223090 164 25511 165 185902 166 185902 163 223090 163 223090 164 2551 165 185902 165 185902 164 255 115 95536 115 95536 115 95536 115 95633 136 42729 166 3842 1996633 137 42729 166 38826 138 255 138 255 139 255 149 255 159 255 159 257 159 257 15	2.179990 17 24.116699 2 576.895634 Nax b 4.921360 33 5.236672 36 5.236672 36 5.236672 36 1.727351 42 2.228470 55 4.228470 55 4.228470 55 4.3.201051 1 9.470739 1 43.201051 1 9.470739 1 43.201051 1 9.470739 1 13.200670 474.942092 9377.296903 11520.034982 81519.32988 11520.34982 81518.32973 37290.810005 57830.18284 49940.3235073 37290.810005 57830.18284 59403.32974 37713.72720 (22563.13747 950322.34210	6152.053499 11606.433660 254147.05451 77 et enefit 6007.209221 77233.644183 7075.103053 8870.590611 13975.640761 61626.635892 13975.640761 316176.17174 579434.29452 316176.17174 579434.29452 316176.17174 579434.29452 316176.17174 579434.29452 3275234.66 3930303.1( 4716385.02 5659683.00 6791640.48 8 8149989.1 1 9780007.1 2 11736028 8 8149989.3 1 4983254 5 16899924 05 2027992 96 2433593	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 00503 52.544936 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 03896 45.809576 038912 42.772873 84446 39.937445 102001 37.289959 179981 34.817961 .610472 32.50982 .063976 30.35468 .345095 28.34240 8.419352 26.4635 3.045376 24.7091
28.000000 29.000000 30.000000 TNPV 1 Year Phase 2 11.00000 33.000000 33.000000 34.000000 35.000000 36.000000 40.000000 40.000000 41.000000 41.000000 45.000000 45.000000 50.000000 30.00000000	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.332959 722288.799551 1040095.871353 1248115.04562 2156742.79883 215774.79883 215774.79883 215774.79883 215774.79883 215774.79883 215774.79883 215774.79883 215774.79883 215774444444	12426.333           10355.277           10355.277           10355.277           10355.277           10355.277           10355.277           110355.277           110355.277           12426.333           14911.599           12472.703           25767.244           30920.66           4 37104.83           3 44525.77           5 35430.93           6 4117.11           5 76940.56           9 2386.62           1 10794.4           1 10794.3           5 76940.56           9 110794.3           1 10794.3           1 10794.3           1 10794.3           2 75692.0           1 3 196996           76 476395           9 571674           9 686009           77 823211           8 987854           118942           118942	1/4         6/7.33           1/8         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         0.000           1/297         0.000           1/297         0.000           1/2030         0.000           1/2330         0.000           1/2669         0.000           1/267         0.000           1/2330         0.000           1/2330         0.000           1/2330         0.000           1/2330         0.000           1/2330         0.000           1/22793         0.00           1/22793         0.00           1/22793         0.00           1/22793         0.00           1/22793         0.00           1/22793         0.00           1/22793         0.00           1/22793         0.00	108.37         108.37           6667         81.280           5667         81.280           5667         54.186           16667         27.09           Interest repaymen           100         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000	386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0.8 M           0         16687.55           0         20025.06           0         24030.07           0         28836.09           0         44603.31           00         49828.7           00         71753.4           00         123989.           000         1243989.           000         148787           000         370231           0000         370231           0000         63974.5           0000         214254           0000         214254           0000         23313           0000         63972.5           0000         370231           00000         63977           00000         53133           00000         63971           00000         13266           00000         13266           00000         1591	4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 99124 147.327 26174 145.573 26174 145.573 26174 145.573 26174 145.573 26174 145.573 21408 142.06 941228 140.31 292474 138.55 941228 140.31 292474 138.55 941228 140.31 292474 138.55 951369 136.8 5.915369 136.8 5.915369 136.8 5.915369 136.8 5.915369 136.8 5.915369 136.8 5.915369 136.8 5.554801 129.7 0.6.665761 11 907.998913 111 929.5986696 1	tion T 12275 62162 13436 7462 13436 7462 13436 7462 13436 7462 13436 7462 1275 107564 172 129084 169 154911 166 185902 163 22309 163 22309 163 22309 163 22309 164 265 114 5551 15053 115 196633 138 142729 165 196633 138 142729 165 134922 238 1281020 28 1281020 28 128100000000000000000000000000000000000	2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .228470 52 .248470 52 .248470 52 .248470 52 .248470 52 .248470 52 .228.90670 474.942092 3377.296903 3377.296903 3372.96903 3372.926903 3372.926903 3554180.38284 44755.81222 3554180.3480 10265022.64	6152.053499 11606.433660 254147.05451 77 et enefit 6007.209221 7233.644183 6075.103053 18870.590611 4668.912596 61526.635892 13975.640761 096794.18351 13975.640761 096794.1835 13975.640761 096794.1835 11895343.778 2274343.29452 2274343.29452 330303.10 4716385.00 6791640.48 8 8149989.1 1 978007.1 2 11736028 8 8149989.2 1 978007.1 2 11736028 8 8149989.2 1 978007.1 2 11736028 8 8149989.2 1 978007.1 2 11736028 8 8149989.2 1 978007.1 2 11736028 8 14083254 5 1689924 05 2027992 6 2433593 4072 29203	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 00812 49.061835 30896 45.809576 33912 42.772873 84446 39.937445 102001 37.289595 102001 37.289595 102001 37.289595 102001 37.289595 103063976 30.35468 .345095 28.34240 8.419352 26.4635 3.045376 24.7091 138.333519 23.07
28.000000 29.000000 30.000000 TNPV 1	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.322959 722288.799551 1040095.871353 1248115.04562 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.35575 258605 2156742.79883 2588091.35575 258605 2156742.79883 258805 2156742.79883 258805 2156742.79885 2156742.79885 215672.27885 2157572.27885 215672.2	Carbon Carbon credits 12426.333 14911.590 17893.912 21472.703 25767.244 3 0920.66 4 37104.83 3 44525.77 5 53430.9 5 64117.11 5 76940.55 9 2328.66 2 110794.4 1 132953.3 4 159543.5 5 191452.7 5 191452.7 5 2328.66 2 110794.4 1 309530.5 5 191452.7 5 2328.66 2 110794.4 1 309543.5 5 191452.7 5 191452.7 5 2328.66 2 110794.4 1 309590.5 5 191452.7 5 191452.7 8 23211 2 275692.0 13 396996 76 476395 11 571674 4 96 886009 17 823211 28 987854 4 118542 21 122757	1/4         6/7.33           1/8         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         677.33           1/27         0.0000           1/297         0.0000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200         0.000           1/200 <td>108.37         108.37           6667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000</td> <td>386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0.8 M           0         16687.55           0         20025.06           0         24836.09           0         48633.10           0         41523.9           00         49828.7           00         71753.4           00         123989.           000         178545           000         148785           000         147854           0000         370231           0000         44422           0000         63976           0000         63976           0000         13266           00000         13266           00000         1591           00000         1591           00000         1591           00000         1910</td> <td>Annual 4860 157.8512 579764 350.41 3.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 17690 142.066 941228 140.31 131.5369 136.8 3.498442 135.0 5.598131 133.2 5.517757 131.5 5.621308 129.7 .621308 129.7 .64570 128.0 8.334684 126. (0.801945 122. 2.965234 121. 5.5554801 119. 06.665761 119. 07.998913 113. 1925.558435 119. 06.665761 119. 07.998913 113. 1925.558435 119. 06.665761 119. 07.998913 113. 131.5.518435 11. 1378.62123 123. 1378.62123 123. 1388.518435 11. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1388.518435 11. 1388.518435 11. 1378.62123 123. 1388.518435 11. 1388.518435 11. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123. 1398.62123 123. 1398.62123 123. 1398.62123. 139</td> <td>tion T 275 107564 504594 895 504594 895 504594 895 504594 895 50564 185902 5051 46264 5051 462</td> <td>2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .228470 52 .242118 63 .228470 52 .742118 63 .228470 52 .742118 63 .228470 52 .742118 63 .229.06670 74.942092 3377.296903 .1222.906670 74.942092 3377.296903 .1222.906670 74.942092 3377.296903 .122563.13249 1519.232981 0055.81222 .32790.810005 .347755.81222 .239713.72720 .125263.13747 .2554180.3480 .10265022.64 12318033.31 10265022.64</td> <td>6152.053499 11606.433660 254147.05451 77 et enefit 16007.209221 17233.644183 18870.590611 14668.912596 113975.640761 096794.18351 13975.640761 096794.18351 13975.640761 096794.18351 1895343.7787 3275234.60 3274234.29452 3274234.29452 3275234.60 3930303.11 4716385.00 6791640.48 8 8149989.1 9 780007.1 9 7</td> <td>156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.71574 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.809576 393912 42.772873 84446 39.937445 102001 37.289959 179981 34.817961 .610472 32.50982 .063976 30.35468 3.345095 28.34240 8.419352 26.4635 3.045376 24.7091 138.333519 23.07 784.416205 21.54</td>	108.37         108.37           6667         81.280           5667         81.280           5667         54.186           56667         27.09           Interest         repaymen           Interest         repaymen           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           000         0.00000           0000         0.00000           0000         0.00000           0000         0.0000           0000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           00000         0.0000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000           000000         0.000	386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0.8 M           0         16687.55           0         20025.06           0         24836.09           0         48633.10           0         41523.9           00         49828.7           00         71753.4           00         123989.           000         178545           000         148785           000         147854           0000         370231           0000         44422           0000         63976           0000         63976           0000         13266           00000         13266           00000         1591           00000         1591           00000         1591           00000         1910	Annual 4860 157.8512 579764 350.41 3.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 8999 154.3434 4798 152.5895 3758 150.8356 76510 149.081 71811 147.327 26174 145.573 31408 143.820 17690 142.066 941228 140.31 17690 142.066 941228 140.31 131.5369 136.8 3.498442 135.0 5.598131 133.2 5.517757 131.5 5.621308 129.7 .621308 129.7 .64570 128.0 8.334684 126. (0.801945 122. 2.965234 121. 5.5554801 119. 06.665761 119. 07.998913 113. 1925.558435 119. 06.665761 119. 07.998913 113. 1925.558435 119. 06.665761 119. 07.998913 113. 131.5.518435 11. 1378.62123 123. 1378.62123 123. 1388.518435 11. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1378.62123 123. 1388.518435 11. 1388.518435 11. 1378.62123 123. 1388.518435 11. 1388.518435 11. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123 123. 1398.62123. 1398.62123 123. 1398.62123 123. 1398.62123. 139	tion T 275 107564 504594 895 504594 895 504594 895 504594 895 50564 185902 5051 46264 5051 462	2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .228470 52 .242118 63 .228470 52 .742118 63 .228470 52 .742118 63 .228470 52 .742118 63 .229.06670 74.942092 3377.296903 .1222.906670 74.942092 3377.296903 .1222.906670 74.942092 3377.296903 .122563.13249 1519.232981 0055.81222 .32790.810005 .347755.81222 .239713.72720 .125263.13747 .2554180.3480 .10265022.64 12318033.31 10265022.64	6152.053499 11606.433660 254147.05451 77 et enefit 16007.209221 17233.644183 18870.590611 14668.912596 113975.640761 096794.18351 13975.640761 096794.18351 13975.640761 096794.18351 1895343.7787 3275234.60 3274234.29452 3274234.29452 3275234.60 3930303.11 4716385.00 6791640.48 8 8149989.1 9 780007.1 9 7	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.71574 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 44 74.038236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 30896 45.809576 393912 42.772873 84446 39.937445 102001 37.289959 179981 34.817961 .610472 32.50982 .063976 30.35468 3.345095 28.34240 8.419352 26.4635 3.045376 24.7091 138.333519 23.07 784.416205 21.54
28.000000 29.000000 30.000000 TNPV 1 	241893.057548 290271.669058 348326.002870 Benefit Electricity sale 417991.203444 501589.444132 601907.32959 722288.799551 866746.559461 1040095.871353 1248115.045624 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 2588091.358605 2156742.79883 258651.555392 4472221.867677 5366666.241200 6393999.48944 7727999.38733 9273599.264801 11128319.1177 13353882.94131 16024779.52955 19229735.43544 23075682.52255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.83255 27690819.02710 33228982.33466 68903618.80155	12426.333           10355.277           Carbon           credits           12426.333           14911.599           1783.912           21472.703           25767.244           3092046           37104.83           44525.767           21472.703           25767.246           37104.83           44525.767           21472.703           25767.246           37104.83           44525.767           21472.703           25474.33           64117.15           5767.246           37104.83           44525.77           35430.93           64117.15           5767.246           132953.3           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.31           227643.33           227643.33           227643.33           227643.33	1/4         6/7.33           1/8         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         677.33           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000           1/2         0.000	108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           108.37           1000           1000           1000           1000           1000           1000           1000           1000           1000           10000           10000           10000           10000           10000           10000           10000           10000           100000           100000           100000           100000           100000           100000           100000           100000           100000           100000           100000           100000           100000           100000 <t< td=""><td>386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0           0         8.687.55           0         20025.06           0         24030.07           0         28836.09           0         4463.31           00         44523.9           00         44523.9           00         14523.9           00         14523.9           000         143289.           000         148787           000         1285400           000         148787           0000         13296.00           0000         13266           0000         63976           0000         13266           00000         1326           00000         1591           00000         1591           000000         2750</td><td>Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 5832 156.0973 5832 156.0973 5832 156.0973 5835 150.8356 57510 149.081 71811 147.327 26174 145.573 31408 143.820 71811 147.327 26174 145.573 31408 143.820 71811 147.327 26174 145.573 31408 143.820 594132 140.31 132.59431 133.2 5.594813 133.2 5.554801 119, 5.554801 119, 5.554</td><td>1277         62162           1277         62162           13436         7462           604594         895           10051         895           10156         185902           166         185902           166         185902           166         185902           166         185902           163         223090           164         85517           12245         6662           148         55517           150536         115           196633         133           134923         233           134923         233           134923         233           134923         233           281020         22           134923         233           281020         23           281020         23           285408         55           7.511505         5           5.757602         8           10.403699         12.249796           10.4036983         10.495893           10.875893         10.8741990</td><td>2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .23672 36 .23723 36 .23723 36 .23723 36 .23723 37 .23720 8 .23723 37 .23729 36 .23723 37 .23723 37 .23729 37 .2</td><td>76152.053499 711606.433660 254147.05451 77 et enefit 77 7233.641183 8870.590611 7468.912596 76152.63589 713975.640761 70974.18351 7579434.29455 71895343.7785 72729343.975 7275234.60 7579434.29455 7279434 727943 727943 7279434 727943 727945 727</td><td>156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 47.40.38236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 109812 42.772873 84446 39.937445 102001 37.289959 1345095 28.34240 8.419352 26.4635 3.045376 24.7091 138.333519 23.07 784.416205 21.54 559.452342 20.11 069.232622 18.78</td></t<>	386/         804/.0           400         9657.1           333         11588.           3467         13906           Cost-         0           0         8.687.55           0         20025.06           0         24030.07           0         28836.09           0         4463.31           00         44523.9           00         44523.9           00         14523.9           00         14523.9           000         143289.           000         148787           000         1285400           000         148787           0000         13296.00           0000         13266           0000         63976           0000         13266           00000         1326           00000         1591           00000         1591           000000         2750	Annual 4860 157.8512 579764 350.41 5.295717 346.6 Annual deprecial 4860 157.8512 5832 156.0973 5832 156.0973 5832 156.0973 5832 156.0973 5835 150.8356 57510 149.081 71811 147.327 26174 145.573 31408 143.820 71811 147.327 26174 145.573 31408 143.820 71811 147.327 26174 145.573 31408 143.820 594132 140.31 132.59431 133.2 5.594813 133.2 5.554801 119, 5.554801 119, 5.554	1277         62162           1277         62162           13436         7462           604594         895           10051         895           10156         185902           166         185902           166         185902           166         185902           166         185902           163         223090           164         85517           12245         6662           148         55517           150536         115           196633         133           134923         233           134923         233           134923         233           134923         233           281020         22           134923         233           281020         23           281020         23           285408         55           7.511505         5           5.757602         8           10.403699         12.249796           10.4036983         10.495893           10.875893         10.8741990	2.179990 17 24.116699 2 576.895634 .2576.895634 .2576.895634 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .236672 36 .23672 36 .23723 36 .23723 36 .23723 36 .23723 37 .23720 8 .23723 37 .23729 36 .23723 37 .23723 37 .23729 37 .2	76152.053499 711606.433660 254147.05451 77 et enefit 77 7233.641183 8870.590611 7468.912596 76152.63589 713975.640761 70974.18351 7579434.29455 71895343.7785 72729343.975 7275234.60 7579434.29455 7279434 727943 727943 7279434 727943 727945 727	156.569671 156.569671 6 146.345064 19 136.761411 775.117418 NPV 128.126639 119.640859 119.640859 111.715754 104.314587 97.402956 2 90.948662 1 84.921586 19 79.293556 47.40.38236 27 69.131008 782 64.548864 803 60.270307 5342 56.275252 06503 52.544936 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 00812 49.061835 109812 42.772873 84446 39.937445 102001 37.289959 1345095 28.34240 8.419352 26.4635 3.045376 24.7091 138.333519 23.07 784.416205 21.54 559.452342 20.11 069.232622 18.78

Table 6	(continued).	Detailed	cost and b	penefit of the	he RCSC	PP (milliar	d Rials).

Year	Benefit Cost									
-	Electricity sale	Carbon credits	Principal repayment	Interest repayment	O & M cost	Annual depreciation	Tax	Net benefit	NPV	
hase 3										
1 000000	99221211 074204	2040717 186	265 0.000000	0.000000	3961230 250	028 105 234184	25542705 7569	71 72666887	10687 16 372	705
2.000000	119065453.289045	3539660.62	3518 0.00000	0 0.000000	4753476.31	0833 103.480280	30651252.608	8071 87200281	.513379 15.28	7393
3.000000	142878543.946854	4247592.74	8222 0.00000	0.000000	5704171.57	3000 101.726377	36781508.742	175 10464035	4.653524 14.2	73946
4.000000	171454252.736225	5097111.29	7866 0.00000	0 0.000000	6845005.88	7600 99.972474	44137816.0154	125568442	.158613 13.32	7682
6.000000	205745103.283470 246894123.940164	7339840.26	R927 0.00000	0.000000	9856808.47	8144 96.464668	63558466,9361	150682140	330173 11.61	9188
7.000000	296272948.728196	8807808.32	2713 0.00000	0 0.000000	11828170.1	73772 94.710765	76270165.585	036 21698232	6.581335 10.8	48916
8.000000	355527538.473835	10569369.9	87255 0.0000	00 0.000000	14193804	208527 92.95686	2 91524203.87	6057 2603788	07.419645 10	.129707
9.000000	426633046.168603	12683243.9	84706 0.0000 81647 0.0000	00 0.000000	17032565	050232 91.20295	9 109829049.7 6 131794864 f	37587 312454	584.162530 9.	458177
1.000000	614351586.482788	18263871.3	37977 0.0000	00 0.000000	24526893	672334 87.69515	3 158153842.5	31403 449934	633.921874 8	245719
2.000000	737221903.779345	21916645.6	05572 0.0000	00 0.000000	29432272	406801 85.94125	0 189784615.8	60917 539921	575.175950 7.	699084
3.000000	884666284.535214	26299974.7	26687 0.0000	00 0.000000	35318726	888161 84.18734	7 227741543.7	68639 647905	904.417754 7.	188688
4.000000	1061599541.44225	31559969.	672024 0.000	000 0.00000	0 4238247	2.265794 82.4334	44 273289857	170209 77748	7099.244834	6.712127
5.000000	12/3919449./30/0	45446356	327715 0.000		0 5085896	0.62743 78 9256	41 32/94/833 38 393537404	269732 11195	4532.//4245 81452 746453	5 851689
7.000000	1834444007.61222	54535627.	593258 0.000	000 0.000000	0 7323691	2.075291 77.1717	35 472244889	508436 13434	97756.450016	5.463762
8.000000	2201332809.13466	65442753.	111909 0.000	000 0.00000	8788429	4.490350 75.4178	32 566693871	707185 16121	97320.631206	5.101552
9.000000	2641599370.96159	5 78531303.	734291 0.000	000 0.00000	0 1054611	53.388420 73.663	928 68003265	0.257990 1934	636797.385550	4.763353
0.000000	3169919245.15391	94237564.	481150 0.000	000 0.00000	0 1265533	34.066103 71.910	6122 0702470	4.431260 2321	564169.227676	4.447576
2.000000	4564683713.02163	3 135702092	852855 0.00	0000 0.0000	00 182236	373.055189 68.40	2219 1175096	434.368069 33	43052430.04901	7 3.877434
3.000000	5477620455.62596	5 162842511	.423427 0.00	0000 0.0000	00 218684	247.666227 66.64	8316 1410115	725.100269 40	11662927.63458	1 3.620386
4.000000	6573144546.75115	8 195411013	.708112 0.00	0000 0.0000	00 262421	097.199472 64.89	4413 1692138	873.891214 48	13995524.47417	0 3.380380
5.000000	7887773456.10138	234493216	.449734 0.00	0000 0.0000	00 314905	316.639366 63.14	0510 2030566	652.352653 57	76794640.41859	3 3.156283
7.000000	11358393776,7859	33767023	1.687617 0.0	0000 0.0000	000 45346	3655,960688 59,6	32704 292401	5987,210228 8	318584305.6699	96 2.751674
8.000000	13630072532.1431	40520427	8.025141 0.0	00000 0.000	000 54415	5387.152825 57.8	78801 350881	9188.072384 9	982301177.0643	29 2.569257
9.000000	16356087038.5718	48624513	3.630169 0.0	00000 0.0000	000 65298	7664.583390 56.1	24898 421058	3029.019278 1	1978761422.474	443 2.398933
0.000000	19627304446.2862	05 58349416	0.356202 0.0	00000 0.000	000 78358	5197.500068 54.3	70995 505269	9638.067853 1	4374513716.703	491 2.239900
NPV 3									215.42	7847
Year	Benefit Cost									
	Electricity	Carbon	Principa	al Interest	(	0 & M Annua	L	Ν	let	
hace 4	sale	credits	repayment	nt repayme	nt (	cost deprecia	ion Tax	be	nefit	NPV
lidse 4										
1.000000	23552765335.5434	16 70019299 04 00000150	2.427443 0.0	00000 0.000	000 94030	2237.000082 52.6	17092 606323	9568.838450 1	7249416469.515	270 2.091410
3.000000	33915982083 1825	56 10082779	09.095517 0.0		0000 1354	35221 280118 40	109286 8731	064985 792198	24839159736.0	96474 1 823309
4.000000	40699178499.8190	59 12099334	90.914621 0.	000000 0.000	0000 1624	342265.536141 47	.355383 1047	7277985.844576	29806991691.	997593 1.702436
5.000000	48839014199.7828	33 14519201	89.097545 0.	00000 0.000	0000 1949	810718.643369 45	.601480 1257	2733585.819736	35768390038.	815834 1.589576
6.000000	58606817039.7394	56 17423042	26.917054 0.	000000 0.000	0000 2339	772862.372043 43	.847576 1508	7280305.702232	42922068054.	734657 1.484198
7.000000	70328180447.6873	20907650	72.300465 0.	000000 0.000	0000 2807	72/434.846452 42	339770 2172	4/36369.4/3534	51506481673.	574150 1.385806
9.000000	101272579844.669	770 3010701	704.112669 (	0.000000 0.00	00000 404	3127506.178890	8.585867 260	70820377.54914	5 74169333626	468536 1.208157
00.000000	121527095813.60	3710 361284	2044.935202	0.000000 0.0	000000 48	51753007.414668	36.831964 31	284984455.4267	35 8900320035	8.865540 1.128065
01.000000	145832514976.32	4460 433541	0453.922243	0.000000 0.0	000000 58	22103608.897601	35.078061 37	541981348.7921	60 1068038404	137.478870 1.053282
02.000000	174999017971.58	9320 520249	2544.706691	0.000000 0.0	000000 69	36524330.677120	33.324158 45	050377620.7429	66 1281646085	0.983456
03.000000	209998821565.90	200 624299	0264 377636	0.000000 0.0	000000 83	060505036 175055	20.816352 6	4872543778 412	40 153/9/5302	244.1/6180 0.918260
05.000000	302398303054.90	5310 898990	7117.253162	0.000000 0.0	000000 12	072714043.410063	28.062449 7	7847052536.024	261 221468443	3564.662750 0.800547
06.000000	362877963665.88	7570 107878	88540.703793	0.000000 0	.000000 14	4487256852.092075	26.308546	93416463045.07	0709 26576213	2283.120030 0.747476
07.000000	435453556399.06	5120 129454	66248.844551	0.000000 0	.000000 1	7384708222.510490	24.554643	112099755655.8	38760 3189145	58745.005800 0.69792
0000000	627053121214 65	8110 155345	59498.613461	0.000000 0	000000 2	033070840 415108	22.800740	134519706788.6	72/10 38269/4	64603 542180 0.65165
10.000000	752463745457.58	1350 223697	65678.003384	0.000000 0	.000000 3	040775808.498123	19.292934	193708377779.0	73700 5510843	57528.722900 0.56811
11.000000	902956494549.10	1320 268437	18813.604061	0.000000 0	.000000 3	5048930970.197754	17.539031	232450053336.2	91560 6613012	29038.677000 0.53045
12.000000	1083547793458.9	21400 32212	462576.324871	0.000000	0.000000	43258717164.23729	7 15.785128	278940064004.	865300 793561	474850.358640 0.4952
13.000000	1300257352150.7	38654	955091.589844	0.000000	0.000000	51910460597.08475	5 14.031224	334728076807.	066100 952273	3769824.113530 0.4624
15.000000	1872370587097 0	15900 55663	135331.889366	0.000000	0.000000	74751063259.80203	2 10.523418	482008430604	595460 137127	4228553.984400 0.431
16.000000	2246844704516.4	19400 66795	762398.267250	0.000000	0.000000	39701275911.76245	1 8.769515	578410116726.4	79250 1645529	074267.675000 0.3764
17.000000	2696213645419.7	02600 80154	914877.920685	0.000000	0.000000	107641531094.1149	30 7.015612	694092140072.	651980 197463	4889123.841300 0.351
18.000000	3235456374503.6	43100 96185	897853.504807	0.000000	0.000000	129169837312.9379	10 5.261709	832910568087.	971560 236956	1866950.976600 0.328
19.000000	3882547649404.3	1600 11542	3077424.20578	0.000000	0.000000	155003804775.525	480 3.507806	999492681706	267330 28434	1/4240343.276400 0.30
.0.000000	-102902/1/9285.24	13850	092909.04094	0.000000	0.000000	100001005/30.630	330 1.753903	113333121804	0.134000 3412	105000415.//3400 0.2
IDN/ A										27,518063

TNPV 4 Total

27.518063 9704.347848