

第13章 プロジェクトの評価

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第 1 3 章 プロジェクトの評価

1 3.1 概 説

本件プロジェクトは、アルン川のアルン3開発地点にダム・発電所などの水力発電設備を建設し、1990年代初頭およびそれ以後におけるネパールの電力需要に対応せしめようとするものである。第2章で検討したように、計画の1期工事段階では国内需要のみを対象として設備容量201MWの施設を建設し、次に2期工事段階では国内需要対応に加えて電力の輸出を前提としてさらに201MWの設備を増設し、合計402MWの設備を持つ計画とした。発生電力は、建設開始後8年目から一部供給される予定となっている。

本章では、本件プロジェクトを経済、財務及び社会経済的観点から評価した結果について述べてある。まず、発電端及び受電端におけるそれぞれの発電コストを算定し、次に経済的観点からみたフイージビリティを経済的内部収益率 (EIRR) で評価し、その計算されたEIRRについて、プロジェクトコスト及び便益のそれぞれの変化に応じた感度分析を行った。また、財務的観点から見た本件プロジェクトのフイージビリティを財務的内部収益率 (FIRR) で評価した。FIRRの算定は本件プロジェクトの妥当性を実施機関の立場から考慮したものである。最後に、本件プロジェクトの地域開発並びに国家全体開発に対する社会経済的重要性を考慮し、それらの間接効果 (社会経済効果) に関して定性的に述べた。

1 3.2 発電コスト

1 3.2.1 事業費

本件プロジェクトの事業費は、建設費及び毎年の維持管理費から成る。建設費には、アクセス道路、ダム、トンネル、発電所、送変電施設等のための直接工事費とそれらの建設に必要な工事期間中の一般管理費、施工管理費、工事の数量変更予備費等の間接工事費を含んでいる。また、維持管理費としては、施設の維持管理のための人件費のほかに、設備の維持、修繕に必要な材料費および工事費が含まれる。また、設備の更新費については、水力機器と電気設備を25年目に更新することとし、その費用を算定した。

プロジェクトの便益費用分析のため、事業費を下記の通り、財務コストと経済コストに分けて算定した。なお、財務コストは、送電線及び変電所のコストを含む受電端

コストとし、経済コストはそれらを含まない発電端コストとした。(経済コストについては13.3.2項を参照)

(単位：百万米ドル)

| | 財務コスト | | 経済コスト | |
|------------|-------|-------|-------|-------|
| | 1期のみ | 1+2期 | 1期のみ | 1+2期 |
| 土木工事 | 179.9 | 234.6 | 179.9 | 234.6 |
| 水力機器 | 11.7 | 17.6 | 11.7 | 17.6 |
| 電気機器 | 38.4 | 69.4 | 38.4 | 69.4 |
| 送電線及び変電所 | 87.5 | 107.0 | 0 | 0 |
| 技術管理及び一般管理 | 23.8 | 32.1 | 17.2 | 24.1 |
| 数量予備費 | 43.1 | 57.8 | 33.7 | 46.3 |
| 合計 | 384.4 | 518.5 | 280.9 | 392.0 |

同じく、維持管理費についても財務コストと経済コストに分けて算定した。

| | 財務コスト | | 経済コスト | |
|-----------|-------|------|-------|------|
| | 1期のみ | 1+2期 | 1期のみ | 1+2期 |
| 維持管理費(年間) | 4.1 | 5.7 | 3.0 | 4.3 |

(注) 上記財務及び経済コストの積算は1986年6月時点での価格水準に基づく。

13.2.2 発電コスト

本プロジェクトの発電コストは、発電端及び受電端におけるそれぞれのkwh当たりの平均コストを算定した。kwh当たりの平均コストは、事業費の年間経費(建設費及び維持管理費)を平均年間発生電力量で除したものである。本計画における発電コストの算定条件は下記の通りである。

| | 受電端 (財務コスト) | | 発電端 (経済コスト) | |
|----------------------------|-------------|--------|-------------|--------|
| | 1期 | 1+2期 | 1期 | 1+2期 |
| 建設費 (百万米国ドル) <u>1/</u> | 384.4 | 518.5 | 280.9 | 392.0 |
| 資本還元率 (40年、12%) <u>2/</u> | 0.121 | 0.121 | 0.121 | 0.121 |
| 年経費 (百万米国ドル) | 46.5 | 62.7 | 34.0 | 47.4 |
| 維持管理費 (百万米ドル/年) | 4.1 | 5.7 | 3.0 | 4.3 |
| 年経費合計 (百万米国ドル) | 50.6 | 68.4 | 37.0 | 51.7 |
| 発生電力量 (GWH/年) <u>3/</u> | 1635.5 | 2816.2 | 1721.6 | 2960.3 |
| 発電コスト (米国セント) <u>4/ 5/</u> | 3.1 | 2.4 | 2.1 | 1.7 |

(注) 1/ 発電端コストには送変電コストを含まない。

2/ 土木関連施設の経済耐用年数を50年、水力機器及び電気機器のそれを25年とし、プロジェクト全体の平均経済耐用年数を40年と想定した。

3/ 受電端における電力量は送電ロス5%を考慮してある。

4/ すべてのコストは1986年6月時点の価格水準に基づく。

5/ 発電コストは発生電力量がすべて運開時より消費されると仮定した上で計算している。

1.3.3 経済評価

1.3.3.1 前提条件

プロジェクトの便益・費用分析のための前提条件として次の事項を考慮した。

(1) 使用通貨単位と外貨交換比率

プロジェクトの費用と便益の積算に当たっては、主として国際通貨としての米国ドルを使用した。また、ネパール・ルピーとの外貨交換比率としては、1986年6月時点での公定レートとしてのUS\$ 1.00=Rs 21.35を使用した。

(2) 価格水準

便益と費用の算定に当たっては、1986年6月の価格水準で積算を行った。従って、費用、便益共に、将来にわたってのインフレによる影響は考慮していない。

(3) プロジェクト・ライフの設定

本件プロジェクトにかかわる諸施設のうち、土木関連施設の耐用年数を50年、

また水力機器及び電気機器の耐用年数を25年とした。なお、送返電設備については、財務評価ではその費用を考慮したが、経済評価においてはこれらの費用は考慮していない。このような条件の下に本計画に拘わる費用と便益を57年にわたって現在価値化した。

(4) 便益の算定

便益はプロジェクト開始後8年目から発生することになる。便益の算定に当たっては直接便益、すなわち電力の発生に伴う便益のみを算定した。プロジェクトにより派生する雇用機会の創出、あるいはアクセス道路の建設に伴う経済的インパクトなどの間接便益については計量化が困難であるため算定はしていないが、13.5節において、定性的に記述した。

(5) 建中利子

建設期間中の利子(IDC)は費用積算に含まれていない。

(6) 価格上昇

将来の費用及び便益にかかわる価格の上昇率は、一般的インフレーションと同じ比率で変化するものと見なした。従って、経済分析においては、費用、便益共に価格の上昇は算定していない。

1 3.3.2 経済費用

経済費用は、財務価格から税金、補助金、利子等のいわゆる移転支出を控除し、さらに変換係数を用いて財務価格を経済価格に変換する手法を用いるのが通常である。しかしながら、本件プロジェクトの場合は、移転支出の全体に占める比率は無視出来る程度(輸入資材の1%程度)であり、また、建設費に占める内貨部分の比率が低く(14%)、変換係数による変換は全体の評価に大した影響を及ぼさないことから、1986年6月時点価格での発電端コストを経済費用とみなすこととした。経済費用は、1期工事段階では280.9百万米国ドルであり、全体計画(1期+2期)では392.0百万米国ドルとなる。(但し、送変電コストは含まない。)建設費の年度別支出額はTable 13-2と13-4に示した。

運転維持費は施設の維持管理のための人件費と設備の維持・修繕に必要な材料費、工事費を含んでいる。年間運転維持費は、土木設備の1%、水力設備と電気設備の各2%、および送変電設備の1.5%の比率で算定した。このようにして算定された年間の運転維

持費は、1期工事段階（201MW）では3.0百万米国ドル、また、全体計画（1期+2期）では4.3百万米国ドルとなる。また、設備更新費として、水力機器と電気設備を据付け後25年目に更新するものとし、それぞれの費用を算定した。

1.3.3.3 経済便益

(1) 出力と発生電力量

本件プロジェクトの直接便益は、ネパール国内で消費される電力、またはネパール国内での需要を超過した部分で国外に輸出される電力の発生によって生まれる。

本件プロジェクトによる出力と発生電力量は次の通りである。

ア alun 3 プロジェクトの出力及び発生電力量

| 年 | 設備容量 (MW) | 有効出力 (MW) | 発生電力量 (GWh/年) | |
|--------|--------------|--------------|---------------|--------|
| | | | 1期のみ | 1期+2期 |
| 1994 | 134 | 52.0 | 1159.7 | 1159.7 |
| 1995 | 134 | 69.0 | 1159.7 | 1159.7 |
| 1996 | 134 | 86.1 | 1159.7 | 1159.7 |
| 1997 | 134 | 104.2 | 1159.7 | 1159.7 |
| 1998 | 134 | 123.2 | 1159.7 | 1159.7 |
| 1999 | 402 | 143.0 | 1721.6 | 2960.3 |
| 2000 | 402 | 163.7 | 1721.6 | 2960.3 |
| 2001 | 402 | 185.4 | 1721.6 | 2960.3 |
| 2002 | 402 | 208.3 | 1721.6 | 2960.3 |
| 2003 | 402 | 232.3 | 1721.6 | 2960.3 |
| 2004 | 402 | 257.5 | 1721.6 | 2960.3 |
| 2005 | 402 | 283.8 | 1721.6 | 2960.3 |
| 2006 | 402 | 311.3 | 1721.6 | 2960.3 |
| 2007 | 402 | 340.1 | 1721.6 | 2960.3 |
| 2008以降 | 402 | 354.0 | 1721.6 | 2960.3 |

上記の発生電力量については電力需要を考慮して、ネパール国内用消費可能電力、輸出用消費可能電力及び余剰電力に分類される。

全体計画における発生電力量の分類

単位：GWH/年間

| 年 | 国内用電力 ¹⁾ | 輸出用電力 | 余剰電力 | 合計 |
|--------|---------------------|--------|-------|--------|
| 1994 | 179 | 0 | 980.7 | 1159.7 |
| 1995 | 256 | 0 | 903.7 | 1159.7 |
| 1996 | 333 | 0 | 826.7 | 1159.7 |
| 1997 | 415 | 0 | 744.7 | 1159.7 |
| 1998 | 500 | 0 | 659.7 | 1159.7 |
| 1999 | 588 | 2372.3 | 0 | 2960.3 |
| 2000 | 680 | 2280.3 | 0 | 2960.3 |
| 2001 | 776 | 2184.3 | 0 | 2960.3 |
| 2002 | 876 | 2084.3 | 0 | 2960.3 |
| 2003 | 980 | 1980.3 | 0 | 2960.3 |
| 2004 | 1089 | 1871.3 | 0 | 2960.3 |
| 2005 | 1201 | 1759.3 | 0 | 2960.3 |
| 2006 | 1318 | 1642.3 | 0 | 2960.3 |
| 2007 | 1440 | 1520.3 | 0 | 2960.3 |
| 2008 | 1567 | 1393.3 | 0 | 2960.3 |
| 2009 | 1699 | 1261.3 | 0 | 2960.3 |
| 2010 | 1837 | 1123.3 | 0 | 2960.3 |
| 2011以降 | 1863.2 | 1097.1 | 0 | 2960.3 |

¹⁾ 国内用電力には1036GWH/年間の輸出電力量を含む。

(2) 経済便益単価

本件プロジェクトの直接便益は、前述の出力と発生電力量に対して、それぞれの便益単価を乗じて算定されるが、それぞれの便益単価については、主として、ネパール電力庁（当時の）が作成した「ネパールにおける電力の長期限界費用（1984年版）」に述べられている電力の長期限界費用に基づく電力価値を使用した。同報告書を検討した結果、LRMCは妥当に導入されており、さらにプロジェクト評価を行うに当たって適切に使用され得るという結論を得た。ただし、その長期限界費用は1984年価格水準で算定しているため、これを1986年6月価格水準に修正した。修正にあたっては、年6%のインフレ率を加味して、1986年6月時点での単価を下記のように設定した。なお、輸出電力価値については、NEA予測単価を使用した。

| | |
|--------|-----------------|
| 設備容量価値 | 68米国ドル/KW/年 |
| 有効電力価値 | 6.3 米国セント/KWH/年 |
| 輸出電力価値 | 4.8 米国セント/KWH/年 |
| 余剰電力価値 | 0.5 米国セント/KWH/年 |

(注) 1. インフレーション年率6%については、下記資料を参考に設定した。

1) Nepal - Prospects for Economic Adjustment and Growth, 1985,
World Bank

2) Country Report (India, Nepal - No. 4 1986), The Economist
Intelligence Unit

2. 上述の長期限界費用は、発電端におけるコストから算定されたものである。

1.3.3.4 経済的内部収益率 (EIRR) 及び便益費用比率 (B/C)

本件プロジェクトの経済費用と経済便益のキャッシュ・フローを1期工事段階（国内需要対応計画）と全体計画（1期+2期、国内プラス輸出）の二つのケースに分けて作成し、そのキャッシュ・フローを57年間にわたって割引率を用いて現在価値化した。内部収益率とは、便益費用比率 (B/C) が1、すなわち、純便益 (B-C) が0となる時の割引率をいうが、上記二つのケースについてこの内部収益率を計算すると下記のようなになる。また、割引率12%の時の便益費用比率は下記の通りとする。（詳細はTable 13-5、13-6を参照）

| | <u>EIRR (%)</u> | <u>B/C</u> |
|----------------|-----------------|------------|
| 1期工事段階 (201MW) | 15.5 | 1.5 |
| 1期+2期 (402MW) | 19.5 | 2.1 |

上記に明らかな通り、本件プロジェクトの経済的内部収益率は、1期工事段階及び1期+2期工事段階の二つのケース共に、ネパールにおける資本の機会費用と考えられている12%を上回っており、したがって、本件プロジェクトは経済的妥当性を有していることがわかる。

1 3. 3. 5 感度分析

将来における経済的条件の変化に対して、プロジェクトがどのような影響を受けるのかについて検討するため、下記のような条件を設定した場合の感度分析をおこなった。

- (1) 建設工事費が10% 増えた場合。
- (2) 便益が10% 減少した場合。
- (3) 上記(1)と(2)が同時に発生した場合。
- (4) 輸出電力が20MW減少した場合。

上記の条件で感度分析した結果は次の通りである。

| | <u>経済的内部収益率 (EIRR:%)</u> | |
|--------|--------------------------|-------|
| | 1期 | 1期+2期 |
| (1)の場合 | 14.7 | 18.5 |
| (2)の場合 | 14.5 | 18.3 |
| (3)の場合 | 13.6 | 17.3 |
| (4)の場合 | 14.5 | 18.8 |

上記に明らかなように、本件プロジェクトの経済性は極めて健全であり、建設工事費が1割増えた場合、便益が1割減少した場合、あるいはこれらが同時に起こった場合でも、EIRRが12%を超えている。なお、これらの計算結果については、Table 13-7からTable 13-14 までに示した。

1 3.4 財務評価

1 3.4.1 概説

財務評価の目的は、プロジェクト実施主体の立場から当該プロジェクトを実施した場合の収益性を判断するものであり、プロジェクト・ライフを通じての財務費用（支出）と財務便益（収入）を現在価値で比較検討し、その結果を財務的内部収益率（FIRR）であらわす。財務費用は、1986年6月時点での市場価格で評価された事業費（送変電コストを含む）であり、建設期間中の利子やインフレーションを見込んでいないので、建設開始時もしくは完成時に実際に要する費用とは異なっている。便益は、発生した電力を販売することによって得られる毎年の収入（売電収入）を算定した。

1 3.4.2 財務評価の前提

財務評価の前提となる使用通貨単位、外貨交換率、プロジェクト・ライフの期間及び価格水準については経済評価の場合と同じであるが、便益は本件プロジェクトの実施主体であるNEAの売電収入であり、売電単価としては、国内用を1kwh当たり5.6米国セント（1985/1986年現在のNEAの売電平均価格から算定）、輸出用を1kwh当たり4.8米国セント（NEA予測価格）とした。

1 3.4.3 財務費用

プロジェクトの事業費は、フィージビリティ調査実施時点、すなわち1986年6月時点での市場価格をもとに積算した。財務費用には、アクセス道路、ダム、トンネル、発電所、送変電所等の建設のための直接工事費とそれらの建設に必要な工事期間中の一般管理費、施工管理費、工事の数量変更予備費等の間接工事費を含む。

また、維持管理費および設備更新費については、送変電設備も含めて算定した。

なお、設備更新費については、発電所機器、送変電施設を25年毎に更新することとし、25年目に撤去した時点での残存価値はゼロとみなした。

1 3.4.4 財務的内部収益率（FIRR）

本件プロジェクトの財務費用（支出）と財務便益（収入）のキャッシュ・フローを1期工事段階（国内需要対応計画）と1期+2期段階（国内プラス輸出）の二つのケースに分けて作成し、そのキャッシュ・フローを57年間にわたって割引率を用いて現

在価値化し、FIRRの計算を行った。その結果は次の通りである。（詳細については Table 13-15 および13-16 を参照）。

| | <u>FIRR (%)</u> |
|-----------------|-----------------|
| 1 期工事段階 (201MW) | 10.8 |
| 1 期+2 期 (402MW) | 14.9 |

上記のFIRRの比率は、1期工事段階及び1期+2期工事段階ともに、当該プロジェクトの実施のためのプロジェクト資金を調達した場合に負担すべき利子分を十分に補填できるだけの収益性を有していることを示している。従って、本件プロジェクトは財務的にプロジェクトを実施する妥当性を有していると云うことができる。

1 3. 4. 5 感度分析

前節で算定されたFIRRが、将来の経済的条件の変化に対してどのような影響を受けるのかについて検討するため、下記のケースについて感度分析をおこなった。

(Table 13-17 から 13-24迄参照)

- (1) 建設費がインフレ以外のなんらかの要因で10% 上昇した場合。
- (2) 便益が予測より10% 減少した場合。
- (3) 上記(1)と(2)が同時に発生した場合。
- (4) 輸出電力が20MW減少した場合。

これらの感度分析の結果は次の通りである。

| | <u>1 期のみ</u> | <u>1 期+2 期</u> |
|--------|--------------|----------------|
| (1)の場合 | 10.1 | 14.0 |
| (2)の場合 | 10.0 | 13.9 |
| (3)の場合 | 9.4 | 13.0 |
| (4)の場合 | 10.0 | 14.5 |

上記の分析結果から、本件プロジェクトの財務的内部収益率は、建設コストの1割増大及び便益の1割減少、ないしはそれら二つが同時に発生した場合であっても、9.4%以上の数値を示しており、従って、本件プロジェクトは財務的妥当性を有していることが明らかである。

1.3.5 プロジェクトの間接効果

今までに述べた直接便益に加えて、本件プロジェクトの実施に伴って、下記のような間接的便益が派生する。これらの間接便益については、数値で表すことは困難であるが、これらの間接効果は国家並びに地域開発に貢献する度合が極めて大きいため、できるだけ取り出して評価するように努めた。

① 国家経済への貢献

発電電力量の増加により、ネパール国内における需要家に対し安定したエネルギーを供給できることとなり、工業用、商業用に必要な電力を比較的安い価格で提供することが可能となる。このことにより、工業活動、商業活動がますます活発になることが予想される。

② 輸入燃料の節約

本件プロジェクトの実施により、このプロジェクトがない場合に必要とされたであろうディーゼル、石炭等の輸入燃料の消費を節約できることになる。

③ 新規雇用機会の創出

本件プロジェクトの建設工事の実施により、建設工事期間（およそ13年間）中に、熟練及び未熟練労働の機会が増大することとなる。工事完成後においては、プロジェクト施設の維持管理のための仕事が創出されることになる。これらに付帯する効果として、工事に従事した人達が各分野においてさまざまな経験、ノウハウ、技術を獲得でき、それらの経験の積み重ねをネパールでの将来の開発事業に活用することが可能となる。

④ 運輸交通の改善

ヒレからプロジェクト・サイトまでのアクセス道路の建設によって、コシ州(Koshi Zone)における運輸交通システムが改善されることになる。道路の整備に伴って、プロジェクト地域の経済の活性化に貢献するのみならず、近隣地域との交流にも大いに貢献することが予想される。

⑤ 地域経済の活性化

本件プロジェクトの実施により、新規雇用機会が創出され、その結果として収入が増加すること、さらには運輸交通が改善され、近隣地域との交流がしやすくなる等の効果が発生し、これらによって地域経済の活性化が進むこととなる。

⑥ アルン川沿い地域の開発促進

1985年に国際協力事業団によって作成された「コン河マスタープラン」によれば、アルン川沿いに6か所の水力発電開発地点が有力地点として確認されており、アルン3プロジェクトのアクセス道路がプロジェクト・サイトまで建設されることにより、そこから上下流地域へのアクセスが良くなることにより、有力開発地点周辺地域の開発が急速に進むことになろう。

⑦ 観光開発事業の推進

本件プロジェクトのアクセス道路の大部分はコン県における幹線道路として利用されることになろう。それにともなって、将来はピラトナガールからダングク、アルン3地点を通して中国国境までの道路が建設される可能性があり、そのことによって、この地域における観光開発が進むこと、それに伴って、雇用機会が増大することが期待される。

Table 13-1 Disbursement Schedule (Stage-1, 201 MW)
(Financial Cost)

unit: million US\$

| | Cost | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------------------------|-------|-----|------|------|------|------|------|-------|------|-----|-----|-----|------|-----|-----|
| Civil Works | 179.9 | 3.9 | 15.9 | 16.7 | 18.4 | 35.0 | 39.6 | 35.8 | 13.7 | 0 | 0 | 0 | 0.6 | 0.4 | 0 |
| Hydraulic Equipment | 11.7 | 0 | 0 | 0 | 0 | 1.2 | 2.3 | 4.7 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electromechanical Equipment | 38.4 | 0 | 0 | 0 | 0 | 2.9 | 11.6 | 8.7 | 5.8 | 0 | 0 | 4.7 | 3.8 | 0.9 | 0 |
| Transmission Line and Substation | 87.5 | 0 | 0 | 0 | 0 | 0 | 7.9 | 47.3 | 23.7 | 0 | 0 | 0 | 5.2 | 3.4 | 0 |
| Base Cost | 317.5 | 3.9 | 15.9 | 16.7 | 18.4 | 39.1 | 61.4 | 96.6 | 46.7 | 0 | 0 | 4.7 | 9.5 | 4.7 | 0 |
| Engineering & Administration | 23.8 | 0.3 | 1.2 | 1.2 | 1.4 | 2.9 | 4.6 | 7.2 | 3.5 | 0 | 0 | 0.4 | 0.7 | 0.4 | 0 |
| Physical Contingency | 43.1 | 0.6 | 2.5 | 2.6 | 2.9 | 5.9 | 8.6 | 12.2 | 5.7 | 0 | 0 | 0.5 | 1.0 | 0.5 | 0 |
| Total | 384.4 | 4.8 | 19.6 | 20.6 | 22.7 | 48.0 | 74.5 | 116.0 | 55.9 | 0 | 0 | 5.5 | 11.2 | 5.6 | 0 |
| O & M Cost | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 4.1 | 4.1 |

Table 13-2 Disbursement Schedule (Stage-1, 201 MW)
(Economic Cost)

unit: million US\$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------------------------|-----|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|
| Cost | | | | | | | | | | | | | | |
| Civil Works | 3.9 | 15.9 | 16.7 | 18.4 | 35.0 | 39.6 | 35.8 | 13.7 | 0 | 0 | 0 | 0.6 | 0.4 | 0 |
| Hydraulic Equipment | 0 | 0 | 0 | 0 | 1.2 | 2.3 | 4.7 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electromechanical Equipment | 0 | 0 | 0 | 0 | 2.9 | 11.6 | 8.7 | 5.8 | 0 | 0 | 4.7 | 3.8 | 0.9 | 0 |
| Transmission Line and Substation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Cost | 3.9 | 15.9 | 16.7 | 18.4 | 39.1 | 53.5 | 49.2 | 23.0 | 0 | 0 | 4.7 | 4.3 | 1.3 | 0 |
| Engineering & Administration | 0.3 | 1.2 | 1.2 | 1.4 | 2.9 | 4.0 | 3.7 | 1.7 | 0 | 0 | 0.4 | 0.3 | 0.1 | 0 |
| Physical Contingency | 0.6 | 2.5 | 2.6 | 2.9 | 5.9 | 7.7 | 7.1 | 3.2 | 0 | 0 | 0.5 | 0.5 | 0.1 | 0 |
| Total | 4.8 | 19.6 | 20.6 | 22.7 | 48.0 | 65.2 | 60.0 | 27.9 | 0 | 0 | 5.5 | 5.1 | 1.5 | 0 |
| O & M Cost | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 |

Table 13-3 Disbursement Schedule (Stage-1&2, 402 MW)
(Financial Cost)

unit: million US\$

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------------------------|-----|------|------|------|------|------|-------|------|------|------|------|------|-----|-----|
| Cost | | | | | | | | | | | | | | |
| Civil Works | 3.9 | 15.9 | 16.7 | 18.4 | 35.0 | 39.6 | 35.8 | 18.9 | 9.8 | 16.2 | 18.1 | 6.0 | 0.4 | 0 |
| Hydraulic Equipment | 0 | 0 | 0 | 0 | 1.2 | 2.3 | 4.7 | 3.5 | 0 | 0 | 3.2 | 2.7 | 0 | 0 |
| Electromechanical Equipment | 0 | 0 | 0 | 0 | 2.9 | 11.6 | 8.7 | 5.8 | 0 | 0 | 20.2 | 16.2 | 4.0 | 0 |
| Transmission Line and Substation | 0 | 0 | 0 | 0 | 0 | 7.9 | 47.3 | 23.7 | 0 | 0 | 16.9 | 11.2 | 0 | 0 |
| Base Cost | 3.9 | 15.9 | 16.7 | 18.4 | 39.1 | 61.4 | 96.6 | 51.9 | 9.8 | 16.2 | 58.3 | 36.0 | 4.4 | 0 |
| Engineering & Administration | 0.3 | 1.2 | 1.2 | 1.4 | 2.9 | 4.6 | 7.2 | 3.9 | 0.7 | 1.2 | 4.4 | 2.7 | 0.3 | 0 |
| Physical Contingency | 0.6 | 2.5 | 2.6 | 2.9 | 5.9 | 8.6 | 12.2 | 6.5 | 1.5 | 2.6 | 7.2 | 4.2 | 0.5 | 0 |
| Total | 4.8 | 19.6 | 20.6 | 22.7 | 48.0 | 74.5 | 116.0 | 62.3 | 12.1 | 20.0 | 69.9 | 42.9 | 5.2 | 0 |
| O & M Cost | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 5.7 | 5.7 |

Table 13-4 Disbursement Schedule (Stage-1&2, 402 MW)
(Economic Cost)

unit: million US\$

| | Cost | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------------------------------|-------|-----|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
| Civil Works | 234.6 | 3.9 | 15.9 | 16.7 | 18.4 | 35.0 | 39.6 | 35.8 | 18.9 | 9.8 | 16.2 | 18.1 | 6.0 | 0.4 | 0 |
| Hydraulic Equipment | 17.6 | 0 | 0 | 0 | 0 | 1.2 | 2.3 | 4.7 | 3.5 | 0 | 0 | 3.2 | 2.7 | 0 | 0 |
| Electromechanical Equipment | 69.4 | 0 | 0 | 0 | 0 | 2.9 | 11.6 | 8.7 | 5.8 | 0 | 0 | 20.2 | 16.2 | 4.0 | 0 |
| Transmission Line and Substation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Base Cost | 321.6 | 3.9 | 15.9 | 16.7 | 18.4 | 39.1 | 53.5 | 49.2 | 28.2 | 9.8 | 16.2 | 41.5 | 24.8 | 4.4 | 0 |
| Engineering & Administration | 24.1 | 0.3 | 1.2 | 1.2 | 1.4 | 2.9 | 4.0 | 3.7 | 2.1 | 0.7 | 1.2 | 3.1 | 1.9 | 0.3 | 0 |
| Physical Contingency | 46.3 | 0.6 | 2.5 | 2.6 | 2.9 | 5.9 | 7.7 | 7.1 | 4.0 | 1.5 | 2.6 | 5.4 | 3.0 | 0.5 | 0 |
| Total | 392.0 | 4.8 | 19.6 | 20.6 | 22.7 | 48.0 | 65.2 | 60.0 | 34.2 | 12.0 | 20.0 | 50.0 | 29.7 | 5.2 | 0 |
| O & M Cost | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 4.3 | 4.3 |

Table 13-5 Economic Internal Rate of Return
(Stage-1, 201 MW)

| | | COSTS | | | | | | | BENEFITS | | | | | MILLION US\$ | | |
|---------|------|----------------------------------|---------------------------------|----------------|---------------------|-------------------------------|--------------------|-------------------|---------------------|--------------------------------|-------------------------|--------------------------------|-------------------------|--------------|--|--|
| NO. | YEAR | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (15.54%) | NET PRESENT VALUE | | | |
| | | | | | | | | | | | | | | | | |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 | | | |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.865 | -16.96 | | | |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.749 | -15.43 | | | |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.648 | -14.72 | | | |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.561 | -26.93 | | | |
| 6 | 1992 | 65.20 | 0.00 | 65.20 | 0.00 | 0.00 | 0.00 | 0.00 | -65.20 | 0.567 | -37.00 | 0.486 | -31.66 | | | |
| 7 | 1993 | 60.00 | 0.00 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | -60.00 | 0.507 | -30.40 | 0.420 | -25.22 | | | |
| 8 | 1994 | 27.80 | 2.00 | 29.80 | 11.30 | 4.90 | 3.50 | 19.70 | -10.10 | 0.452 | -4.57 | 0.364 | -3.67 | | | |
| 9 | 1995 | 0.00 | 2.00 | 2.00 | 16.10 | 4.50 | 5.90 | 26.50 | -24.50 | 0.404 | 9.90 | 0.315 | 7.71 | | | |
| 10 | 1996 | 0.00 | 2.00 | 2.00 | 21.00 | 4.10 | 7.10 | 32.20 | -30.20 | 0.361 | 10.89 | 0.272 | 8.23 | | | |
| 11 | 1997 | 5.50 | 2.00 | 7.50 | 26.20 | 3.70 | 8.40 | 38.30 | -30.80 | 0.322 | 9.92 | 0.236 | 7.26 | | | |
| 12 | 1998 | 5.10 | 2.00 | 7.10 | 31.50 | 3.30 | 9.70 | 44.50 | -37.40 | 0.287 | 10.75 | 0.204 | 7.63 | | | |
| 13 | 1999 | 1.60 | 3.00 | 4.60 | 37.00 | 5.70 | 11.10 | 53.80 | -49.20 | 0.257 | 12.63 | 0.177 | 8.69 | | | |
| 14 | 2000 | 0.00 | 3.00 | 3.00 | 42.80 | 5.20 | 12.60 | 60.60 | -57.60 | 0.229 | 13.20 | 0.153 | 8.81 | | | |
| 15 | 2001 | 0.00 | 3.00 | 3.00 | 48.90 | 4.70 | 13.70 | 67.30 | -64.30 | 0.205 | 13.16 | 0.132 | 8.51 | | | |
| 16 | 2002 | 0.00 | 3.00 | 3.00 | 55.20 | 4.20 | 13.70 | 73.10 | -70.10 | 0.183 | 12.81 | 0.115 | 8.03 | | | |
| 17 | 2003 | 0.00 | 3.00 | 3.00 | 61.70 | 3.70 | 13.70 | 79.10 | -76.10 | 0.163 | 12.41 | 0.099 | 7.54 | | | |
| 18 | 2004 | 0.00 | 3.00 | 3.00 | 68.60 | 3.20 | 13.70 | 85.50 | -82.50 | 0.146 | 12.02 | 0.086 | 7.08 | | | |
| 19 | 2005 | 0.00 | 3.00 | 3.00 | 75.70 | 2.60 | 13.70 | 92.00 | -89.00 | 0.130 | 11.57 | 0.074 | 6.61 | | | |
| 20 | 2006 | 0.00 | 3.00 | 3.00 | 83.00 | 2.00 | 13.70 | 98.70 | -95.70 | 0.116 | 11.11 | 0.064 | 6.15 | | | |
| 21 | 2007 | 0.00 | 3.00 | 3.00 | 90.70 | 1.40 | 13.70 | 105.80 | -102.80 | 0.104 | 10.66 | 0.056 | 5.72 | | | |
| 22 | 2008 | 0.00 | 3.00 | 3.00 | 98.70 | 0.80 | 13.70 | 113.20 | -110.20 | 0.093 | 10.20 | 0.048 | 5.30 | | | |
| 23 | 2009 | 0.00 | 3.00 | 3.00 | 107.00 | 0.10 | 13.70 | 120.80 | -117.80 | 0.083 | 9.74 | 0.042 | 4.91 | | | |
| 24 | 2010 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.074 | 8.81 | 0.036 | 4.30 | | | |
| 25 | 2011 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.066 | 7.87 | 0.031 | 3.79 | | | |
| 26 | 2012 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.059 | 7.02 | 0.027 | 3.22 | | | |
| 27 | 2013 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.053 | 6.27 | 0.023 | 2.79 | | | |
| 28 | 2014 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.047 | 5.60 | 0.020 | 2.42 | | | |
| 29 | 2015 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.042 | 5.00 | 0.018 | 2.09 | | | |
| 30 | 2016 | 4.10 | 3.00 | 7.10 | 108.70 | 0.00 | 13.70 | 122.40 | -115.30 | 0.037 | 4.31 | 0.015 | 1.75 | | | |
| 31 | 2017 | 13.90 | 3.00 | 16.90 | 108.70 | 0.00 | 13.70 | 122.40 | -105.50 | 0.033 | 3.52 | 0.013 | 1.36 | | | |
| 32 | 2018 | 13.40 | 3.00 | 16.40 | 108.70 | 0.00 | 13.70 | 122.40 | -105.00 | 0.030 | 3.16 | 0.011 | 1.20 | | | |
| 33 | 2019 | 9.30 | 3.00 | 12.30 | 108.70 | 0.00 | 13.70 | 122.40 | -110.10 | 0.027 | 2.93 | 0.010 | 1.08 | | | |
| 34 | 2020 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.024 | 2.84 | 0.009 | 1.02 | | | |
| 35 | 2021 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.021 | 2.53 | 0.007 | 0.88 | | | |
| 36 | 2022 | 4.70 | 3.00 | 7.70 | 108.70 | 0.00 | 13.70 | 122.40 | -114.70 | 0.019 | 2.17 | 0.006 | 0.73 | | | |
| 37 | 2023 | 3.80 | 3.00 | 6.80 | 108.70 | 0.00 | 13.70 | 122.40 | -115.60 | 0.017 | 1.95 | 0.006 | 0.64 | | | |
| 38 | 2024 | 0.90 | 3.00 | 3.90 | 108.70 | 0.00 | 13.70 | 122.40 | -118.50 | 0.015 | 1.79 | 0.005 | 0.57 | | | |
| 39 | 2025 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.013 | 1.61 | 0.004 | 0.49 | | | |
| 40 | 2026 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.012 | 1.44 | 0.004 | 0.43 | | | |
| 41 | 2027 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.011 | 1.28 | 0.003 | 0.37 | | | |
| 42 | 2028 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.010 | 1.15 | 0.003 | 0.32 | | | |
| 43 | 2029 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.009 | 1.02 | 0.002 | 0.28 | | | |
| 44 | 2030 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.008 | 0.91 | 0.002 | 0.24 | | | |
| 45 | 2031 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.007 | 0.82 | 0.002 | 0.21 | | | |
| 46 | 2032 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.006 | 0.73 | 0.002 | 0.18 | | | |
| 47 | 2033 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.005 | 0.65 | 0.001 | 0.16 | | | |
| 48 | 2034 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.005 | 0.58 | 0.001 | 0.13 | | | |
| 49 | 2035 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.004 | 0.52 | 0.001 | 0.12 | | | |
| 50 | 2036 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.004 | 0.46 | 0.001 | 0.10 | | | |
| 51 | 2037 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.003 | 0.41 | 0.001 | 0.09 | | | |
| 52 | 2038 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.003 | 0.37 | 0.001 | 0.08 | | | |
| 53 | 2039 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.003 | 0.33 | 0.001 | 0.07 | | | |
| 54 | 2040 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.002 | 0.29 | 0.000 | 0.06 | | | |
| 55 | 2041 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.002 | 0.26 | 0.000 | 0.05 | | | |
| 56 | 2042 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.002 | 0.23 | 0.000 | 0.04 | | | |
| 57 | 2043 | 0.00 | 3.00 | 3.00 | 108.70 | 0.00 | 13.70 | 122.40 | -119.40 | 0.002 | 0.21 | 0.000 | 0.04 | | | |
| *TOTAL* | | 331.00 | 145.00 | 476.00 | 4571.20 | 54.10 | 647.40 | 5272.70 | 4796.70 | | 92.66 | | -0.00 | | | |

Total construction cost = US\$280.9 mil.
 Replacement cost = US\$50.1 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 274
 Present value (C) = 181
 B/C = 1.5
 B-C = 93
 IRR = 15.5%

Table 13-6 Economic Internal Rate of Return
(Stage-1&2, 402 MW)

| NO. YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (19.53%) | NET PRESENT VALUE |
|----------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| | | | | | | | | | | | | |
| 1 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.837 | -16.40 |
| 3 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.700 | -14.42 |
| 4 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.686 | -13.29 |
| 5 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.490 | -23.51 |
| 6 1992 | 65.20 | 0.00 | 65.20 | 0.00 | 0.00 | 0.00 | 0.00 | -65.20 | 0.567 | -37.00 | 0.410 | -26.72 |
| 7 1993 | 60.00 | 0.00 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | -60.00 | 0.507 | -30.40 | 0.343 | -20.57 |
| 8 1994 | 34.20 | 1.90 | 36.10 | 11.30 | 4.90 | 3.50 | 19.70 | -16.40 | 0.452 | -7.42 | 0.287 | -4.70 |
| 9 1995 | 12.10 | 1.90 | 14.00 | 16.10 | 4.50 | 5.90 | 26.50 | 12.50 | 0.404 | 5.05 | 0.240 | 3.00 |
| 10 1996 | 20.00 | 1.90 | 21.90 | 21.00 | 4.10 | 7.10 | 32.20 | 10.30 | 0.361 | 3.71 | 0.201 | 2.07 |
| 11 1997 | 49.90 | 1.90 | 51.80 | 26.20 | 3.70 | 8.40 | 38.30 | -13.50 | 0.322 | -4.35 | 0.168 | -2.27 |
| 12 1998 | 29.70 | 1.90 | 31.60 | 31.50 | 3.30 | 9.70 | 44.50 | 12.90 | 0.287 | -3.71 | 0.141 | -1.81 |
| 13 1999 | 5.20 | 5.70 | 10.90 | 37.00 | 113.90 | 11.10 | 162.00 | 151.10 | 0.257 | 38.78 | 0.118 | 17.76 |
| 14 2000 | 0.00 | 5.70 | 5.70 | 42.30 | 109.40 | 13.60 | 164.80 | 159.10 | 0.229 | 36.46 | 0.098 | 15.65 |
| 15 2001 | 0.00 | 5.70 | 5.70 | 48.90 | 104.90 | 13.70 | 167.50 | 161.80 | 0.205 | 33.11 | 0.082 | 13.31 |
| 16 2002 | 0.00 | 5.70 | 5.70 | 55.20 | 100.10 | 14.20 | 169.50 | 163.80 | 0.183 | 29.93 | 0.069 | 11.27 |
| 17 2003 | 0.00 | 5.70 | 5.70 | 61.70 | 95.10 | 15.80 | 172.50 | 166.90 | 0.163 | 27.23 | 0.058 | 9.51 |
| 18 2004 | 0.00 | 5.70 | 5.70 | 68.60 | 89.80 | 17.50 | 175.90 | 170.20 | 0.148 | 24.79 | 0.048 | 8.20 |
| 19 2005 | 0.00 | 5.70 | 5.70 | 75.70 | 84.50 | 19.30 | 179.50 | 173.80 | 0.130 | 22.60 | 0.040 | 7.00 |
| 20 2006 | 0.00 | 5.70 | 5.70 | 83.00 | 78.80 | 21.20 | 183.00 | 177.30 | 0.116 | 20.59 | 0.034 | 5.98 |
| 21 2007 | 0.00 | 5.70 | 5.70 | 90.70 | 73.00 | 23.10 | 186.80 | 181.10 | 0.104 | 18.77 | 0.028 | 5.11 |
| 22 2008 | 0.00 | 5.70 | 5.70 | 98.70 | 66.90 | 24.10 | 189.70 | 184.00 | 0.093 | 17.03 | 0.024 | 4.34 |
| 23 2009 | 0.00 | 5.70 | 5.70 | 107.00 | 60.50 | 24.10 | 191.80 | 185.90 | 0.083 | 15.36 | 0.020 | 3.67 |
| 24 2010 | 0.00 | 5.70 | 5.70 | 108.70 | 53.90 | 24.10 | 185.70 | 181.00 | 0.074 | 13.36 | 0.017 | 2.99 |
| 25 2011 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.066 | 11.85 | 0.014 | 2.48 |
| 26 2012 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.059 | 10.88 | 0.012 | 2.08 |
| 27 2013 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.053 | 9.44 | 0.010 | 1.74 |
| 28 2014 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.047 | 8.43 | 0.008 | 1.45 |
| 29 2015 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.042 | 7.53 | 0.007 | 1.22 |
| 30 2016 | 4.00 | 5.70 | 9.70 | 108.70 | 52.70 | 24.10 | 185.50 | 175.80 | 0.037 | 6.57 | 0.006 | 1.00 |
| 31 2017 | 13.80 | 5.70 | 19.50 | 108.70 | 52.70 | 24.10 | 185.50 | 166.00 | 0.033 | 5.54 | 0.006 | 0.79 |
| 32 2018 | 13.10 | 5.70 | 18.80 | 108.70 | 52.70 | 24.10 | 185.50 | 166.70 | 0.030 | 4.97 | 0.004 | 0.65 |
| 33 2019 | 9.20 | 5.70 | 14.90 | 108.70 | 52.70 | 24.10 | 185.50 | 170.60 | 0.027 | 4.54 | 0.003 | 0.57 |
| 34 2020 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.024 | 4.27 | 0.003 | 0.50 |
| 35 2021 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.021 | 3.81 | 0.002 | 0.42 |
| 36 2022 | 23.70 | 5.70 | 29.40 | 108.70 | 52.70 | 24.10 | 185.50 | 156.10 | 0.019 | 2.95 | 0.002 | 0.30 |
| 37 2023 | 19.20 | 5.70 | 24.90 | 108.70 | 52.70 | 24.10 | 185.50 | 160.60 | 0.017 | 2.72 | 0.002 | 0.26 |
| 38 2024 | 4.00 | 5.70 | 9.70 | 108.70 | 52.70 | 24.10 | 185.50 | 175.80 | 0.015 | 2.65 | 0.001 | 0.24 |
| 39 2025 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.013 | 2.42 | 0.001 | 0.20 |
| 40 2026 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.012 | 2.16 | 0.001 | 0.17 |
| 41 2027 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.011 | 1.93 | 0.001 | 0.14 |
| 42 2028 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.010 | 1.73 | 0.001 | 0.12 |
| 43 2029 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.009 | 1.54 | 0.001 | 0.10 |
| 44 2030 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.008 | 1.38 | 0.000 | 0.08 |
| 45 2031 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.007 | 1.23 | 0.000 | 0.07 |
| 46 2032 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.006 | 1.10 | 0.000 | 0.06 |
| 47 2033 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.005 | 0.98 | 0.000 | 0.05 |
| 48 2034 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.005 | 0.87 | 0.000 | 0.04 |
| 49 2035 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.004 | 0.78 | 0.000 | 0.03 |
| 50 2036 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.004 | 0.70 | 0.000 | 0.03 |
| 51 2037 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.003 | 0.62 | 0.000 | 0.02 |
| 52 2038 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.003 | 0.56 | 0.000 | 0.02 |
| 53 2039 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.003 | 0.50 | 0.000 | 0.02 |
| 54 2040 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.002 | 0.44 | 0.000 | 0.01 |
| 55 2041 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.002 | 0.40 | 0.000 | 0.01 |
| 56 2042 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.002 | 0.35 | 0.000 | 0.01 |
| 57 2043 | 0.00 | 5.70 | 5.70 | 108.70 | 52.70 | 24.10 | 185.50 | 179.80 | 0.002 | 0.32 | 0.000 | 0.01 |
| *TOTAL* | 479.00 | 266.00 | 745.00 | 4571.20 | 2790.40 | 1050.70 | 8412.30 | 7667.30 | | 251.78 | | 0.00 |

Total construction cost = US\$392.0 mil.
 Replacement cost = US\$87.0 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 477
 Present value (C) = 225
 B/C = 2.1
 B-C = 252
 IRR = 19.5%

Table 13-7 Sensitivity Analysis of EIRR

(201 MW: Cost +10%)

| MILLION US\$ | | | | | | | | | | | | | |
|--------------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (14.66%) | NET PRESENT VALUE |
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -3.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.872 | -18.84 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.761 | -17.27 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.663 | -16.58 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.579 | -30.55 |
| 6 | 1992 | 71.70 | 0.00 | 71.70 | 0.00 | 0.00 | 0.00 | 0.00 | -71.70 | 0.567 | -40.68 | 0.508 | -36.18 |
| 7 | 1993 | 68.00 | 0.00 | 68.00 | 0.00 | 0.00 | 0.00 | 0.00 | -68.00 | 0.507 | -33.44 | 0.440 | -29.04 |
| 8 | 1994 | 30.60 | 2.20 | 32.80 | 11.30 | 4.90 | 3.50 | 19.70 | -13.10 | 0.452 | -5.93 | 0.384 | -5.03 |
| 9 | 1995 | 0.00 | 2.20 | 2.20 | 16.10 | 4.50 | 5.90 | 26.50 | 24.30 | 0.404 | 9.81 | 0.335 | 8.13 |
| 10 | 1996 | 0.00 | 2.20 | 2.20 | 21.00 | 4.10 | 7.10 | 32.20 | 30.00 | 0.361 | 10.82 | 0.292 | 8.76 |
| 11 | 1997 | 6.10 | 2.20 | 8.30 | 26.20 | 3.70 | 8.40 | 38.30 | 30.00 | 0.322 | 9.66 | 0.255 | 7.64 |
| 12 | 1998 | 5.10 | 2.20 | 7.30 | 31.50 | 3.30 | 9.70 | 44.50 | 36.20 | 0.287 | 10.41 | 0.222 | 8.04 |
| 13 | 1999 | 1.80 | 3.30 | 5.10 | 37.00 | 5.70 | 11.10 | 53.80 | 48.70 | 0.257 | 12.50 | 0.194 | 9.43 |
| 14 | 2000 | 0.00 | 3.30 | 3.30 | 42.80 | 5.20 | 12.60 | 60.60 | 57.30 | 0.229 | 13.13 | 0.169 | 9.68 |
| 15 | 2001 | 0.00 | 3.30 | 3.30 | 48.90 | 4.70 | 13.70 | 67.30 | 64.00 | 0.205 | 13.10 | 0.147 | 9.43 |
| 16 | 2002 | 0.00 | 3.30 | 3.30 | 55.20 | 4.20 | 13.70 | 73.10 | 69.80 | 0.183 | 12.75 | 0.128 | 8.97 |
| 17 | 2003 | 0.00 | 3.30 | 3.30 | 61.70 | 3.70 | 13.70 | 79.10 | 75.80 | 0.163 | 12.36 | 0.112 | 8.49 |
| 18 | 2004 | 0.00 | 3.30 | 3.30 | 68.60 | 3.20 | 13.70 | 85.50 | 82.20 | 0.146 | 11.97 | 0.098 | 8.03 |
| 19 | 2005 | 0.00 | 3.30 | 3.30 | 75.70 | 2.60 | 13.70 | 92.00 | 88.70 | 0.130 | 11.53 | 0.085 | 7.56 |
| 20 | 2006 | 0.00 | 3.30 | 3.30 | 83.00 | 2.00 | 13.70 | 98.70 | 95.40 | 0.116 | 11.08 | 0.074 | 7.09 |
| 21 | 2007 | 0.00 | 3.30 | 3.30 | 90.70 | 1.40 | 13.70 | 105.80 | 102.50 | 0.104 | 10.63 | 0.065 | 6.64 |
| 22 | 2008 | 0.00 | 3.30 | 3.30 | 98.70 | 0.80 | 13.70 | 113.20 | 109.90 | 0.093 | 10.17 | 0.057 | 6.21 |
| 23 | 2009 | 0.00 | 3.30 | 3.30 | 107.00 | 0.10 | 13.70 | 120.80 | 117.50 | 0.083 | 9.71 | 0.049 | 5.79 |
| 24 | 2010 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.074 | 8.79 | 0.043 | 5.12 |
| 25 | 2011 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.066 | 7.85 | 0.037 | 4.47 |
| 26 | 2012 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.059 | 7.01 | 0.033 | 3.99 |
| 27 | 2013 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.053 | 6.26 | 0.029 | 3.40 |
| 28 | 2014 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.047 | 5.59 | 0.025 | 2.95 |
| 29 | 2015 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.042 | 4.99 | 0.022 | 2.58 |
| 30 | 2016 | 4.50 | 3.30 | 7.80 | 108.70 | 0.00 | 13.70 | 122.40 | 114.60 | 0.037 | 4.28 | 0.019 | 2.17 |
| 31 | 2017 | 15.30 | 3.30 | 18.60 | 108.70 | 0.00 | 13.70 | 122.40 | 103.80 | 0.033 | 3.46 | 0.016 | 1.71 |
| 32 | 2018 | 14.70 | 3.30 | 18.00 | 108.70 | 0.00 | 13.70 | 122.40 | 104.40 | 0.030 | 3.11 | 0.014 | 1.50 |
| 33 | 2019 | 10.20 | 3.30 | 13.50 | 108.70 | 0.00 | 13.70 | 122.40 | 108.90 | 0.027 | 2.90 | 0.013 | 1.37 |
| 34 | 2020 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.024 | 2.83 | 0.011 | 1.30 |
| 35 | 2021 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.021 | 2.53 | 0.010 | 1.14 |
| 36 | 2022 | 5.20 | 3.30 | 8.50 | 108.70 | 0.00 | 13.70 | 122.40 | 113.90 | 0.019 | 2.16 | 0.008 | 0.95 |
| 37 | 2023 | 4.20 | 3.30 | 7.50 | 108.70 | 0.00 | 13.70 | 122.40 | 114.90 | 0.017 | 1.94 | 0.007 | 0.83 |
| 38 | 2024 | 1.00 | 3.30 | 4.30 | 108.70 | 0.00 | 13.70 | 122.40 | 118.10 | 0.015 | 1.78 | 0.006 | 0.75 |
| 39 | 2025 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.013 | 1.61 | 0.006 | 0.66 |
| 40 | 2026 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.012 | 1.43 | 0.005 | 0.57 |
| 41 | 2027 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.011 | 1.28 | 0.004 | 0.50 |
| 42 | 2028 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.010 | 1.14 | 0.004 | 0.44 |
| 43 | 2029 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.009 | 1.02 | 0.003 | 0.38 |
| 44 | 2030 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.008 | 0.91 | 0.003 | 0.33 |
| 45 | 2031 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.007 | 0.81 | 0.002 | 0.29 |
| 46 | 2032 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.006 | 0.73 | 0.002 | 0.25 |
| 47 | 2033 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.005 | 0.65 | 0.002 | 0.22 |
| 48 | 2034 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.005 | 0.58 | 0.002 | 0.19 |
| 49 | 2035 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.004 | 0.52 | 0.001 | 0.17 |
| 50 | 2036 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.004 | 0.46 | 0.001 | 0.15 |
| 51 | 2037 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.003 | 0.41 | 0.001 | 0.13 |
| 52 | 2038 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.003 | 0.37 | 0.001 | 0.11 |
| 53 | 2039 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.003 | 0.33 | 0.001 | 0.10 |
| 54 | 2040 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.002 | 0.29 | 0.001 | 0.08 |
| 55 | 2041 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.002 | 0.26 | 0.001 | 0.07 |
| 56 | 2042 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.002 | 0.23 | 0.001 | 0.06 |
| 57 | 2043 | 0.00 | 3.30 | 3.30 | 108.70 | 0.00 | 13.70 | 122.40 | 119.10 | 0.002 | 0.21 | 0.000 | 0.06 |
| *TOTAL* | | 364.80 | 159.50 | 524.30 | 4571.20 | 54.10 | 647.40 | 5272.70 | 4748.40 | | 74.26 | | -0.00 |

Total construction cost = US\$309.7 mil.
 Replacement cost = US\$55.1 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 274
 Present value (C) = 200
 B/C = 1.37
 B-C = 74
 IRR = 14.7%

Table 13-8 Sensitivity Analysis of EIRR
(201 MW: Benefit -10%)

| | | COSTS | | | BENEFITS | | | BENEFITS | DISCOUNT | NET | DISCOUNT | NET | |
|---------|------|----------------------------------|---------------------------------|----------------|---------------------|-------------------------------|--------------------|-------------------|----------|--------------------|------------------|--------------------|------------------|
| NO. | YEAR | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | COSTS | FACTOR (12.00%) | PRESENT VALUE | FACTOR (14.48%) | PRESENT VALUE |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.874 | -17.12 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.763 | -15.72 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.667 | -15.13 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.582 | -27.95 |
| 6 | 1992 | 65.20 | 0.00 | 65.20 | 0.00 | 0.00 | 0.00 | 0.00 | -65.20 | 0.567 | -37.00 | 0.509 | -33.16 |
| 7 | 1993 | 60.00 | 0.00 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | -60.00 | 0.507 | -30.40 | 0.444 | -26.66 |
| 8 | 1994 | 27.80 | 2.00 | 29.80 | 10.20 | 4.40 | 3.20 | 17.80 | -12.00 | 0.452 | -5.43 | 0.388 | -4.66 |
| 9 | 1995 | 0.00 | 3.00 | 2.00 | 14.30 | 4.10 | 4.20 | 22.80 | 20.80 | 0.404 | 8.40 | 0.339 | 7.05 |
| 10 | 1996 | 0.00 | 2.00 | 2.00 | 18.90 | 3.70 | 5.30 | 27.90 | 25.90 | 0.361 | 9.34 | 0.296 | 7.67 |
| 11 | 1997 | 5.50 | 3.00 | 7.50 | 23.60 | 3.30 | 6.40 | 33.30 | 25.80 | 0.322 | 8.31 | 0.259 | 6.67 |
| 12 | 1998 | 5.10 | 2.00 | 7.10 | 28.40 | 3.00 | 7.60 | 39.00 | 31.90 | 0.287 | 9.17 | 0.226 | 7.21 |
| 13 | 1999 | 1.60 | 3.00 | 4.60 | 33.30 | 5.10 | 8.70 | 47.10 | 42.50 | 0.257 | 10.91 | 0.197 | 8.39 |
| 14 | 2000 | 0.00 | 3.00 | 3.00 | 38.50 | 4.70 | 10.00 | 53.20 | 50.20 | 0.229 | 11.50 | 0.172 | 8.66 |
| 15 | 2001 | 0.00 | 3.00 | 3.00 | 44.00 | 4.30 | 11.30 | 59.60 | 56.60 | 0.205 | 11.58 | 0.151 | 8.53 |
| 16 | 2002 | 0.00 | 3.00 | 3.00 | 49.70 | 3.80 | 12.30 | 65.80 | 62.80 | 0.183 | 11.47 | 0.132 | 8.26 |
| 17 | 2003 | 0.00 | 3.00 | 3.00 | 55.50 | 3.30 | 12.30 | 71.10 | 68.10 | 0.163 | 11.11 | 0.115 | 7.83 |
| 18 | 2004 | 0.00 | 3.00 | 3.00 | 61.70 | 2.80 | 12.30 | 76.80 | 73.80 | 0.146 | 10.75 | 0.100 | 7.41 |
| 19 | 2005 | 0.00 | 3.00 | 3.00 | 68.10 | 2.30 | 12.30 | 82.70 | 79.70 | 0.130 | 10.36 | 0.088 | 6.99 |
| 20 | 2006 | 0.00 | 3.00 | 3.00 | 74.70 | 1.80 | 12.30 | 88.80 | 85.80 | 0.116 | 9.96 | 0.077 | 6.57 |
| 21 | 2007 | 0.00 | 3.00 | 3.00 | 81.60 | 1.30 | 12.30 | 95.20 | 92.20 | 0.104 | 9.56 | 0.067 | 6.17 |
| 22 | 2008 | 0.00 | 3.00 | 3.00 | 88.80 | 0.70 | 12.30 | 101.80 | 98.80 | 0.093 | 9.14 | 0.059 | 5.78 |
| 23 | 2009 | 0.00 | 3.00 | 3.00 | 96.30 | 0.10 | 12.30 | 108.70 | 105.70 | 0.083 | 8.74 | 0.051 | 5.40 |
| 24 | 2010 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.074 | 7.89 | 0.045 | 4.77 |
| 25 | 2011 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.066 | 7.04 | 0.039 | 4.17 |
| 26 | 2012 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.059 | 6.29 | 0.034 | 3.64 |
| 27 | 2013 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.053 | 5.61 | 0.030 | 3.18 |
| 28 | 2014 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.047 | 5.01 | 0.026 | 2.78 |
| 29 | 2015 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.042 | 4.48 | 0.023 | 2.43 |
| 30 | 2016 | 4.10 | 3.00 | 7.10 | 97.60 | 0.00 | 12.30 | 109.90 | 102.80 | 0.037 | 3.84 | 0.020 | 2.04 |
| 31 | 2017 | 13.90 | 3.00 | 16.90 | 97.60 | 0.00 | 12.30 | 109.90 | 93.00 | 0.033 | 3.10 | 0.017 | 1.61 |
| 32 | 2018 | 13.40 | 3.00 | 16.40 | 97.60 | 0.00 | 12.30 | 109.90 | 93.50 | 0.030 | 2.79 | 0.015 | 1.41 |
| 33 | 2019 | 9.30 | 3.00 | 12.30 | 97.60 | 0.00 | 12.30 | 109.90 | 97.00 | 0.027 | 2.60 | 0.013 | 1.29 |
| 34 | 2020 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.024 | 2.54 | 0.012 | 1.23 |
| 35 | 2021 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.021 | 2.27 | 0.010 | 1.08 |
| 36 | 2022 | 4.70 | 3.00 | 7.70 | 97.60 | 0.00 | 12.30 | 109.90 | 102.20 | 0.019 | 1.94 | 0.009 | 0.90 |
| 37 | 2023 | 3.80 | 3.00 | 6.80 | 97.60 | 0.00 | 12.30 | 109.90 | 103.10 | 0.017 | 1.74 | 0.008 | 0.79 |
| 38 | 2024 | 0.90 | 3.00 | 3.90 | 97.60 | 0.00 | 12.30 | 109.90 | 106.00 | 0.015 | 1.60 | 0.007 | 0.71 |
| 39 | 2025 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.013 | 1.44 | 0.006 | 0.63 |
| 40 | 2026 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.012 | 1.29 | 0.005 | 0.55 |
| 41 | 2027 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.011 | 1.15 | 0.004 | 0.48 |
| 42 | 2028 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.010 | 1.03 | 0.004 | 0.42 |
| 43 | 2029 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.009 | 0.92 | 0.003 | 0.37 |
| 44 | 2030 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.008 | 0.82 | 0.003 | 0.32 |
| 45 | 2031 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.007 | 0.73 | 0.003 | 0.28 |
| 46 | 2032 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.006 | 0.65 | 0.002 | 0.24 |
| 47 | 2033 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.005 | 0.58 | 0.002 | 0.21 |
| 48 | 2034 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.005 | 0.52 | 0.002 | 0.19 |
| 49 | 2035 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.004 | 0.46 | 0.002 | 0.16 |
| 50 | 2036 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.004 | 0.41 | 0.001 | 0.14 |
| 51 | 2037 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.003 | 0.37 | 0.001 | 0.12 |
| 52 | 2038 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.003 | 0.33 | 0.001 | 0.11 |
| 53 | 2039 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.003 | 0.29 | 0.001 | 0.09 |
| 54 | 2040 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.002 | 0.26 | 0.001 | 0.08 |
| 55 | 2041 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.002 | 0.24 | 0.001 | 0.07 |
| 56 | 2042 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.002 | 0.21 | 0.001 | 0.06 |
| 57 | 2043 | 0.00 | 3.00 | 3.00 | 97.60 | 0.00 | 12.30 | 109.90 | 106.90 | 0.002 | 0.19 | 0.001 | 0.06 |
| *TOTAL* | | 331.00 | 145.00 | 476.00 | 4106.20 | 48.70 | 573.30 | 4728.20 | 4262.20 | | 62.73 | | -0.00 |

Total construction cost = US\$280.9 mil.
 Replacement cost = US\$50.1 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 244
 Present value (C) = 181
 B/C = 1.3
 B-C = 63
 IRR = 14.5%

Table 13-9 Sensitivity Analysis of EIRR

(201 MW: Cost +10%, Benefit -10%)

(UNIT: MILLION US\$)

| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (13.64%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 3.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.880 | -19.01 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.774 | -17.58 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.681 | -17.04 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.600 | -31.66 |
| 6 | 1992 | 71.70 | 0.00 | 71.70 | 0.00 | 0.00 | 0.00 | 0.00 | -71.70 | 0.567 | -40.68 | 0.528 | -37.83 |
| 7 | 1993 | 65.00 | 0.00 | 65.00 | 0.00 | 0.00 | 0.00 | 0.00 | -65.00 | 0.507 | -33.44 | 0.464 | -30.65 |
| 8 | 1994 | 30.60 | 2.20 | 32.80 | 10.20 | 4.40 | 3.20 | 17.80 | -15.00 | 0.452 | -6.79 | 0.409 | -6.13 |
| 9 | 1995 | 0.00 | 2.20 | 2.20 | 14.50 | 4.10 | 4.20 | 22.80 | 20.60 | 0.404 | 8.32 | 0.360 | 7.11 |
| 10 | 1996 | 0.00 | 2.20 | 2.20 | 18.90 | 3.70 | 5.30 | 27.90 | 25.70 | 0.361 | 9.27 | 0.316 | 8.13 |
| 11 | 1997 | 6.10 | 2.20 | 8.30 | 23.50 | 3.30 | 6.40 | 33.20 | 24.90 | 0.322 | 8.02 | 0.278 | 6.93 |
| 12 | 1998 | 6.10 | 2.20 | 8.30 | 28.40 | 3.00 | 7.50 | 38.90 | 30.60 | 0.287 | 8.80 | 0.245 | 7.50 |
| 13 | 1999 | 1.80 | 3.30 | 5.10 | 33.30 | 5.10 | 8.70 | 47.10 | 42.00 | 0.257 | 10.78 | 0.216 | 9.06 |
| 14 | 2000 | 0.00 | 3.30 | 3.30 | 38.60 | 4.70 | 10.00 | 53.30 | 50.00 | 0.229 | 11.46 | 0.190 | 9.49 |
| 15 | 2001 | 0.00 | 3.30 | 3.30 | 44.00 | 4.30 | 11.30 | 59.60 | 56.30 | 0.205 | 11.52 | 0.167 | 9.40 |
| 16 | 2002 | 0.00 | 3.30 | 3.30 | 49.70 | 3.80 | 12.30 | 65.80 | 62.50 | 0.183 | 11.42 | 0.147 | 9.18 |
| 17 | 2003 | 0.00 | 3.30 | 3.30 | 55.60 | 3.30 | 12.30 | 71.20 | 67.90 | 0.163 | 11.08 | 0.125 | 8.78 |
| 18 | 2004 | 0.00 | 3.30 | 3.30 | 61.70 | 2.80 | 12.30 | 76.80 | 73.50 | 0.146 | 10.70 | 0.114 | 8.36 |
| 19 | 2005 | 0.00 | 3.30 | 3.30 | 68.10 | 2.30 | 12.30 | 82.70 | 79.40 | 0.130 | 10.33 | 0.100 | 7.95 |
| 20 | 2006 | 0.00 | 3.30 | 3.30 | 74.70 | 1.80 | 12.30 | 88.80 | 85.50 | 0.116 | 9.93 | 0.088 | 7.53 |
| 21 | 2007 | 0.00 | 3.30 | 3.30 | 81.60 | 1.30 | 12.30 | 95.20 | 91.90 | 0.104 | 9.53 | 0.078 | 7.12 |
| 22 | 2008 | 0.00 | 3.30 | 3.30 | 88.80 | 0.70 | 12.30 | 101.80 | 98.50 | 0.093 | 9.12 | 0.068 | 6.72 |
| 23 | 2009 | 0.00 | 3.30 | 3.30 | 96.30 | 0.10 | 12.30 | 108.70 | 105.40 | 0.083 | 8.71 | 0.060 | 6.33 |
| 24 | 2010 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.074 | 7.87 | 0.053 | 5.63 |
| 25 | 2011 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.066 | 7.02 | 0.046 | 4.96 |
| 26 | 2012 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.059 | 6.27 | 0.041 | 4.36 |
| 27 | 2013 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.053 | 5.60 | 0.036 | 3.84 |
| 28 | 2014 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.047 | 5.00 | 0.032 | 3.38 |
| 29 | 2015 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.042 | 4.46 | 0.028 | 2.97 |
| 30 | 2016 | 4.50 | 3.30 | 7.80 | 97.60 | 0.00 | 12.30 | 109.90 | 102.10 | 0.037 | 3.82 | 0.025 | 2.50 |
| 31 | 2017 | 15.30 | 3.30 | 18.60 | 97.60 | 0.00 | 12.30 | 109.90 | 91.30 | 0.033 | 3.05 | 0.022 | 1.97 |
| 32 | 2018 | 14.70 | 3.30 | 18.00 | 97.60 | 0.00 | 12.30 | 109.90 | 91.90 | 0.030 | 2.74 | 0.019 | 1.75 |
| 33 | 2019 | 10.20 | 3.30 | 13.50 | 97.60 | 0.00 | 12.30 | 109.90 | 96.40 | 0.027 | 2.57 | 0.017 | 1.61 |
| 34 | 2020 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.024 | 2.53 | 0.015 | 1.57 |
| 35 | 2021 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.021 | 2.26 | 0.013 | 1.38 |
| 36 | 2022 | 5.20 | 3.30 | 8.50 | 97.60 | 0.00 | 12.30 | 109.90 | 101.40 | 0.019 | 1.92 | 0.011 | 1.15 |
| 37 | 2023 | 4.20 | 3.30 | 7.50 | 97.60 | 0.00 | 12.30 | 109.90 | 102.40 | 0.017 | 1.73 | 0.010 | 1.03 |
| 38 | 2024 | 1.00 | 3.30 | 4.30 | 97.60 | 0.00 | 12.30 | 109.90 | 105.60 | 0.015 | 1.59 | 0.009 | 0.93 |
| 39 | 2025 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.013 | 1.44 | 0.008 | 0.83 |
| 40 | 2026 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.012 | 1.28 | 0.007 | 0.73 |
| 41 | 2027 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.011 | 1.15 | 0.006 | 0.64 |
| 42 | 2028 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.010 | 1.02 | 0.005 | 0.56 |
| 43 | 2029 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.009 | 0.91 | 0.005 | 0.50 |
| 44 | 2030 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.008 | 0.82 | 0.004 | 0.44 |
| 45 | 2031 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.007 | 0.73 | 0.004 | 0.38 |
| 46 | 2032 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.006 | 0.65 | 0.003 | 0.34 |
| 47 | 2033 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.005 | 0.58 | 0.003 | 0.30 |
| 48 | 2034 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.005 | 0.52 | 0.002 | 0.26 |
| 49 | 2035 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.004 | 0.46 | 0.002 | 0.23 |
| 50 | 2036 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.004 | 0.41 | 0.002 | 0.20 |
| 51 | 2037 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.003 | 0.37 | 0.002 | 0.18 |
| 52 | 2038 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.003 | 0.33 | 0.001 | 0.15 |
| 53 | 2039 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.003 | 0.29 | 0.001 | 0.14 |
| 54 | 2040 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.002 | 0.26 | 0.001 | 0.12 |
| 55 | 2041 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.002 | 0.23 | 0.001 | 0.11 |
| 56 | 2042 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.002 | 0.21 | 0.001 | 0.09 |
| 57 | 2043 | 0.00 | 3.30 | 3.30 | 97.60 | 0.00 | 12.30 | 109.90 | 106.60 | 0.002 | 0.19 | 0.001 | 0.08 |
| *TOTAL* | | 364.80 | 159.50 | 524.30 | 4106.30 | 48.70 | 573.20 | 4728.20 | 4203.90 | | 44.31 | | -0.00 |

Total construction cost = US\$309.7 mil.
 Replacement cost = US\$55.1 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 244
 Present value (C) = 200
 B/C = 1.2
 B-C = 44
 IRR = 13.6%

Table 13-10 Sensitivity Analysis of EIRR

(201 MW: Power Export Decrease by 20 MW)

| NO. YEAR | INVESTMENT AND REPLACEMENT | COSTS OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | BENEFITS SALABLE EXPORT SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (14.84%) | NET PRESENT VALUE |
|----------|----------------------------|---------------------------------|-------------|------------------|---------------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| 1 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.873 | -17.11 |
| 3 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.762 | -15.70 |
| 4 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.666 | -15.11 |
| 5 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.581 | -27.89 |
| 6 1992 | 65.20 | 0.00 | 65.20 | 0.00 | 0.00 | 0.00 | 0.00 | -65.20 | 0.567 | -37.00 | 0.507 | -33.01 |
| 7 1993 | 60.00 | 0.00 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | -60.00 | 0.507 | -30.40 | 0.443 | -26.57 |
| 8 1994 | 27.80 | 2.00 | 29.80 | 5.80 | 5.30 | 2.20 | 13.30 | -16.50 | 0.452 | -7.46 | 0.387 | -6.38 |
| 9 1995 | 0.00 | 2.00 | 2.00 | 10.00 | 5.00 | 3.30 | 18.30 | 16.30 | 0.404 | 6.58 | 0.338 | 5.50 |
| 10 1996 | 0.00 | 2.00 | 2.00 | 15.50 | 4.60 | 4.50 | 24.80 | 22.80 | 0.361 | 8.15 | 0.296 | 6.66 |
| 11 1997 | 5.50 | 2.00 | 7.50 | 20.60 | 4.20 | 5.70 | 30.50 | 23.00 | 0.322 | 7.41 | 0.257 | 5.92 |
| 12 1998 | 5.10 | 2.00 | 7.10 | 26.00 | 3.70 | 7.00 | 36.70 | 29.60 | 0.287 | 8.51 | 0.225 | 6.65 |
| 13 1999 | 1.80 | 3.00 | 4.60 | 31.50 | 6.10 | 8.40 | 46.00 | 41.40 | 0.257 | 10.63 | 0.196 | 8.12 |
| 14 2000 | 0.00 | 3.00 | 3.00 | 37.30 | 5.60 | 9.80 | 52.70 | 49.70 | 0.229 | 11.39 | 0.171 | 8.51 |
| 15 2001 | 0.00 | 3.00 | 3.00 | 43.40 | 5.20 | 11.20 | 59.80 | 56.80 | 0.205 | 11.62 | 0.149 | 8.49 |
| 16 2002 | 0.00 | 3.00 | 3.00 | 49.70 | 4.70 | 12.80 | 67.20 | 64.20 | 0.183 | 11.73 | 0.130 | 8.38 |
| 17 2003 | 0.00 | 3.00 | 3.00 | 56.20 | 4.10 | 13.70 | 74.60 | 71.00 | 0.163 | 11.58 | 0.114 | 8.09 |
| 18 2004 | 0.00 | 3.00 | 3.00 | 63.10 | 3.60 | 14.70 | 80.40 | 77.40 | 0.146 | 11.27 | 0.099 | 7.70 |
| 19 2005 | 0.00 | 3.00 | 3.00 | 70.10 | 3.00 | 15.70 | 86.80 | 83.80 | 0.130 | 10.90 | 0.087 | 7.28 |
| 20 2006 | 0.00 | 3.00 | 3.00 | 77.50 | 2.50 | 16.70 | 93.70 | 90.70 | 0.116 | 10.53 | 0.076 | 6.88 |
| 21 2007 | 0.00 | 3.00 | 3.00 | 85.20 | 1.80 | 17.70 | 100.70 | 97.70 | 0.104 | 10.13 | 0.066 | 6.47 |
| 22 2008 | 0.00 | 3.00 | 3.00 | 93.20 | 1.20 | 18.70 | 108.10 | 105.10 | 0.093 | 9.73 | 0.058 | 6.07 |
| 23 2009 | 0.00 | 3.00 | 3.00 | 101.50 | 0.60 | 19.70 | 115.80 | 112.80 | 0.083 | 9.32 | 0.050 | 5.69 |
| 24 2010 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 20.70 | 122.20 | 119.20 | 0.074 | 8.80 | 0.044 | 5.25 |
| 25 2011 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 21.70 | 122.20 | 119.20 | 0.066 | 7.85 | 0.038 | 4.58 |
| 26 2012 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 22.70 | 122.20 | 119.20 | 0.059 | 7.01 | 0.034 | 4.00 |
| 27 2013 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 23.70 | 122.20 | 119.20 | 0.053 | 6.26 | 0.029 | 3.49 |
| 28 2014 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 24.70 | 122.20 | 119.20 | 0.047 | 5.59 | 0.026 | 3.05 |
| 29 2015 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 25.70 | 122.20 | 119.20 | 0.042 | 4.99 | 0.022 | 2.66 |
| 30 2016 | 4.10 | 3.00 | 7.10 | 108.50 | 0.00 | 26.70 | 122.20 | 115.10 | 0.037 | 4.30 | 0.020 | 2.24 |
| 31 2017 | 13.90 | 3.00 | 16.90 | 108.50 | 0.00 | 27.70 | 122.20 | 105.30 | 0.033 | 3.51 | 0.017 | 1.79 |
| 32 2018 | 13.40 | 3.00 | 16.40 | 108.50 | 0.00 | 28.70 | 122.20 | 105.80 | 0.030 | 3.15 | 0.015 | 1.57 |
| 33 2019 | 9.30 | 3.00 | 12.30 | 108.50 | 0.00 | 29.70 | 122.20 | 109.90 | 0.027 | 2.92 | 0.013 | 1.43 |
| 34 2020 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 30.70 | 122.20 | 119.20 | 0.024 | 2.83 | 0.011 | 1.35 |
| 35 2021 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 31.70 | 122.20 | 119.20 | 0.021 | 2.53 | 0.010 | 1.18 |
| 36 2022 | 4.70 | 3.00 | 7.70 | 108.50 | 0.00 | 32.70 | 122.20 | 114.50 | 0.019 | 2.17 | 0.009 | 0.99 |
| 37 2023 | 3.80 | 3.00 | 6.80 | 108.50 | 0.00 | 33.70 | 122.20 | 115.40 | 0.017 | 1.95 | 0.008 | 0.87 |
| 38 2024 | 0.90 | 3.00 | 3.90 | 108.50 | 0.00 | 34.70 | 122.20 | 118.30 | 0.015 | 1.79 | 0.007 | 0.78 |
| 39 2025 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 35.70 | 122.20 | 119.20 | 0.013 | 1.61 | 0.006 | 0.69 |
| 40 2026 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 36.70 | 122.20 | 119.20 | 0.012 | 1.43 | 0.005 | 0.60 |
| 41 2027 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 37.70 | 122.20 | 119.20 | 0.011 | 1.28 | 0.004 | 0.52 |
| 42 2028 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 38.70 | 122.20 | 119.20 | 0.010 | 1.14 | 0.004 | 0.46 |
| 43 2029 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 39.70 | 122.20 | 119.20 | 0.009 | 1.02 | 0.003 | 0.40 |
| 44 2030 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 40.70 | 122.20 | 119.20 | 0.008 | 0.91 | 0.003 | 0.35 |
| 45 2031 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 41.70 | 122.20 | 119.20 | 0.007 | 0.81 | 0.003 | 0.30 |
| 46 2032 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 42.70 | 122.20 | 119.20 | 0.006 | 0.73 | 0.002 | 0.26 |
| 47 2033 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 43.70 | 122.20 | 119.20 | 0.005 | 0.65 | 0.002 | 0.23 |
| 48 2034 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 44.70 | 122.20 | 119.20 | 0.005 | 0.58 | 0.002 | 0.20 |
| 49 2035 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 45.70 | 122.20 | 119.20 | 0.004 | 0.52 | 0.001 | 0.18 |
| 50 2036 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 46.70 | 122.20 | 119.20 | 0.004 | 0.46 | 0.001 | 0.15 |
| 51 2037 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 47.70 | 122.20 | 119.20 | 0.003 | 0.41 | 0.001 | 0.13 |
| 52 2038 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 48.70 | 122.20 | 119.20 | 0.003 | 0.37 | 0.001 | 0.12 |
| 53 2039 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 49.70 | 122.20 | 119.20 | 0.003 | 0.33 | 0.001 | 0.10 |
| 54 2040 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 50.70 | 122.20 | 119.20 | 0.002 | 0.29 | 0.001 | 0.09 |
| 55 2041 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 51.70 | 122.20 | 119.20 | 0.002 | 0.26 | 0.001 | 0.08 |
| 56 2042 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 52.70 | 122.20 | 119.20 | 0.002 | 0.23 | 0.001 | 0.07 |
| 57 2043 | 0.00 | 3.00 | 3.00 | 108.50 | 0.00 | 53.70 | 122.20 | 119.20 | 0.002 | 0.21 | 0.000 | 0.06 |
| *TOTAL* | 331.00 | 145.00 | 476.00 | 4475.60 | 61.20 | 626.60 | 6163.40 | 4687.40 | | 68.15 | | -0.00 |

Total construction cost = US\$280.9 mil.
 Replacement cost = US\$50.1 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 249
 Present value (C) = 181
 B/C = 1.4
 B-C = 68
 IRR = 14.5%

Table 13-11 Sensitivity Analysis of EIRR

(402 MW: Cost +10%)

| MILLION US\$ | | | | | | | | | | | | | |
|--------------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (18.46%) | NET PRESENT VALUE |
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.844 | -18.23 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.713 | -16.18 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.602 | -15.04 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.508 | -26.81 |
| 6 | 1992 | 71.70 | 0.00 | 71.70 | 0.00 | 0.00 | 0.00 | 0.00 | -71.70 | 0.567 | -40.68 | 0.429 | -30.73 |
| 7 | 1993 | 66.00 | 0.00 | 66.00 | 0.00 | 0.00 | 0.00 | 0.00 | -66.00 | 0.507 | -33.44 | 0.362 | -23.88 |
| 8 | 1994 | 37.60 | 2.10 | 39.70 | 11.30 | 4.90 | 3.50 | 19.70 | -20.00 | 0.452 | -9.05 | 0.305 | -6.11 |
| 9 | 1995 | 13.30 | 2.10 | 15.40 | 16.10 | 4.50 | 5.90 | 26.50 | 11.10 | 0.404 | 4.48 | 0.238 | 2.86 |
| 10 | 1996 | 22.00 | 2.10 | 24.10 | 21.00 | 4.10 | 7.10 | 32.20 | 8.10 | 0.361 | 2.92 | 0.218 | 1.76 |
| 11 | 1997 | 54.90 | 2.10 | 57.00 | 26.20 | 3.70 | 8.40 | 38.30 | -18.70 | 0.322 | -6.02 | 0.184 | -3.44 |
| 12 | 1998 | 32.70 | 2.10 | 34.80 | 31.50 | 3.30 | 9.70 | 44.50 | 9.70 | 0.287 | 2.79 | 0.155 | 1.50 |
| 13 | 1999 | 5.70 | 6.30 | 12.00 | 37.00 | 113.90 | 11.10 | 162.00 | 150.00 | 0.257 | 38.50 | 0.131 | 19.64 |
| 14 | 2000 | 0.00 | 6.30 | 6.30 | 42.80 | 109.40 | 12.60 | 164.80 | 158.50 | 0.229 | 36.32 | 0.111 | 17.52 |
| 15 | 2001 | 0.00 | 6.30 | 6.30 | 48.90 | 104.90 | 13.70 | 167.50 | 161.20 | 0.205 | 32.98 | 0.093 | 15.04 |
| 16 | 2002 | 0.00 | 6.30 | 6.30 | 55.20 | 100.10 | 14.20 | 169.50 | 163.20 | 0.183 | 29.82 | 0.079 | 12.65 |
| 17 | 2003 | 0.00 | 6.30 | 6.30 | 61.70 | 95.10 | 15.80 | 172.60 | 166.30 | 0.163 | 27.13 | 0.066 | 11.05 |
| 18 | 2004 | 0.00 | 6.30 | 6.30 | 68.60 | 89.80 | 17.50 | 175.90 | 169.60 | 0.146 | 24.70 | 0.056 | 9.52 |
| 19 | 2005 | 0.00 | 6.30 | 6.30 | 75.70 | 84.50 | 19.30 | 179.50 | 173.20 | 0.130 | 22.52 | 0.047 | 8.20 |
| 20 | 2006 | 0.00 | 6.30 | 6.30 | 83.00 | 78.80 | 21.20 | 183.00 | 176.70 | 0.116 | 20.52 | 0.040 | 7.07 |
| 21 | 2007 | 0.00 | 6.30 | 6.30 | 90.70 | 73.00 | 23.10 | 186.80 | 180.50 | 0.104 | 18.71 | 0.034 | 6.09 |
| 22 | 2008 | 0.00 | 6.30 | 6.30 | 98.70 | 66.90 | 24.10 | 189.70 | 183.40 | 0.093 | 16.98 | 0.028 | 5.23 |
| 23 | 2009 | 0.00 | 6.30 | 6.30 | 107.00 | 60.50 | 24.10 | 191.60 | 185.30 | 0.083 | 15.31 | 0.024 | 4.46 |
| 24 | 2010 | 0.00 | 6.30 | 6.30 | 108.70 | 53.90 | 24.10 | 186.70 | 180.40 | 0.074 | 13.31 | 0.020 | 3.66 |
| 25 | 2011 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.066 | 11.81 | 0.017 | 3.07 |
| 26 | 2012 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.059 | 10.54 | 0.014 | 2.59 |
| 27 | 2013 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.053 | 9.41 | 0.012 | 2.19 |
| 28 | 2014 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.047 | 8.40 | 0.010 | 1.85 |
| 29 | 2015 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.042 | 7.50 | 0.009 | 1.56 |
| 30 | 2016 | 4.40 | 6.30 | 10.70 | 108.70 | 52.70 | 24.10 | 185.50 | 174.80 | 0.037 | 6.53 | 0.007 | 1.28 |
| 31 | 2017 | 15.20 | 6.30 | 21.50 | 108.70 | 52.70 | 24.10 | 185.50 | 164.00 | 0.033 | 5.47 | 0.006 | 1.02 |
| 32 | 2018 | 14.40 | 6.30 | 20.70 | 108.70 | 52.70 | 24.10 | 185.50 | 164.80 | 0.030 | 4.91 | 0.005 | 0.86 |
| 33 | 2019 | 10.10 | 6.30 | 16.40 | 108.70 | 52.70 | 24.10 | 185.50 | 169.10 | 0.027 | 4.50 | 0.004 | 0.75 |
| 34 | 2020 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.024 | 4.26 | 0.004 | 0.67 |
| 35 | 2021 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.021 | 3.80 | 0.003 | 0.56 |
| 36 | 2022 | 26.10 | 6.30 | 32.40 | 108.70 | 52.70 | 24.10 | 185.50 | 153.10 | 0.019 | 2.90 | 0.003 | 0.41 |
| 37 | 2023 | 21.10 | 6.30 | 27.40 | 108.70 | 52.70 | 24.10 | 185.50 | 158.10 | 0.017 | 2.67 | 0.002 | 0.35 |
| 38 | 2024 | 4.40 | 6.30 | 10.70 | 108.70 | 52.70 | 24.10 | 185.50 | 174.80 | 0.015 | 2.64 | 0.002 | 0.33 |
| 39 | 2025 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.013 | 2.42 | 0.002 | 0.29 |
| 40 | 2026 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.012 | 2.16 | 0.001 | 0.24 |
| 41 | 2027 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.011 | 1.93 | 0.001 | 0.20 |
| 42 | 2028 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.010 | 1.72 | 0.001 | 0.17 |
| 43 | 2029 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.009 | 1.54 | 0.001 | 0.15 |
| 44 | 2030 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.008 | 1.37 | 0.001 | 0.12 |
| 45 | 2031 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.007 | 1.22 | 0.001 | 0.10 |
| 46 | 2032 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.006 | 1.09 | 0.000 | 0.09 |
| 47 | 2033 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.005 | 0.98 | 0.000 | 0.07 |
| 48 | 2034 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.005 | 0.87 | 0.000 | 0.06 |
| 49 | 2035 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.004 | 0.78 | 0.000 | 0.05 |
| 50 | 2036 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.004 | 0.69 | 0.000 | 0.04 |
| 51 | 2037 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.003 | 0.62 | 0.000 | 0.04 |
| 52 | 2038 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.003 | 0.55 | 0.000 | 0.03 |
| 53 | 2039 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.003 | 0.49 | 0.000 | 0.03 |
| 54 | 2040 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.002 | 0.44 | 0.000 | 0.02 |
| 55 | 2041 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.002 | 0.39 | 0.000 | 0.02 |
| 56 | 2042 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.002 | 0.35 | 0.000 | 0.02 |
| 57 | 2043 | 0.00 | 6.30 | 6.30 | 108.70 | 52.70 | 24.10 | 185.50 | 179.20 | 0.002 | 0.31 | 0.000 | 0.01 |
| *TOTAL* | | 527.00 | 294.00 | 821.00 | 4571.20 | 2790.40 | 1050.70 | 8412.30 | 7591.30 | | 229.06 | | 0.00 |

Total construction cost = US\$431.3 mil.
 Replacement cost = US\$95.7 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 477
 Present value (C) = 248
 B/C = 1.9
 B-C = 229
 IRR = 18.5%

Table 13-12 Sensitivity Analysis of EIRR

(402 MW: Benefit -10%)

| | | COSTS | | | BENEFITS | | | BENEFITS | DISCOUNT | NET | DISCOUNT | NET | |
|---------|------|-------------|-------------|--------|----------|---------|----------|----------|----------|---------|----------|---------|--------|
| | | INVESTMENT | OPERATION | TOTAL | SALABLE | SALABLE | USEFUL | TOTAL | FACTOR | PRESENT | FACTOR | PRESENT | |
| NO. | YEAR | AND | AND | COSTS | DOMESTIC | EXPORT, | CAPACITY | BENEFITS | (12.00X) | VALUE | (18.34X) | VALUE | |
| | | REPLACEMENT | MAINTENANCE | | | SURPLUS | | | - COSTS | | | | |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.845 | -16.56 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.714 | -14.71 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.603 | -13.70 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.510 | -24.47 |
| 6 | 1992 | 55.20 | 0.00 | 55.20 | 0.00 | 0.00 | 0.00 | 0.00 | -55.20 | 0.567 | -37.00 | 0.431 | -28.09 |
| 7 | 1993 | 50.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 | -50.00 | 0.507 | -30.40 | 0.364 | -21.84 |
| 8 | 1994 | 34.20 | 1.90 | 36.10 | 10.20 | 4.40 | 3.20 | 17.80 | -18.30 | 0.452 | -8.28 | 0.308 | -5.63 |
| 9 | 1995 | 12.10 | 1.90 | 14.00 | 14.50 | 4.10 | 4.20 | 22.80 | 3.80 | 0.404 | 3.55 | 0.280 | 2.29 |
| 10 | 1996 | 20.00 | 1.90 | 21.90 | 18.90 | 3.70 | 5.30 | 27.90 | 6.00 | 0.361 | 2.16 | 0.220 | 1.32 |
| 11 | 1997 | 49.90 | 1.90 | 51.80 | 23.60 | 3.30 | 6.40 | 33.30 | -18.50 | 0.322 | -5.96 | 0.186 | -3.43 |
| 12 | 1998 | 29.70 | 1.90 | 31.60 | 28.40 | 3.00 | 7.60 | 39.00 | 7.40 | 0.287 | 2.13 | 0.157 | 1.16 |
| 13 | 1999 | 5.20 | 5.70 | 10.90 | 33.30 | 102.50 | 8.70 | 144.50 | 133.60 | 0.257 | 34.29 | 0.133 | 17.71 |
| 14 | 2000 | 0.00 | 5.70 | 5.70 | 38.50 | 96.50 | 10.00 | 147.00 | 141.30 | 0.229 | 32.38 | 0.112 | 15.82 |
| 15 | 2001 | 0.00 | 5.70 | 5.70 | 44.00 | 94.40 | 11.30 | 149.70 | 144.00 | 0.205 | 29.47 | 0.095 | 13.63 |
| 16 | 2002 | 0.00 | 5.70 | 5.70 | 49.70 | 90.10 | 12.80 | 152.60 | 145.90 | 0.183 | 26.84 | 0.080 | 11.75 |
| 17 | 2003 | 0.00 | 5.70 | 5.70 | 55.50 | 85.60 | 14.20 | 155.30 | 149.60 | 0.163 | 24.40 | 0.068 | 10.11 |
| 18 | 2004 | 0.00 | 5.70 | 5.70 | 61.70 | 80.80 | 15.80 | 158.30 | 152.60 | 0.146 | 22.23 | 0.057 | 8.71 |
| 19 | 2005 | 0.00 | 5.70 | 5.70 | 68.10 | 76.10 | 17.40 | 161.60 | 155.90 | 0.130 | 20.27 | 0.048 | 7.52 |
| 20 | 2006 | 0.00 | 5.70 | 5.70 | 74.70 | 70.90 | 19.10 | 164.70 | 159.00 | 0.116 | 18.46 | 0.041 | 6.48 |
| 21 | 2007 | 0.00 | 5.70 | 5.70 | 81.60 | 65.70 | 20.80 | 168.10 | 162.40 | 0.104 | 16.84 | 0.034 | 5.59 |
| 22 | 2008 | 0.00 | 5.70 | 5.70 | 88.80 | 60.20 | 21.70 | 170.70 | 165.00 | 0.093 | 15.27 | 0.029 | 4.80 |
| 23 | 2009 | 0.00 | 5.70 | 5.70 | 96.30 | 54.50 | 21.70 | 172.50 | 168.80 | 0.083 | 13.78 | 0.025 | 4.10 |
| 24 | 2010 | 0.00 | 5.70 | 5.70 | 104.10 | 48.50 | 21.70 | 174.30 | 168.60 | 0.074 | 12.44 | 0.021 | 3.50 |
| 25 | 2011 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.066 | 11.14 | 0.018 | 2.97 |
| 26 | 2012 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.059 | 9.95 | 0.015 | 2.51 |
| 27 | 2013 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.053 | 8.88 | 0.013 | 2.12 |
| 28 | 2014 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.047 | 7.93 | 0.011 | 1.79 |
| 29 | 2015 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.042 | 7.08 | 0.009 | 1.51 |
| 30 | 2016 | 4.00 | 5.70 | 9.70 | 105.70 | 47.40 | 21.70 | 174.80 | 165.10 | 0.037 | 6.17 | 0.008 | 1.25 |
| 31 | 2017 | 13.80 | 5.70 | 19.50 | 105.70 | 47.40 | 21.70 | 174.80 | 155.30 | 0.033 | 5.18 | 0.006 | 0.99 |
| 32 | 2018 | 13.10 | 5.70 | 18.80 | 105.70 | 47.40 | 21.70 | 174.80 | 156.00 | 0.030 | 4.65 | 0.005 | 0.84 |
| 33 | 2019 | 9.20 | 5.70 | 14.90 | 105.70 | 47.40 | 21.70 | 174.80 | 159.90 | 0.027 | 4.25 | 0.005 | 0.73 |
| 34 | 2020 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.024 | 4.02 | 0.004 | 0.65 |
| 35 | 2021 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.021 | 3.59 | 0.003 | 0.55 |
| 36 | 2022 | 23.70 | 5.70 | 29.40 | 105.70 | 47.40 | 21.70 | 174.80 | 146.40 | 0.019 | 2.75 | 0.003 | 0.40 |
| 37 | 2023 | 19.20 | 5.70 | 24.90 | 105.70 | 47.40 | 21.70 | 174.80 | 149.90 | 0.017 | 2.53 | 0.002 | 0.35 |
| 38 | 2024 | 4.00 | 5.70 | 9.70 | 105.70 | 47.40 | 21.70 | 174.80 | 165.10 | 0.015 | 2.49 | 0.002 | 0.32 |
| 39 | 2025 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.013 | 2.28 | 0.002 | 0.28 |
| 40 | 2026 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.012 | 2.04 | 0.001 | 0.24 |
| 41 | 2027 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.011 | 1.82 | 0.001 | 0.20 |
| 42 | 2028 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.010 | 1.62 | 0.001 | 0.17 |
| 43 | 2029 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.009 | 1.45 | 0.001 | 0.14 |
| 44 | 2030 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.008 | 1.29 | 0.001 | 0.12 |
| 45 | 2031 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.007 | 1.15 | 0.001 | 0.10 |
| 46 | 2032 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.006 | 1.03 | 0.001 | 0.09 |
| 47 | 2033 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.005 | 0.92 | 0.000 | 0.07 |
| 48 | 2034 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.005 | 0.82 | 0.000 | 0.06 |
| 49 | 2035 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.004 | 0.73 | 0.000 | 0.05 |
| 50 | 2036 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.004 | 0.66 | 0.000 | 0.04 |
| 51 | 2037 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.003 | 0.59 | 0.000 | 0.04 |
| 52 | 2038 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.003 | 0.52 | 0.000 | 0.03 |
| 53 | 2039 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.003 | 0.47 | 0.000 | 0.03 |
| 54 | 2040 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.002 | 0.42 | 0.000 | 0.02 |
| 55 | 2041 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.002 | 0.37 | 0.000 | 0.02 |
| 56 | 2042 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.002 | 0.33 | 0.000 | 0.02 |
| 57 | 2043 | 0.00 | 5.70 | 5.70 | 105.70 | 47.40 | 21.70 | 174.80 | 169.10 | 0.002 | 0.30 | 0.000 | 0.01 |
| *TOTAL* | | 479.00 | 266.00 | 745.00 | 4389.00 | 2510.50 | 938.00 | 7828.50 | 7083.50 | | 206.94 | | -0.00 |

Total construction cost = US\$392.0 mil.
 Replacement cost = US\$87.0 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 432
 Present value (C) = 225
 B/C = 1.9
 B-C = 207
 IRR = 18.3%

Table 13-13 Sensitivity Analysis of EIRR

(402 MW: Cost +10%, Benefit -10%)

(UNIT: MILLION US\$)

| NO. YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (17.32%) | NET PRESENT VALUE |
|----------|----------------------------|---------------------------|-------------|------------------|------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.882 | -18.41 |
| 3 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.727 | -16.49 |
| 4 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.619 | -15.18 |
| 5 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.528 | -27.87 |
| 6 1992 | 71.70 | 0.00 | 71.70 | 0.00 | 0.00 | 0.00 | 0.00 | -71.70 | 0.567 | -40.68 | 0.450 | -32.26 |
| 7 1993 | 66.00 | 0.00 | 66.00 | 0.00 | 0.00 | 0.00 | 0.00 | -66.00 | 0.507 | -33.44 | 0.383 | -25.31 |
| 8 1994 | 37.60 | 2.10 | 39.70 | 10.20 | 4.40 | 3.20 | 17.80 | -21.90 | 0.452 | -9.91 | 0.327 | -7.16 |
| 9 1995 | 13.30 | 2.10 | 15.40 | 14.50 | 4.10 | 4.20 | 22.80 | 7.40 | 0.404 | 2.99 | 0.279 | 2.06 |
| 10 1996 | 22.00 | 2.10 | 24.10 | 18.90 | 3.70 | 5.30 | 27.90 | 3.80 | 0.361 | 1.37 | 0.237 | 0.90 |
| 11 1997 | 54.90 | 2.10 | 57.00 | 23.60 | 3.30 | 6.40 | 33.30 | -23.70 | 0.322 | -7.63 | 0.202 | -4.80 |
| 12 1998 | 32.70 | 2.10 | 34.80 | 28.40 | 3.00 | 7.60 | 39.00 | 4.20 | 0.287 | 1.21 | 0.173 | 0.72 |
| 13 1999 | 5.70 | 6.30 | 12.00 | 33.30 | 102.50 | 8.70 | 144.50 | 132.50 | 0.257 | 34.01 | 0.147 | 19.49 |
| 14 2000 | 0.00 | 6.30 | 6.30 | 38.50 | 98.50 | 10.00 | 147.00 | 140.70 | 0.229 | 32.24 | 0.125 | 17.64 |
| 15 2001 | 0.00 | 6.30 | 6.30 | 44.00 | 94.40 | 11.30 | 149.70 | 143.40 | 0.205 | 29.34 | 0.107 | 15.32 |
| 16 2002 | 0.00 | 6.30 | 6.30 | 49.70 | 90.10 | 12.80 | 152.60 | 146.30 | 0.183 | 26.73 | 0.091 | 13.32 |
| 17 2003 | 0.00 | 6.30 | 6.30 | 55.50 | 85.60 | 14.20 | 155.30 | 149.00 | 0.163 | 24.31 | 0.078 | 11.57 |
| 18 2004 | 0.00 | 6.30 | 6.30 | 61.70 | 80.80 | 15.80 | 158.30 | 152.00 | 0.146 | 22.14 | 0.066 | 10.06 |
| 19 2005 | 0.00 | 6.30 | 6.30 | 68.10 | 76.10 | 17.40 | 161.60 | 155.30 | 0.130 | 20.20 | 0.056 | 8.76 |
| 20 2006 | 0.00 | 6.30 | 6.30 | 74.70 | 70.90 | 19.10 | 164.70 | 158.40 | 0.116 | 18.39 | 0.048 | 7.61 |
| 21 2007 | 0.00 | 6.30 | 6.30 | 81.60 | 65.70 | 20.80 | 168.10 | 161.80 | 0.104 | 16.77 | 0.041 | 6.63 |
| 22 2008 | 0.00 | 6.30 | 6.30 | 88.80 | 60.20 | 21.70 | 170.70 | 164.40 | 0.093 | 15.22 | 0.035 | 5.74 |
| 23 2009 | 0.00 | 6.30 | 6.30 | 96.30 | 54.50 | 21.70 | 172.60 | 166.20 | 0.083 | 13.74 | 0.030 | 4.95 |
| 24 2010 | 0.00 | 6.30 | 6.30 | 104.10 | 48.50 | 21.70 | 174.30 | 168.00 | 0.074 | 12.40 | 0.025 | 4.26 |
| 25 2011 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.066 | 11.10 | 0.022 | 3.64 |
| 26 2012 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.059 | 9.91 | 0.018 | 3.11 |
| 27 2013 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.053 | 8.85 | 0.016 | 2.65 |
| 28 2014 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.047 | 7.90 | 0.013 | 2.26 |
| 29 2015 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.042 | 7.05 | 0.011 | 1.92 |
| 30 2016 | 4.40 | 6.30 | 10.70 | 105.70 | 47.40 | 21.70 | 174.80 | 164.10 | 0.037 | 6.13 | 0.010 | 1.60 |
| 31 2017 | 15.20 | 6.30 | 21.50 | 105.70 | 47.40 | 21.70 | 174.80 | 153.30 | 0.033 | 5.12 | 0.008 | 1.27 |
| 32 2018 | 14.40 | 6.30 | 20.70 | 105.70 | 47.40 | 21.70 | 174.80 | 154.10 | 0.030 | 4.59 | 0.007 | 1.09 |
| 33 2019 | 10.10 | 6.30 | 16.40 | 105.70 | 47.40 | 21.70 | 174.80 | 158.40 | 0.027 | 4.21 | 0.006 | 0.95 |
| 34 2020 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.024 | 4.00 | 0.005 | 0.87 |
| 35 2021 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.021 | 3.57 | 0.004 | 0.74 |
| 36 2022 | 26.10 | 6.30 | 32.40 | 105.70 | 47.40 | 21.70 | 174.80 | 142.40 | 0.019 | 2.70 | 0.004 | 0.53 |
| 37 2023 | 21.10 | 6.30 | 27.40 | 105.70 | 47.40 | 21.70 | 174.80 | 147.40 | 0.017 | 2.49 | 0.003 | 0.47 |
| 38 2024 | 4.40 | 6.30 | 10.70 | 105.70 | 47.40 | 21.70 | 174.80 | 164.10 | 0.015 | 2.48 | 0.003 | 0.44 |
| 39 2025 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.013 | 2.27 | 0.002 | 0.39 |
| 40 2026 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.012 | 2.03 | 0.002 | 0.33 |
| 41 2027 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.011 | 1.81 | 0.002 | 0.28 |
| 42 2028 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.010 | 1.62 | 0.001 | 0.24 |
| 43 2029 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.009 | 1.44 | 0.001 | 0.21 |
| 44 2030 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.008 | 1.29 | 0.001 | 0.18 |
| 45 2031 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.007 | 1.15 | 0.001 | 0.15 |
| 46 2032 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.006 | 1.03 | 0.001 | 0.13 |
| 47 2033 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.005 | 0.92 | 0.001 | 0.11 |
| 48 2034 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.005 | 0.82 | 0.001 | 0.09 |
| 49 2035 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.004 | 0.73 | 0.000 | 0.08 |
| 50 2036 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.004 | 0.65 | 0.000 | 0.07 |
| 51 2037 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.003 | 0.58 | 0.000 | 0.06 |
| 52 2038 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.003 | 0.52 | 0.000 | 0.05 |
| 53 2039 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.003 | 0.46 | 0.000 | 0.04 |
| 54 2040 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.002 | 0.41 | 0.000 | 0.04 |
| 55 2041 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.002 | 0.37 | 0.000 | 0.03 |
| 56 2042 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.002 | 0.33 | 0.000 | 0.03 |
| 57 2043 | 0.00 | 6.30 | 6.30 | 105.70 | 47.40 | 21.70 | 174.80 | 168.50 | 0.002 | 0.30 | 0.000 | 0.02 |
| *TOTAL* | 527.00 | 294.00 | 821.00 | 4380.00 | 2510.50 | 938.00 | 7828.50 | 7007.50 | | 184.21 | | 0.00 |

Total construction cost = US\$431.1 mil.
 Replacement cost = US\$95.7 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 432
 Present value (C) = 248
 B/C = 1.7
 B-C = 184
 IRR = 17.3%

Table 13-14 Sensitivity Analysis of EIRR

(402 MW: Power Export Decrease by 20 MW)

| NO. | YEAR | INVESTMENT AND REPLACEMENT | COSTS OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | BENEFITS SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (18.81%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------------|-------------|------------------|----------------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.842 | -16.50 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.708 | -14.59 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.596 | -13.54 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.502 | -24.09 |
| 6 | 1992 | 65.20 | 0.00 | 65.20 | 0.00 | 0.00 | 0.00 | 0.00 | -65.20 | 0.567 | -37.00 | 0.422 | -27.54 |
| 7 | 1993 | 60.00 | 0.00 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | -60.00 | 0.507 | -30.40 | 0.356 | -21.33 |
| 8 | 1994 | 34.20 | 1.90 | 36.10 | 5.80 | 5.30 | 2.20 | 13.30 | -22.80 | 0.452 | -10.31 | 0.299 | -6.82 |
| 9 | 1995 | 12.10 | 1.90 | 14.00 | 10.00 | 5.00 | 3.30 | 18.30 | 4.30 | 0.404 | 1.74 | 0.252 | 1.08 |
| 10 | 1996 | 20.00 | 1.90 | 21.90 | 15.50 | 4.60 | 4.50 | 24.60 | 2.70 | 0.361 | 0.97 | 0.212 | 0.57 |
| 11 | 1997 | 49.90 | 1.90 | 51.80 | 20.60 | 4.20 | 5.70 | 30.50 | -21.30 | 0.322 | -6.86 | 0.178 | -3.80 |
| 12 | 1998 | 29.70 | 1.90 | 31.60 | 26.00 | 3.70 | 7.00 | 36.70 | 5.10 | 0.287 | 1.47 | 0.150 | 0.77 |
| 13 | 1999 | 5.20 | 5.70 | 10.90 | 31.50 | 118.10 | 8.40 | 158.00 | 147.10 | 0.257 | 37.78 | 0.126 | 18.59 |
| 14 | 2000 | 0.00 | 5.70 | 5.70 | 37.30 | 113.70 | 9.80 | 180.80 | 155.10 | 0.229 | 35.54 | 0.106 | 16.50 |
| 15 | 2001 | 0.00 | 5.70 | 5.70 | 43.40 | 109.10 | 11.20 | 163.70 | 158.00 | 0.205 | 32.33 | 0.090 | 14.15 |
| 16 | 2002 | 0.00 | 5.70 | 5.70 | 49.70 | 104.30 | 12.80 | 166.80 | 161.10 | 0.183 | 29.43 | 0.075 | 12.14 |
| 17 | 2003 | 0.00 | 5.70 | 5.70 | 56.20 | 99.30 | 14.40 | 169.90 | 164.20 | 0.163 | 26.78 | 0.063 | 10.42 |
| 18 | 2004 | 0.00 | 5.70 | 5.70 | 63.10 | 88.70 | 16.20 | 168.00 | 162.30 | 0.146 | 23.64 | 0.053 | 8.67 |
| 19 | 2005 | 0.00 | 5.70 | 5.70 | 70.10 | 83.00 | 17.90 | 171.00 | 165.30 | 0.130 | 21.50 | 0.045 | 7.43 |
| 20 | 2006 | 0.00 | 5.70 | 5.70 | 77.50 | 77.20 | 19.80 | 174.50 | 168.80 | 0.116 | 19.60 | 0.038 | 6.39 |
| 21 | 2007 | 0.00 | 5.70 | 5.70 | 85.20 | 71.10 | 21.80 | 178.10 | 172.40 | 0.104 | 17.87 | 0.032 | 5.49 |
| 22 | 2008 | 0.00 | 5.70 | 5.70 | 93.20 | 64.70 | 23.80 | 181.70 | 176.00 | 0.093 | 16.29 | 0.027 | 4.72 |
| 23 | 2009 | 0.00 | 5.70 | 5.70 | 101.50 | 58.10 | 24.10 | 183.70 | 178.00 | 0.083 | 14.71 | 0.023 | 4.01 |
| 24 | 2010 | 0.00 | 5.70 | 5.70 | 110.20 | 52.70 | 24.10 | 187.00 | 181.30 | 0.074 | 13.38 | 0.019 | 3.44 |
| 25 | 2011 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.066 | 12.42 | 0.016 | 3.01 |
| 26 | 2012 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.059 | 11.09 | 0.013 | 2.54 |
| 27 | 2013 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.053 | 9.90 | 0.011 | 2.13 |
| 28 | 2014 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.047 | 8.84 | 0.010 | 1.80 |
| 29 | 2015 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.042 | 7.89 | 0.008 | 1.51 |
| 30 | 2016 | 4.00 | 5.70 | 9.70 | 117.40 | 52.70 | 24.10 | 194.20 | 184.50 | 0.037 | 6.90 | 0.007 | 1.25 |
| 31 | 2017 | 13.80 | 5.70 | 19.50 | 117.40 | 52.70 | 24.10 | 194.20 | 174.70 | 0.033 | 5.83 | 0.006 | 0.99 |
| 32 | 2018 | 13.10 | 5.70 | 18.80 | 117.40 | 52.70 | 24.10 | 194.20 | 175.40 | 0.030 | 5.23 | 0.005 | 0.84 |
| 33 | 2019 | 9.20 | 5.70 | 14.90 | 117.40 | 52.70 | 24.10 | 194.20 | 179.30 | 0.027 | 4.77 | 0.004 | 0.72 |
| 34 | 2020 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.024 | 4.48 | 0.003 | 0.64 |
| 35 | 2021 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.021 | 4.00 | 0.003 | 0.54 |
| 36 | 2022 | 23.70 | 5.70 | 29.40 | 117.40 | 52.70 | 24.10 | 194.20 | 164.80 | 0.019 | 3.12 | 0.002 | 0.40 |
| 37 | 2023 | 19.20 | 5.70 | 24.90 | 117.40 | 52.70 | 24.10 | 194.20 | 169.30 | 0.017 | 2.86 | 0.002 | 0.34 |
| 38 | 2024 | 4.00 | 5.70 | 9.70 | 117.40 | 52.70 | 24.10 | 194.20 | 184.50 | 0.016 | 2.79 | 0.002 | 0.31 |
| 39 | 2025 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.013 | 2.54 | 0.001 | 0.27 |
| 40 | 2026 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.012 | 2.27 | 0.001 | 0.23 |
| 41 | 2027 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.011 | 2.03 | 0.001 | 0.19 |
| 42 | 2028 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.010 | 1.81 | 0.001 | 0.16 |
| 43 | 2029 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.009 | 1.61 | 0.001 | 0.14 |
| 44 | 2030 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.008 | 1.44 | 0.001 | 0.11 |
| 45 | 2031 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.007 | 1.29 | 0.001 | 0.10 |
| 46 | 2032 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.006 | 1.15 | 0.000 | 0.08 |
| 47 | 2033 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.005 | 1.03 | 0.000 | 0.07 |
| 48 | 2034 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.005 | 0.92 | 0.000 | 0.06 |
| 49 | 2035 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.004 | 0.82 | 0.000 | 0.05 |
| 50 | 2036 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.004 | 0.73 | 0.000 | 0.04 |
| 51 | 2037 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.003 | 0.65 | 0.000 | 0.03 |
| 52 | 2038 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.003 | 0.58 | 0.000 | 0.03 |
| 53 | 2039 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.003 | 0.52 | 0.000 | 0.02 |
| 54 | 2040 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.002 | 0.46 | 0.000 | 0.02 |
| 55 | 2041 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.002 | 0.41 | 0.000 | 0.02 |
| 56 | 2042 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.002 | 0.37 | 0.000 | 0.01 |
| 57 | 2043 | 0.00 | 5.70 | 5.70 | 117.40 | 52.70 | 24.10 | 194.20 | 188.50 | 0.002 | 0.33 | 0.000 | 0.01 |
| *TOTAL* | | 479.00 | 266.00 | 745.00 | 4771.00 | 2801.90 | 1022.30 | 8595.20 | 7850.20 | | 234.13 | | 0.01 |

Total construction cost = US\$392.0 mil.
 Replacement cost = US\$87.0 million
 kw value B1 = 68 US\$/kw
 kwh value B2 = 0.063 US\$/kwh
 kwh value B3 = 0.048 US\$/kwh
 kwh value B4 = 0.005 US\$/kwh

Discount rate = 12%
 Present value (B) = 460
 Present value (C) = 225
 B/C = 2.0
 B-C = 235
 IRR = 18.8%

Table 13-15 Financial Internal Rate of Return

(Stage-1, 201 MW)

| MILLION US\$ | | | | | | | | | | | | | |
|--------------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (10.80%) | NET PRESENT VALUE |
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.903 | -17.69 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.815 | -16.78 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.735 | -16.69 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.664 | -31.85 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | -74.60 | 0.567 | -42.33 | 0.599 | -44.68 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | -116.00 | 0.507 | -58.77 | 0.541 | -62.71 |
| 8 | 1994 | 55.90 | 2.70 | 58.60 | 10.40 | 0.00 | 0.00 | 10.40 | -48.20 | 0.452 | -21.80 | 0.488 | -23.52 |
| 9 | 1995 | 0.00 | 2.70 | 2.70 | 14.90 | 0.00 | 0.00 | 14.90 | 12.20 | 0.404 | 4.93 | 0.440 | 5.37 |
| 10 | 1996 | 0.00 | 2.70 | 2.70 | 19.30 | 0.00 | 0.00 | 19.30 | 16.60 | 0.361 | 5.99 | 0.397 | 6.50 |
| 11 | 1997 | 5.50 | 2.70 | 8.20 | 24.10 | 0.00 | 0.00 | 24.10 | 15.90 | 0.322 | 5.12 | 0.359 | 5.70 |
| 12 | 1998 | 11.20 | 2.70 | 13.90 | 29.00 | 0.00 | 0.00 | 29.00 | 15.10 | 0.287 | 4.34 | 0.324 | 4.89 |
| 13 | 1999 | 5.50 | 3.10 | 9.70 | 34.20 | 0.00 | 0.00 | 34.20 | 24.50 | 0.257 | 6.29 | 0.292 | 7.16 |
| 14 | 2000 | 0.00 | 4.10 | 4.10 | 39.50 | 0.00 | 0.00 | 39.50 | 35.40 | 0.229 | 8.11 | 0.264 | 9.34 |
| 15 | 2001 | 0.00 | 4.10 | 4.10 | 45.10 | 0.00 | 0.00 | 45.10 | 41.00 | 0.205 | 8.39 | 0.238 | 9.76 |
| 16 | 2002 | 0.00 | 4.10 | 4.10 | 50.90 | 0.00 | 0.00 | 50.90 | 46.80 | 0.183 | 8.55 | 0.215 | 10.06 |
| 17 | 2003 | 0.00 | 4.10 | 4.10 | 56.90 | 0.00 | 0.00 | 56.90 | 52.80 | 0.163 | 8.61 | 0.194 | 10.24 |
| 18 | 2004 | 0.00 | 4.10 | 4.10 | 63.30 | 0.00 | 0.00 | 63.30 | 59.20 | 0.146 | 8.62 | 0.175 | 10.36 |
| 19 | 2005 | 0.00 | 4.10 | 4.10 | 69.80 | 0.00 | 0.00 | 69.80 | 65.70 | 0.130 | 8.54 | 0.158 | 10.38 |
| 20 | 2006 | 0.00 | 4.10 | 4.10 | 76.60 | 0.00 | 0.00 | 76.60 | 72.50 | 0.116 | 8.42 | 0.143 | 10.34 |
| 21 | 2007 | 0.00 | 4.10 | 4.10 | 83.60 | 0.00 | 0.00 | 83.60 | 79.50 | 0.104 | 8.24 | 0.129 | 10.23 |
| 22 | 2008 | 0.00 | 4.10 | 4.10 | 91.00 | 0.00 | 0.00 | 91.00 | 86.90 | 0.093 | 8.04 | 0.116 | 10.09 |
| 23 | 2009 | 0.00 | 4.10 | 4.10 | 98.70 | 0.00 | 0.00 | 98.70 | 94.60 | 0.083 | 7.82 | 0.105 | 9.92 |
| 24 | 2010 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 96.90 | 0.074 | 7.08 | 0.095 | 9.07 |
| 25 | 2011 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.066 | 6.32 | 0.085 | 8.19 |
| 26 | 2012 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.059 | 5.64 | 0.077 | 7.39 |
| 27 | 2013 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.053 | 5.04 | 0.070 | 6.67 |
| 28 | 2014 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.047 | 4.50 | 0.063 | 6.02 |
| 29 | 2015 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.042 | 4.02 | 0.057 | 5.44 |
| 30 | 2016 | 4.10 | 4.10 | 8.20 | 100.00 | 0.00 | 0.00 | 100.00 | 91.80 | 0.037 | 3.43 | 0.051 | 4.70 |
| 31 | 2017 | 13.90 | 4.10 | 18.00 | 100.00 | 0.00 | 0.00 | 100.00 | 82.00 | 0.033 | 2.74 | 0.046 | 3.79 |
| 32 | 2018 | 13.40 | 4.10 | 17.50 | 100.00 | 0.00 | 0.00 | 100.00 | 82.50 | 0.030 | 2.46 | 0.042 | 3.44 |
| 33 | 2019 | 9.30 | 4.10 | 13.40 | 100.00 | 0.00 | 0.00 | 100.00 | 86.60 | 0.027 | 2.30 | 0.038 | 3.26 |
| 34 | 2020 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.024 | 2.28 | 0.034 | 3.26 |
| 35 | 2021 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.021 | 2.03 | 0.031 | 2.94 |
| 36 | 2022 | 4.70 | 4.10 | 8.80 | 100.00 | 0.00 | 0.00 | 100.00 | 91.20 | 0.019 | 1.73 | 0.028 | 2.52 |
| 37 | 2023 | 3.80 | 4.10 | 7.90 | 100.00 | 0.00 | 0.00 | 100.00 | 92.10 | 0.017 | 1.55 | 0.025 | 2.30 |
| 38 | 2024 | 0.90 | 4.10 | 5.00 | 100.00 | 0.00 | 0.00 | 100.00 | 95.00 | 0.015 | 1.44 | 0.023 | 2.14 |
| 39 | 2025 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.013 | 1.29 | 0.020 | 1.95 |
| 40 | 2026 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.012 | 1.15 | 0.018 | 1.76 |
| 41 | 2027 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.011 | 1.03 | 0.017 | 1.59 |
| 42 | 2028 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.010 | 0.92 | 0.015 | 1.43 |
| 43 | 2029 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.009 | 0.82 | 0.013 | 1.29 |
| 44 | 2030 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.008 | 0.73 | 0.012 | 1.17 |
| 45 | 2031 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.007 | 0.65 | 0.011 | 1.05 |
| 46 | 2032 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.006 | 0.58 | 0.010 | 0.95 |
| 47 | 2033 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.005 | 0.52 | 0.009 | 0.85 |
| 48 | 2034 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.005 | 0.47 | 0.008 | 0.78 |
| 49 | 2035 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.004 | 0.42 | 0.007 | 0.70 |
| 50 | 2035 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.004 | 0.37 | 0.007 | 0.63 |
| 51 | 2037 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.003 | 0.33 | 0.006 | 0.57 |
| 52 | 2038 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.003 | 0.30 | 0.005 | 0.51 |
| 53 | 2039 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.003 | 0.26 | 0.005 | 0.46 |
| 54 | 2040 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.002 | 0.24 | 0.004 | 0.42 |
| 55 | 2041 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.002 | 0.21 | 0.004 | 0.38 |
| 56 | 2042 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.002 | 0.19 | 0.004 | 0.34 |
| 57 | 2043 | 0.00 | 4.10 | 4.10 | 100.00 | 0.00 | 0.00 | 100.00 | 95.90 | 0.002 | 0.17 | 0.003 | 0.31 |
| *TOTAL* | | 434.60 | 198.00 | 632.60 | 4207.30 | 0.00 | 0.00 | 4207.30 | 3574.70 | | -35.06 | | 0.00 |

Total construction cost = US\$384.5 mil.

Replacement cost = US\$50.1 million

kwh value (domestic) = 0.056 US\$/kwh

kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%

Present value (B) = 199

Present value (C) = 234

B/C = 0.8

B-C = -35

IRR = 10.8%

Table 13-16 Financial Internal Rate of Return

(Stage-1&2, 402 MW)

UNIT: MILLION US\$

| NO. | YEAR | COSTS | | | BENEFITS | | | | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (14.89%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------|-------------|------------------|----------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT | USEFUL CAPACITY | TOTAL BENEFITS | | | | | |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.870 | -17.06 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.758 | -15.61 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.659 | -14.97 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.574 | -27.55 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | -74.60 | 0.567 | -42.33 | 0.500 | -37.26 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | -116.00 | 0.507 | -58.77 | 0.435 | -50.43 |
| 8 | 1994 | 62.30 | 1.90 | 64.20 | 10.40 | 0.00 | 0.00 | 10.40 | -53.80 | 0.462 | -24.34 | 0.378 | -20.35 |
| 9 | 1995 | 12.10 | 1.90 | 14.00 | 14.90 | 0.00 | 0.00 | 14.90 | 0.90 | 0.404 | 0.36 | 0.323 | 0.30 |
| 10 | 1996 | 20.00 | 1.90 | 21.90 | 19.30 | 0.00 | 0.00 | 19.30 | -2.60 | 0.361 | -0.94 | 0.287 | -0.75 |
| 11 | 1997 | 69.90 | 1.90 | 71.80 | 24.10 | 0.00 | 0.00 | 24.10 | -47.70 | 0.322 | -15.36 | 0.250 | -11.90 |
| 12 | 1998 | 42.90 | 1.90 | 44.80 | 29.00 | 0.00 | 0.00 | 29.00 | -15.80 | 0.287 | -4.54 | 0.217 | -3.43 |
| 13 | 1999 | 5.20 | 5.70 | 10.90 | 34.20 | 105.00 | 0.00 | 139.20 | 128.30 | 0.257 | 32.93 | 0.189 | 24.25 |
| 14 | 2000 | 0.00 | 5.70 | 5.70 | 39.50 | 100.90 | 0.00 | 140.40 | 134.70 | 0.229 | 30.87 | 0.165 | 22.16 |
| 15 | 2001 | 0.00 | 5.70 | 5.70 | 45.10 | 96.70 | 0.00 | 141.80 | 136.10 | 0.205 | 27.85 | 0.143 | 19.49 |
| 16 | 2002 | 0.00 | 5.70 | 5.70 | 50.90 | 92.20 | 0.00 | 143.10 | 137.40 | 0.183 | 25.10 | 0.125 | 17.13 |
| 17 | 2003 | 0.00 | 5.70 | 5.70 | 56.90 | 87.60 | 0.00 | 144.50 | 138.80 | 0.163 | 22.64 | 0.108 | 15.06 |
| 18 | 2004 | 0.00 | 5.70 | 5.70 | 63.30 | 82.80 | 0.00 | 146.10 | 140.40 | 0.146 | 20.45 | 0.094 | 13.26 |
| 19 | 2005 | 0.00 | 5.70 | 5.70 | 69.80 | 77.90 | 0.00 | 147.70 | 142.00 | 0.130 | 18.47 | 0.082 | 11.67 |
| 20 | 2006 | 0.00 | 5.70 | 5.70 | 76.60 | 72.70 | 0.00 | 149.30 | 143.60 | 0.116 | 16.67 | 0.072 | 10.27 |
| 21 | 2007 | 0.00 | 5.70 | 5.70 | 83.60 | 67.30 | 0.00 | 150.90 | 145.20 | 0.104 | 15.05 | 0.062 | 9.04 |
| 22 | 2008 | 0.00 | 5.70 | 5.70 | 91.00 | 61.70 | 0.00 | 152.70 | 147.00 | 0.093 | 13.61 | 0.054 | 7.97 |
| 23 | 2009 | 0.00 | 5.70 | 5.70 | 98.70 | 55.80 | 0.00 | 154.50 | 148.80 | 0.083 | 12.30 | 0.047 | 7.02 |
| 24 | 2010 | 0.00 | 5.70 | 5.70 | 106.70 | 49.70 | 0.00 | 156.40 | 150.70 | 0.074 | 11.12 | 0.041 | 6.19 |
| 25 | 2011 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 151.10 | 0.066 | 9.95 | 0.036 | 5.40 |
| 26 | 2012 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 151.10 | 0.059 | 8.89 | 0.031 | 4.70 |
| 27 | 2013 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 151.10 | 0.053 | 7.94 | 0.027 | 4.09 |
| 28 | 2014 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 151.10 | 0.047 | 7.09 | 0.024 | 3.56 |
| 29 | 2015 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 151.10 | 0.042 | 6.33 | 0.021 | 3.10 |
| 30 | 2016 | 4.10 | 5.70 | 9.80 | 108.20 | 48.60 | 0.00 | 156.80 | 147.00 | 0.037 | 5.50 | 0.018 | 2.62 |
| 31 | 2017 | 13.90 | 5.70 | 19.60 | 108.20 | 48.60 | 0.00 | 156.80 | 137.20 | 0.033 | 4.58 | 0.016 | 2.13 |
| 32 | 2018 | 12.40 | 5.70 | 18.10 | 108.20 | 48.60 | 0.00 | 156.80 | 137.70 | 0.030 | 4.10 | 0.014 | 1.86 |
| 33 | 2019 | 9.30 | 5.70 | 15.00 | 108.20 | 48.60 | 0.00 | 156.80 | 141.80 | 0.027 | 3.77 | 0.012 | 1.67 |
| 34 | 2020 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.024 | 3.59 | 0.010 | 1.55 |
| 35 | 2021 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.021 | 3.21 | 0.009 | 1.35 |
| 36 | 2022 | 23.40 | 5.70 | 29.10 | 108.20 | 48.60 | 0.00 | 156.80 | 127.70 | 0.019 | 2.42 | 0.008 | 0.99 |
| 37 | 2023 | 18.90 | 5.70 | 24.60 | 108.20 | 48.60 | 0.00 | 156.80 | 132.20 | 0.017 | 2.24 | 0.007 | 0.88 |
| 38 | 2024 | 4.00 | 5.70 | 9.70 | 108.20 | 48.60 | 0.00 | 156.80 | 147.10 | 0.015 | 2.22 | 0.006 | 0.86 |
| 39 | 2025 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.013 | 2.04 | 0.005 | 0.77 |
| 40 | 2026 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.012 | 1.82 | 0.004 | 0.67 |
| 41 | 2027 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.011 | 1.62 | 0.004 | 0.59 |
| 42 | 2028 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.010 | 1.45 | 0.003 | 0.51 |
| 43 | 2029 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.009 | 1.29 | 0.003 | 0.44 |
| 44 | 2030 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.008 | 1.16 | 0.003 | 0.39 |
| 45 | 2031 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.007 | 1.03 | 0.002 | 0.34 |
| 46 | 2032 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.006 | 0.92 | 0.002 | 0.29 |
| 47 | 2033 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.005 | 0.82 | 0.002 | 0.25 |
| 48 | 2034 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.005 | 0.73 | 0.001 | 0.22 |
| 49 | 2035 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.004 | 0.66 | 0.001 | 0.19 |
| 50 | 2036 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.004 | 0.59 | 0.001 | 0.17 |
| 51 | 2037 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.003 | 0.52 | 0.001 | 0.15 |
| 52 | 2038 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.003 | 0.47 | 0.001 | 0.13 |
| 53 | 2039 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.003 | 0.42 | 0.001 | 0.11 |
| 54 | 2040 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.002 | 0.37 | 0.001 | 0.10 |
| 55 | 2041 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.002 | 0.33 | 0.001 | 0.08 |
| 56 | 2042 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.002 | 0.30 | 0.000 | 0.07 |
| 57 | 2043 | 0.00 | 5.70 | 5.70 | 108.20 | 48.60 | 0.00 | 156.80 | 161.10 | 0.002 | 0.26 | 0.000 | 0.06 |
| *TOTAL* | | 605.70 | 266.00 | 871.70 | 4484.60 | 2554.10 | 0.00 | 7038.70 | 6167.00 | | 104.38 | | -0.00 |

Total construction cost = US\$518.7 mil.
Replacement cost = US\$87.0 million

kwh value (domestic) = 0.056 US\$/kwh
kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
Present value (B) = 386
Present value (C) = 282
B/C = 1.4
B-C = 104
IRR = 14.9%

Table 13-17 Sensitivity Analysis of FIRR

(201 MW: Cost +10%)

| MILLION US\$ | | | | | | | | | | | | | |
|--------------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|----------------|
| NO. | YEAR | COSTS | | | BENEFITS | | | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (10.11%) | NET PRESENT VALUE | |
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | TOTAL BENEFITS |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.908 | -19.62 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.825 | -18.72 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.749 | -18.72 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.680 | -35.91 |
| 6 | 1992 | 82.10 | 0.00 | 82.10 | 0.00 | 0.00 | 0.00 | 0.00 | -82.10 | 0.567 | -46.59 | 0.618 | -50.71 |
| 7 | 1993 | 127.60 | 0.00 | 127.60 | 0.00 | 0.00 | 0.00 | 0.00 | -127.60 | 0.507 | -64.65 | 0.561 | -71.58 |
| 8 | 1994 | 61.50 | 3.00 | 64.50 | 10.40 | 0.00 | 0.00 | 10.40 | -54.10 | 0.452 | -24.47 | 0.509 | -27.56 |
| 9 | 1995 | 0.00 | 3.00 | 3.00 | 14.90 | 0.00 | 0.00 | 14.90 | 11.90 | 0.404 | 4.81 | 0.463 | 5.51 |
| 10 | 1996 | 0.00 | 3.00 | 3.00 | 19.30 | 0.00 | 0.00 | 19.30 | 16.30 | 0.361 | 5.88 | 0.420 | 6.85 |
| 11 | 1997 | 6.10 | 3.00 | 9.10 | 24.10 | 0.00 | 0.00 | 24.10 | 15.00 | 0.322 | 4.83 | 0.382 | 5.72 |
| 12 | 1998 | 12.30 | 3.00 | 15.30 | 29.00 | 0.00 | 0.00 | 29.00 | 13.70 | 0.287 | 3.94 | 0.347 | 4.75 |
| 13 | 1999 | 6.30 | 4.50 | 10.70 | 34.20 | 0.00 | 0.00 | 34.20 | 23.50 | 0.257 | 6.03 | 0.315 | 7.40 |
| 14 | 2000 | 0.00 | 4.50 | 4.50 | 39.50 | 0.00 | 0.00 | 39.50 | 35.00 | 0.229 | 8.02 | 0.286 | 10.00 |
| 15 | 2001 | 0.00 | 4.50 | 4.50 | 45.10 | 0.00 | 0.00 | 45.10 | 40.60 | 0.205 | 8.31 | 0.260 | 10.54 |
| 16 | 2002 | 0.00 | 4.50 | 4.50 | 50.90 | 0.00 | 0.00 | 50.90 | 46.40 | 0.183 | 8.48 | 0.236 | 10.94 |
| 17 | 2003 | 0.00 | 4.50 | 4.50 | 56.90 | 0.00 | 0.00 | 56.90 | 52.40 | 0.163 | 8.55 | 0.214 | 11.22 |
| 18 | 2004 | 0.00 | 4.50 | 4.50 | 63.30 | 0.00 | 0.00 | 63.30 | 58.80 | 0.146 | 8.56 | 0.194 | 11.43 |
| 19 | 2005 | 0.00 | 4.50 | 4.50 | 69.80 | 0.00 | 0.00 | 69.80 | 65.30 | 0.130 | 8.49 | 0.177 | 11.53 |
| 20 | 2006 | 0.00 | 4.50 | 4.50 | 76.60 | 0.00 | 0.00 | 76.60 | 72.10 | 0.116 | 8.37 | 0.160 | 11.56 |
| 21 | 2007 | 0.00 | 4.50 | 4.50 | 83.80 | 0.00 | 0.00 | 83.80 | 79.10 | 0.104 | 8.20 | 0.146 | 11.52 |
| 22 | 2008 | 0.00 | 4.50 | 4.50 | 91.00 | 0.00 | 0.00 | 91.00 | 86.50 | 0.093 | 8.01 | 0.132 | 11.44 |
| 23 | 2009 | 0.00 | 4.50 | 4.50 | 98.70 | 0.00 | 0.00 | 98.70 | 94.20 | 0.083 | 7.78 | 0.120 | 11.31 |
| 24 | 2010 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.074 | 7.05 | 0.109 | 10.41 |
| 25 | 2011 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.066 | 6.29 | 0.099 | 9.46 |
| 26 | 2012 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.059 | 5.62 | 0.090 | 8.59 |
| 27 | 2013 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.053 | 5.02 | 0.082 | 7.80 |
| 28 | 2014 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.047 | 4.48 | 0.074 | 7.08 |
| 29 | 2015 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.042 | 4.00 | 0.067 | 6.43 |
| 30 | 2016 | 4.50 | 4.50 | 9.00 | 100.00 | 0.00 | 0.00 | 100.00 | 91.00 | 0.037 | 3.40 | 0.061 | 5.57 |
| 31 | 2017 | 15.30 | 4.50 | 19.80 | 100.00 | 0.00 | 0.00 | 100.00 | 90.20 | 0.033 | 2.68 | 0.056 | 4.46 |
| 32 | 2018 | 14.70 | 4.50 | 19.20 | 100.00 | 0.00 | 0.00 | 100.00 | 80.80 | 0.030 | 2.41 | 0.050 | 4.08 |
| 33 | 2019 | 10.20 | 4.50 | 14.70 | 100.00 | 0.00 | 0.00 | 100.00 | 85.30 | 0.027 | 2.27 | 0.046 | 3.91 |
| 34 | 2020 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.024 | 2.27 | 0.042 | 3.97 |
| 35 | 2021 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.021 | 2.03 | 0.038 | 3.61 |
| 36 | 2022 | 5.20 | 4.50 | 9.70 | 100.00 | 0.00 | 0.00 | 100.00 | 90.30 | 0.019 | 1.71 | 0.034 | 3.10 |
| 37 | 2023 | 4.20 | 4.50 | 8.70 | 100.00 | 0.00 | 0.00 | 100.00 | 91.30 | 0.017 | 1.54 | 0.031 | 2.85 |
| 38 | 2024 | 1.00 | 4.50 | 5.50 | 100.00 | 0.00 | 0.00 | 100.00 | 94.50 | 0.015 | 1.43 | 0.028 | 2.67 |
| 39 | 2025 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.013 | 1.29 | 0.026 | 2.45 |
| 40 | 2026 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.012 | 1.15 | 0.023 | 2.23 |
| 41 | 2027 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.011 | 1.03 | 0.021 | 2.02 |
| 42 | 2028 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.010 | 0.92 | 0.019 | 1.84 |
| 43 | 2029 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.009 | 0.82 | 0.017 | 1.67 |
| 44 | 2030 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.008 | 0.73 | 0.016 | 1.52 |
| 45 | 2031 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.007 | 0.65 | 0.014 | 1.38 |
| 46 | 2032 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.006 | 0.58 | 0.013 | 1.25 |
| 47 | 2033 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.005 | 0.52 | 0.012 | 1.14 |
| 48 | 2034 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.005 | 0.46 | 0.011 | 1.03 |
| 49 | 2035 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.004 | 0.41 | 0.010 | 0.94 |
| 50 | 2036 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.004 | 0.37 | 0.009 | 0.85 |
| 51 | 2037 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.003 | 0.33 | 0.008 | 0.77 |
| 52 | 2038 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.003 | 0.30 | 0.007 | 0.70 |
| 53 | 2039 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.003 | 0.26 | 0.007 | 0.64 |
| 54 | 2040 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.002 | 0.24 | 0.006 | 0.58 |
| 55 | 2041 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.002 | 0.21 | 0.006 | 0.53 |
| 56 | 2042 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.002 | 0.19 | 0.005 | 0.48 |
| 57 | 2043 | 0.00 | 4.50 | 4.50 | 100.00 | 0.00 | 0.00 | 100.00 | 95.50 | 0.002 | 0.17 | 0.005 | 0.43 |
| *TOTAL* | | 478.30 | 217.50 | 695.80 | 4207.30 | 0.00 | 0.00 | 4207.30 | 3511.50 | | -38.68 | | 0.00 |

Total construction cost = US\$423.2 mil.
 Replacement cost = US\$55.1 million

kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 199
 Present value (C) = 258
 B/C = 0.8
 B-C = -59
 IRR = 10.1%

Table 13-18 Sensitivity Analysis of FIRR

(201 MW: Benefit -10%)

(UNIT: MILLION US\$)

| NO. | YEAR | COSTS | | | BENEFITS | | | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (10.06%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------|-------------|------------------|------------------------|-----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT SURPLUS | USEFUL CAPACITY | | | | | |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.893 | -17.50 | 0.909 | -17.81 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.797 | -16.42 | 0.826 | -17.01 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.712 | -16.18 | 0.750 | -17.03 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.636 | -30.50 | 0.682 | -32.73 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.567 | -42.33 | 0.620 | -46.22 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.507 | -58.77 | 0.563 | -65.31 |
| 8 | 1994 | 55.90 | 2.70 | 58.60 | 9.40 | 0.00 | 0.00 | 9.40 | 0.452 | -22.26 | 0.512 | -25.17 |
| 9 | 1995 | 0.00 | 2.70 | 2.70 | 13.40 | 0.00 | 0.00 | 13.40 | 0.404 | 4.32 | 0.465 | 4.97 |
| 10 | 1996 | 0.00 | 2.70 | 2.70 | 17.40 | 0.00 | 0.00 | 17.40 | 0.361 | 5.30 | 0.422 | 6.21 |
| 11 | 1997 | 5.50 | 2.70 | 8.20 | 21.70 | 0.00 | 0.00 | 21.70 | 0.322 | 4.35 | 0.384 | 5.18 |
| 12 | 1998 | 11.20 | 2.70 | 13.90 | 26.10 | 0.00 | 0.00 | 26.10 | 0.287 | 3.51 | 0.349 | 4.26 |
| 13 | 1999 | 5.60 | 4.10 | 9.70 | 30.70 | 0.00 | 0.00 | 30.70 | 0.257 | 5.39 | 0.317 | 6.66 |
| 14 | 2000 | 0.00 | 4.10 | 4.10 | 35.60 | 0.00 | 0.00 | 35.60 | 0.229 | 7.22 | 0.288 | 9.07 |
| 15 | 2001 | 0.00 | 4.10 | 4.10 | 40.60 | 0.00 | 0.00 | 40.60 | 0.205 | 7.47 | 0.262 | 9.55 |
| 16 | 2002 | 0.00 | 4.10 | 4.10 | 45.80 | 0.00 | 0.00 | 45.80 | 0.183 | 7.62 | 0.238 | 9.92 |
| 17 | 2003 | 0.00 | 4.10 | 4.10 | 51.20 | 0.00 | 0.00 | 51.20 | 0.163 | 7.68 | 0.216 | 10.18 |
| 18 | 2004 | 0.00 | 4.10 | 4.10 | 57.00 | 0.00 | 0.00 | 57.00 | 0.146 | 7.70 | 0.195 | 10.39 |
| 19 | 2005 | 0.00 | 4.10 | 4.10 | 62.80 | 0.00 | 0.00 | 62.80 | 0.130 | 7.63 | 0.178 | 10.47 |
| 20 | 2006 | 0.00 | 4.10 | 4.10 | 68.90 | 0.00 | 0.00 | 68.90 | 0.116 | 7.52 | 0.162 | 10.51 |
| 21 | 2007 | 0.00 | 4.10 | 4.10 | 75.20 | 0.00 | 0.00 | 75.20 | 0.104 | 7.37 | 0.147 | 10.48 |
| 22 | 2008 | 0.00 | 4.10 | 4.10 | 81.90 | 0.00 | 0.00 | 81.90 | 0.093 | 7.20 | 0.134 | 10.42 |
| 23 | 2009 | 0.00 | 4.10 | 4.10 | 88.80 | 0.00 | 0.00 | 88.80 | 0.083 | 7.00 | 0.122 | 10.30 |
| 24 | 2010 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.074 | 6.34 | 0.111 | 9.50 |
| 25 | 2011 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.066 | 5.66 | 0.100 | 8.63 |
| 26 | 2012 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.059 | 5.05 | 0.091 | 7.84 |
| 27 | 2013 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.053 | 4.51 | 0.083 | 7.13 |
| 28 | 2014 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.047 | 4.03 | 0.075 | 6.47 |
| 29 | 2015 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.042 | 3.59 | 0.068 | 5.88 |
| 30 | 2016 | 4.10 | 4.10 | 8.20 | 90.00 | 0.00 | 0.00 | 90.00 | 0.037 | 3.06 | 0.062 | 5.09 |
| 31 | 2017 | 13.90 | 4.10 | 18.00 | 90.00 | 0.00 | 0.00 | 90.00 | 0.033 | 2.40 | 0.057 | 4.07 |
| 32 | 2018 | 13.40 | 4.10 | 17.50 | 90.00 | 0.00 | 0.00 | 90.00 | 0.030 | 2.16 | 0.051 | 3.73 |
| 33 | 2019 | 9.30 | 4.10 | 13.40 | 90.00 | 0.00 | 0.00 | 90.00 | 0.027 | 2.04 | 0.047 | 3.58 |
| 34 | 2020 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.024 | 2.04 | 0.042 | 3.65 |
| 35 | 2021 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.021 | 1.82 | 0.039 | 3.31 |
| 36 | 2022 | 4.70 | 4.10 | 8.80 | 90.00 | 0.00 | 0.00 | 90.00 | 0.019 | 1.54 | 0.035 | 2.85 |
| 37 | 2023 | 3.80 | 4.10 | 7.90 | 90.00 | 0.00 | 0.00 | 90.00 | 0.017 | 1.39 | 0.032 | 2.61 |
| 38 | 2024 | 0.90 | 4.10 | 5.00 | 90.00 | 0.00 | 0.00 | 90.00 | 0.015 | 1.28 | 0.029 | 2.46 |
| 39 | 2025 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.013 | 1.16 | 0.028 | 2.20 |
| 40 | 2026 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.012 | 1.03 | 0.024 | 2.05 |
| 41 | 2027 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.011 | 0.92 | 0.022 | 1.86 |
| 42 | 2028 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.010 | 0.82 | 0.020 | 1.69 |
| 43 | 2029 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.009 | 0.74 | 0.018 | 1.54 |
| 44 | 2030 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.008 | 0.66 | 0.016 | 1.40 |
| 45 | 2031 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.007 | 0.59 | 0.015 | 1.27 |
| 46 | 2032 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.006 | 0.52 | 0.013 | 1.16 |
| 47 | 2033 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.005 | 0.47 | 0.012 | 1.05 |
| 48 | 2034 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.005 | 0.42 | 0.011 | 0.96 |
| 49 | 2035 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.004 | 0.37 | 0.010 | 0.87 |
| 50 | 2036 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.004 | 0.33 | 0.009 | 0.79 |
| 51 | 2037 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.003 | 0.30 | 0.008 | 0.72 |
| 52 | 2038 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.003 | 0.27 | 0.008 | 0.65 |
| 53 | 2039 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.003 | 0.24 | 0.007 | 0.59 |
| 54 | 2040 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.002 | 0.21 | 0.006 | 0.54 |
| 55 | 2041 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.002 | 0.19 | 0.006 | 0.49 |
| 56 | 2042 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.002 | 0.17 | 0.005 | 0.44 |
| 57 | 2043 | 0.00 | 4.10 | 4.10 | 90.00 | 0.00 | 0.00 | 90.00 | 0.002 | 0.15 | 0.005 | 0.40 |
| *TOTAL* | | 434.60 | 199.00 | 632.60 | 3786.50 | 0.00 | 0.00 | 3786.50 | | -54.98 | | -0.00 |

Total construction cost = US\$384.5 mil.
 Replacement cost = US\$50.1 million

kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 179
 Present value (C) = 234
 B/C = 0.8
 B-C = -55
 IRR = 10.0%

Table 13-19 Sensitivity Analysis of FIRR

(201 MW: Cost +10%, Benefit -10%)

(UNIT: MILLION US\$)

| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (9.39%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------|-------------|------------------|------------------------|-----------------|----------------|------------------|--------------------------|-------------------|-------------------------|-------------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.914 | -19.75 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.836 | -18.97 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.764 | -19.10 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.55 | 0.698 | -36.87 |
| 6 | 1992 | 82.10 | 0.00 | 82.10 | 0.00 | 0.00 | 0.00 | 0.00 | -82.10 | 0.567 | -46.59 | 0.638 | -52.41 |
| 7 | 1993 | 127.60 | 0.00 | 127.60 | 0.00 | 0.00 | 0.00 | 0.00 | -127.60 | 0.507 | -64.65 | 0.584 | -74.46 |
| 8 | 1994 | 61.50 | 3.00 | 64.50 | 9.40 | 0.00 | 9.40 | 9.40 | -55.10 | 0.452 | -24.92 | 0.533 | -29.39 |
| 9 | 1995 | 0.00 | 3.00 | 3.00 | 13.40 | 0.00 | 0.00 | 13.40 | 10.40 | 0.404 | 4.20 | 0.488 | 5.07 |
| 10 | 1996 | 0.00 | 3.00 | 3.00 | 17.40 | 0.00 | 0.00 | 17.40 | 14.40 | 0.361 | 5.19 | 0.446 | 6.42 |
| 11 | 1997 | 6.10 | 3.00 | 9.10 | 21.70 | 0.00 | 0.00 | 21.70 | 12.60 | 0.322 | 4.06 | 0.408 | 5.13 |
| 12 | 1998 | 12.30 | 3.00 | 15.30 | 26.10 | 0.00 | 0.00 | 26.10 | 10.80 | 0.287 | 3.10 | 0.373 | 4.02 |
| 13 | 1999 | 6.20 | 4.50 | 10.70 | 30.70 | 0.00 | 0.00 | 30.70 | 20.00 | 0.257 | 5.13 | 0.341 | 6.81 |
| 14 | 2000 | 0.00 | 4.50 | 4.50 | 38.60 | 0.00 | 0.00 | 38.60 | 31.10 | 0.229 | 7.13 | 0.311 | 9.68 |
| 15 | 2001 | 0.00 | 4.50 | 4.50 | 40.60 | 0.00 | 0.00 | 40.60 | 36.10 | 0.205 | 7.39 | 0.285 | 10.27 |
| 16 | 2002 | 0.00 | 4.50 | 4.50 | 45.80 | 0.00 | 0.00 | 45.80 | 41.30 | 0.183 | 7.55 | 0.260 | 10.74 |
| 17 | 2003 | 0.00 | 4.50 | 4.50 | 51.20 | 0.00 | 0.00 | 51.20 | 46.70 | 0.163 | 7.62 | 0.238 | 11.11 |
| 18 | 2004 | 0.00 | 4.50 | 4.50 | 57.00 | 0.00 | 0.00 | 57.00 | 52.50 | 0.145 | 7.65 | 0.217 | 11.41 |
| 19 | 2005 | 0.00 | 4.50 | 4.50 | 62.80 | 0.00 | 0.00 | 62.80 | 58.30 | 0.130 | 7.58 | 0.199 | 11.59 |
| 20 | 2006 | 0.00 | 4.50 | 4.50 | 68.90 | 0.00 | 0.00 | 68.90 | 64.40 | 0.116 | 7.48 | 0.182 | 11.70 |
| 21 | 2007 | 0.00 | 4.50 | 4.50 | 75.20 | 0.00 | 0.00 | 75.20 | 70.70 | 0.104 | 7.33 | 0.166 | 11.74 |
| 22 | 2008 | 0.00 | 4.50 | 4.50 | 81.90 | 0.00 | 0.00 | 81.90 | 77.40 | 0.093 | 7.16 | 0.152 | 11.75 |
| 23 | 2009 | 0.00 | 4.50 | 4.50 | 88.80 | 0.00 | 0.00 | 88.80 | 84.30 | 0.083 | 6.97 | 0.139 | 11.70 |
| 24 | 2010 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.074 | 6.81 | 0.127 | 10.85 |
| 25 | 2011 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.066 | 5.63 | 0.116 | 9.92 |
| 26 | 2012 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.059 | 5.03 | 0.106 | 9.06 |
| 27 | 2013 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.053 | 4.49 | 0.097 | 8.29 |
| 28 | 2014 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.047 | 4.01 | 0.089 | 7.58 |
| 29 | 2015 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.042 | 3.58 | 0.081 | 6.92 |
| 30 | 2016 | 4.50 | 4.50 | 9.00 | 90.00 | 0.00 | 0.00 | 90.00 | 81.00 | 0.037 | 3.03 | 0.074 | 6.00 |
| 31 | 2017 | 15.30 | 4.50 | 19.80 | 90.00 | 0.00 | 0.00 | 90.00 | 70.20 | 0.033 | 2.34 | 0.068 | 4.75 |
| 32 | 2018 | 14.70 | 4.50 | 19.20 | 90.00 | 0.00 | 0.00 | 90.00 | 70.80 | 0.030 | 2.11 | 0.052 | 4.38 |
| 33 | 2019 | 10.20 | 4.50 | 14.70 | 90.00 | 0.00 | 0.00 | 90.00 | 75.30 | 0.027 | 2.00 | 0.057 | 4.26 |
| 34 | 2020 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.024 | 2.03 | 0.052 | 4.42 |
| 35 | 2021 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.021 | 1.81 | 0.047 | 4.04 |
| 36 | 2022 | 5.20 | 4.50 | 9.70 | 90.00 | 0.00 | 0.00 | 90.00 | 80.30 | 0.019 | 1.52 | 0.043 | 3.47 |
| 37 | 2023 | 4.20 | 4.50 | 8.70 | 90.00 | 0.00 | 0.00 | 90.00 | 81.30 | 0.017 | 1.37 | 0.039 | 3.21 |
| 38 | 2024 | 1.00 | 4.50 | 5.50 | 90.00 | 0.00 | 0.00 | 90.00 | 84.50 | 0.015 | 1.28 | 0.036 | 3.05 |
| 39 | 2025 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.013 | 1.15 | 0.033 | 2.82 |
| 40 | 2026 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.012 | 1.03 | 0.030 | 2.58 |
| 41 | 2027 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.011 | 0.92 | 0.028 | 2.36 |
| 42 | 2028 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.010 | 0.82 | 0.025 | 2.15 |
| 43 | 2029 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.009 | 0.73 | 0.023 | 1.97 |
| 44 | 2030 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.008 | 0.65 | 0.021 | 1.80 |
| 45 | 2031 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.007 | 0.58 | 0.019 | 1.65 |
| 46 | 2032 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.006 | 0.52 | 0.018 | 1.51 |
| 47 | 2033 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.005 | 0.47 | 0.016 | 1.38 |
| 48 | 2034 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.005 | 0.42 | 0.015 | 1.26 |
| 49 | 2035 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.004 | 0.37 | 0.013 | 1.15 |
| 50 | 2036 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.004 | 0.33 | 0.012 | 1.05 |
| 51 | 2037 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.003 | 0.30 | 0.011 | 0.96 |
| 52 | 2038 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.003 | 0.26 | 0.010 | 0.88 |
| 53 | 2039 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.003 | 0.24 | 0.009 | 0.80 |
| 54 | 2040 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.002 | 0.21 | 0.009 | 0.73 |
| 55 | 2041 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.002 | 0.19 | 0.008 | 0.67 |
| 56 | 2042 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.002 | 0.17 | 0.007 | 0.61 |
| 57 | 2043 | 0.00 | 4.50 | 4.50 | 90.00 | 0.00 | 0.00 | 90.00 | 85.50 | 0.002 | 0.15 | 0.007 | 0.56 |
| *TOTAL* | | 478.30 | 217.50 | 695.80 | 3786.50 | 0.00 | 0.00 | 3786.50 | 3090.70 | | -78.60 | | 0.00 |

Total construction cost = US\$423.2 mil.
 Replacement cost = US\$55.1 million

kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 179
 Present value (C) = 258
 B/C = 0.7
 B-C = -79
 IRR = 9.4%

Table 13-20 Sensitivity Analysis of FIRR

(201 MW: Power Export Decrease by 20 MW)

| MILLION US\$ | | | | | | | | | | | | | |
|--------------|------|----------------------------|---------------------------------|-------------|------------------|----------------------------------|-----------------|----------------|------------------|--------------------------|-------------------|-------------------------|-------------------|
| NO. | YEAR | INVESTMENT AND REPLACEMENT | COSTS OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | BENEFITS SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (9.97%) | NET PRESENT VALUE |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.909 | -17.82 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.827 | -17.03 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.752 | -17.07 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.684 | -32.82 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | -74.60 | 0.567 | -42.33 | 0.622 | -46.39 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | -116.00 | 0.507 | -58.77 | 0.565 | -65.59 |
| 8 | 1994 | 55.90 | 2.70 | 58.60 | 5.10 | 0.00 | 0.00 | 5.10 | -53.50 | 0.452 | -24.20 | 0.514 | -27.51 |
| 9 | 1995 | 0.00 | 2.70 | 2.70 | 9.40 | 0.00 | 0.00 | 9.40 | 6.70 | 0.404 | 2.71 | 0.468 | 3.13 |
| 10 | 1996 | 0.00 | 2.70 | 2.70 | 13.70 | 0.00 | 0.00 | 13.70 | 11.00 | 0.361 | 3.97 | 0.425 | 4.68 |
| 11 | 1997 | 5.50 | 2.70 | 8.20 | 18.30 | 0.00 | 0.00 | 18.30 | 10.10 | 0.322 | 3.25 | 0.387 | 3.91 |
| 12 | 1998 | 11.20 | 2.70 | 13.90 | 23.10 | 0.00 | 0.00 | 23.10 | 9.20 | 0.287 | 2.64 | 0.352 | 3.23 |
| 13 | 1999 | 5.60 | 4.10 | 9.70 | 28.00 | 0.00 | 0.00 | 28.00 | 18.30 | 0.257 | 4.70 | 0.320 | 5.85 |
| 14 | 2000 | 0.00 | 4.10 | 4.10 | 33.20 | 0.00 | 0.00 | 33.20 | 29.10 | 0.229 | 6.67 | 0.291 | 8.46 |
| 15 | 2001 | 0.00 | 4.10 | 4.10 | 38.60 | 0.00 | 0.00 | 38.60 | 34.50 | 0.205 | 7.06 | 0.264 | 9.12 |
| 16 | 2002 | 0.00 | 4.10 | 4.10 | 44.20 | 0.00 | 0.00 | 44.20 | 40.10 | 0.183 | 7.33 | 0.240 | 9.64 |
| 17 | 2003 | 0.00 | 4.10 | 4.10 | 50.00 | 0.00 | 0.00 | 50.00 | 45.90 | 0.163 | 7.49 | 0.219 | 10.04 |
| 18 | 2004 | 0.00 | 4.10 | 4.10 | 56.10 | 0.00 | 0.00 | 56.10 | 52.00 | 0.146 | 7.57 | 0.199 | 10.34 |
| 19 | 2005 | 0.00 | 4.10 | 4.10 | 62.40 | 0.00 | 0.00 | 62.40 | 58.30 | 0.130 | 7.58 | 0.181 | 10.54 |
| 20 | 2006 | 0.00 | 4.10 | 4.10 | 68.90 | 0.00 | 0.00 | 68.90 | 64.80 | 0.116 | 7.52 | 0.164 | 10.65 |
| 21 | 2007 | 0.00 | 4.10 | 4.10 | 75.70 | 0.00 | 0.00 | 75.70 | 71.60 | 0.104 | 7.42 | 0.149 | 10.70 |
| 22 | 2008 | 0.00 | 4.10 | 4.10 | 82.80 | 0.00 | 0.00 | 82.80 | 78.70 | 0.093 | 7.28 | 0.136 | 10.70 |
| 23 | 2009 | 0.00 | 4.10 | 4.10 | 90.20 | 0.00 | 0.00 | 90.20 | 86.10 | 0.083 | 7.12 | 0.124 | 10.64 |
| 24 | 2010 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.074 | 6.81 | 0.112 | 10.38 |
| 25 | 2011 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.066 | 6.48 | 0.102 | 9.44 |
| 26 | 2012 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.059 | 5.43 | 0.093 | 8.58 |
| 27 | 2013 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.053 | 4.45 | 0.085 | 7.80 |
| 28 | 2014 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.047 | 4.33 | 0.077 | 7.09 |
| 29 | 2015 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.042 | 3.85 | 0.070 | 6.45 |
| 30 | 2016 | 4.10 | 4.10 | 8.20 | 96.40 | 0.00 | 0.00 | 96.40 | 88.20 | 0.037 | 3.30 | 0.064 | 5.61 |
| 31 | 2017 | 13.90 | 4.10 | 18.00 | 96.40 | 0.00 | 0.00 | 96.40 | 78.40 | 0.033 | 2.62 | 0.058 | 4.53 |
| 32 | 2018 | 13.40 | 4.10 | 17.50 | 96.40 | 0.00 | 0.00 | 96.40 | 76.90 | 0.030 | 2.35 | 0.053 | 4.15 |
| 33 | 2019 | 9.30 | 4.10 | 13.40 | 96.40 | 0.00 | 0.00 | 96.40 | 83.00 | 0.027 | 2.21 | 0.048 | 3.97 |
| 34 | 2020 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.024 | 2.19 | 0.043 | 4.01 |
| 35 | 2021 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.021 | 1.96 | 0.040 | 3.65 |
| 36 | 2022 | 4.70 | 4.10 | 8.80 | 96.40 | 0.00 | 0.00 | 96.40 | 87.60 | 0.019 | 1.66 | 0.036 | 3.15 |
| 37 | 2023 | 3.80 | 4.10 | 7.90 | 96.40 | 0.00 | 0.00 | 96.40 | 88.80 | 0.017 | 1.50 | 0.033 | 2.89 |
| 38 | 2024 | 0.90 | 4.10 | 5.00 | 96.40 | 0.00 | 0.00 | 96.40 | 91.40 | 0.015 | 1.38 | 0.030 | 2.72 |
| 39 | 2025 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.013 | 1.24 | 0.027 | 2.49 |
| 40 | 2026 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.012 | 1.11 | 0.025 | 2.27 |
| 41 | 2027 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.011 | 0.99 | 0.023 | 2.06 |
| 42 | 2028 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.010 | 0.89 | 0.020 | 1.88 |
| 43 | 2029 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.009 | 0.79 | 0.018 | 1.71 |
| 44 | 2030 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.008 | 0.71 | 0.017 | 1.55 |
| 45 | 2031 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.007 | 0.63 | 0.015 | 1.41 |
| 46 | 2032 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.006 | 0.56 | 0.014 | 1.28 |
| 47 | 2033 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.005 | 0.50 | 0.013 | 1.17 |
| 48 | 2034 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.005 | 0.45 | 0.011 | 1.06 |
| 49 | 2035 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.004 | 0.40 | 0.010 | 0.96 |
| 50 | 2036 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.004 | 0.36 | 0.010 | 0.88 |
| 51 | 2037 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.003 | 0.32 | 0.009 | 0.80 |
| 52 | 2038 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.003 | 0.29 | 0.008 | 0.73 |
| 53 | 2039 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.003 | 0.25 | 0.007 | 0.66 |
| 54 | 2040 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.002 | 0.23 | 0.006 | 0.60 |
| 55 | 2041 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.002 | 0.20 | 0.006 | 0.55 |
| 56 | 2042 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.002 | 0.18 | 0.005 | 0.50 |
| 57 | 2043 | 0.00 | 4.10 | 4.10 | 96.40 | 0.00 | 0.00 | 96.40 | 92.30 | 0.002 | 0.16 | 0.005 | 0.45 |
| *TOTAL* | | 434.60 | 198.00 | 632.60 | 3977.30 | 0.00 | 0.00 | 3977.30 | 3344.70 | | -59.59 | | 0.00 |

Total construction cost = US\$384.5 mil.
 Replacement cost = US\$50.1 million
 kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 175
 Present value (C) = 234
 B/C = 0.8
 B-C = -59
 IRR = 10.0%

Table 13-21 Sensitivity Analysis of FIRR

(402 MW: Cost +10%)

UNIT: MILLION US\$

| NO. | YEAR | COSTS | | | BENEFITS | | | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (13.98%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | -5.30 | 1.000 | -5.30 | 1.000 | -5.30 |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | -21.60 | 0.893 | -19.29 | 0.877 | -18.95 |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.797 | -18.10 | 0.770 | -17.47 |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.00 | 0.712 | -17.79 | 0.675 | -16.88 |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | -52.80 | 0.636 | -33.56 | 0.593 | -31.29 |
| 6 | 1992 | 82.10 | 0.00 | 82.10 | 0.00 | 0.00 | 0.00 | 0.00 | -82.10 | 0.567 | -46.59 | 0.520 | -42.68 |
| 7 | 1993 | 127.60 | 0.00 | 127.60 | 0.00 | 0.00 | 0.00 | 0.00 | -127.60 | 0.507 | -64.65 | 0.456 | -58.20 |
| 8 | 1994 | 68.50 | 2.10 | 70.60 | 10.40 | 0.00 | 0.00 | 10.40 | -60.20 | 0.452 | -27.23 | 0.400 | -24.09 |
| 9 | 1995 | 13.30 | 2.10 | 15.40 | 14.90 | 0.00 | 0.00 | 14.90 | -0.50 | 0.404 | -0.20 | 0.351 | -0.18 |
| 10 | 1996 | 22.00 | 2.10 | 24.10 | 19.30 | 0.00 | 0.00 | 19.30 | -4.80 | 0.361 | -1.73 | 0.308 | -1.48 |
| 11 | 1997 | 76.90 | 3.10 | 79.00 | 24.10 | 0.00 | 0.00 | 24.10 | -54.90 | 0.322 | -17.68 | 0.270 | -14.84 |
| 12 | 1998 | 47.20 | 2.10 | 49.30 | 29.00 | 0.00 | 0.00 | 29.00 | -20.30 | 0.287 | -5.84 | 0.237 | -4.81 |
| 13 | 1999 | 5.70 | 6.30 | 12.00 | 34.20 | 105.00 | 0.00 | 139.20 | 127.20 | 0.257 | 32.65 | 0.208 | 26.47 |
| 14 | 2000 | 0.00 | 6.30 | 6.30 | 39.50 | 100.90 | 0.00 | 140.40 | 134.10 | 0.229 | 30.73 | 0.183 | 24.48 |
| 15 | 2001 | 0.00 | 6.30 | 6.30 | 45.10 | 96.70 | 0.00 | 141.80 | 135.50 | 0.205 | 27.73 | 0.160 | 21.70 |
| 16 | 2002 | 0.00 | 6.30 | 6.30 | 50.90 | 92.20 | 0.00 | 143.10 | 136.80 | 0.183 | 24.99 | 0.141 | 19.22 |
| 17 | 2003 | 0.00 | 6.30 | 6.30 | 56.90 | 87.60 | 0.00 | 144.50 | 138.20 | 0.163 | 22.54 | 0.123 | 17.04 |
| 18 | 2004 | 0.00 | 6.30 | 6.30 | 63.30 | 82.80 | 0.00 | 146.10 | 139.80 | 0.146 | 20.36 | 0.108 | 15.12 |
| 19 | 2005 | 0.00 | 6.30 | 6.30 | 69.80 | 77.90 | 0.00 | 147.70 | 141.40 | 0.130 | 18.39 | 0.095 | 13.42 |
| 20 | 2006 | 0.00 | 6.30 | 6.30 | 76.60 | 72.70 | 0.00 | 149.30 | 143.00 | 0.116 | 16.60 | 0.083 | 11.91 |
| 21 | 2007 | 0.00 | 6.30 | 6.30 | 83.60 | 67.30 | 0.00 | 150.90 | 144.60 | 0.104 | 14.99 | 0.073 | 10.56 |
| 22 | 2008 | 0.00 | 6.30 | 6.30 | 91.00 | 61.70 | 0.00 | 152.70 | 146.40 | 0.093 | 13.55 | 0.064 | 9.38 |
| 23 | 2009 | 0.00 | 6.30 | 6.30 | 98.70 | 55.80 | 0.00 | 154.50 | 148.20 | 0.083 | 12.25 | 0.056 | 8.34 |
| 24 | 2010 | 0.00 | 6.30 | 6.30 | 106.70 | 49.70 | 0.00 | 156.40 | 150.10 | 0.074 | 11.08 | 0.049 | 7.41 |
| 25 | 2011 | 0.00 | 6.30 | 6.30 | 109.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.066 | 9.92 | 0.043 | 6.52 |
| 26 | 2012 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.059 | 8.85 | 0.038 | 5.72 |
| 27 | 2013 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.053 | 7.90 | 0.032 | 5.02 |
| 28 | 2014 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.047 | 7.06 | 0.029 | 4.40 |
| 29 | 2015 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.042 | 6.30 | 0.026 | 3.86 |
| 30 | 2016 | 1.50 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 146.00 | 0.037 | 5.46 | 0.023 | 3.29 | |
| 31 | 2017 | 15.30 | 6.30 | 21.60 | 108.20 | 48.60 | 0.00 | 156.80 | 135.20 | 0.033 | 4.51 | 0.020 | 2.67 |
| 32 | 2018 | 14.70 | 6.30 | 21.00 | 108.20 | 48.60 | 0.00 | 156.80 | 135.80 | 0.030 | 4.05 | 0.017 | 2.35 |
| 33 | 2019 | 10.20 | 6.30 | 16.50 | 108.20 | 48.60 | 0.00 | 156.80 | 140.30 | 0.027 | 3.73 | 0.015 | 2.13 |
| 34 | 2020 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.024 | 3.58 | 0.013 | 2.01 |
| 35 | 2021 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.021 | 3.19 | 0.012 | 1.76 |
| 36 | 2022 | 25.70 | 6.30 | 32.00 | 108.20 | 48.60 | 0.00 | 156.80 | 124.80 | 0.019 | 2.36 | 0.010 | 1.28 |
| 37 | 2023 | 20.80 | 6.30 | 27.10 | 108.20 | 48.60 | 0.00 | 156.80 | 129.70 | 0.017 | 2.19 | 0.009 | 1.17 |
| 38 | 2024 | 4.40 | 6.30 | 10.70 | 108.20 | 48.60 | 0.00 | 156.80 | 146.10 | 0.015 | 2.21 | 0.008 | 1.15 |
| 39 | 2025 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.013 | 2.03 | 0.007 | 1.04 |
| 40 | 2026 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.012 | 1.81 | 0.006 | 0.92 |
| 41 | 2027 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.011 | 1.62 | 0.005 | 0.80 |
| 42 | 2028 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.010 | 1.44 | 0.005 | 0.70 |
| 43 | 2029 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.009 | 1.29 | 0.004 | 0.62 |
| 44 | 2030 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.008 | 1.15 | 0.004 | 0.54 |
| 45 | 2031 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.007 | 1.03 | 0.003 | 0.48 |
| 46 | 2032 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.006 | 0.92 | 0.003 | 0.42 |
| 47 | 2033 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.005 | 0.82 | 0.002 | 0.37 |
| 48 | 2034 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.005 | 0.73 | 0.002 | 0.32 |
| 49 | 2035 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.004 | 0.65 | 0.002 | 0.28 |
| 50 | 2036 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.004 | 0.58 | 0.002 | 0.25 |
| 51 | 2037 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.003 | 0.52 | 0.001 | 0.22 |
| 52 | 2038 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.003 | 0.46 | 0.001 | 0.19 |
| 53 | 2039 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.003 | 0.42 | 0.001 | 0.17 |
| 54 | 2040 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.002 | 0.37 | 0.001 | 0.15 |
| 55 | 2041 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.002 | 0.33 | 0.001 | 0.13 |
| 56 | 2042 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.002 | 0.30 | 0.001 | 0.11 |
| 57 | 2043 | 0.00 | 6.30 | 6.30 | 108.20 | 48.60 | 0.00 | 156.80 | 150.50 | 0.002 | 0.26 | 0.001 | 0.10 |
| *TOTAL* | | 666.30 | 294.00 | 960.30 | 4484.60 | 2554.10 | 0.00 | 7038.70 | 6078.40 | | 75.97 | | -0.00 |

Total construction cost = US\$570.7 mil.
 Replacement cost = US\$95.6 million

kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 386
 Present value (C) = 310
 B/C = 1.2
 B-C = 76
 IRR = 14.0%

Table 13-22 Sensitivity Analysis of FIRR

(402 MW: Benefit -10%)

| NO. | YEAR | COSTS | | | BENEFITS | | | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (13.89%) | NET PRESENT VALUE | |
|---------|------|----------------------------|---------------------------|-------------|------------------|-------------------------|-----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|----------------|
| | | INVESTMENT AND REPLACEMENT | OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | | | | | | TOTAL BENEFITS |
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.60 | 0.00 | 19.60 | 0.00 | 0.00 | 0.00 | 0.00 | -19.60 | 0.893 | -17.50 | 0.878 | -17.21 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.771 | -15.88 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.16 | 0.677 | -15.37 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.594 | -28.53 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | -74.60 | 0.567 | -42.33 | 0.522 | -38.94 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | -116.00 | 0.507 | -58.77 | 0.458 | -53.16 |
| 8 | 1994 | 62.30 | 1.90 | 64.20 | 9.40 | 0.00 | 0.00 | 9.40 | -54.80 | 0.452 | -24.79 | 0.402 | -22.05 |
| 9 | 1995 | 12.10 | 1.90 | 14.00 | 13.40 | 0.00 | 0.00 | 13.40 | -0.60 | 0.404 | -0.24 | 0.353 | -0.21 |
| 10 | 1996 | 20.00 | 1.90 | 21.90 | 17.40 | 0.00 | 0.00 | 17.40 | -4.50 | 0.361 | -1.62 | 0.310 | -1.40 |
| 11 | 1997 | 89.90 | 1.90 | 91.80 | 21.70 | 0.00 | 0.00 | 21.70 | -50.10 | 0.322 | -16.13 | 0.272 | -13.65 |
| 12 | 1998 | 42.90 | 1.90 | 44.80 | 26.10 | 0.00 | 0.00 | 26.10 | -18.70 | 0.287 | -5.38 | 0.239 | -4.47 |
| 13 | 1999 | 5.20 | 5.70 | 10.90 | 30.70 | 94.50 | 0.00 | 125.20 | 114.30 | 0.257 | 29.34 | 0.210 | 24.01 |
| 14 | 2000 | 0.00 | 5.70 | 5.70 | 35.60 | 90.80 | 0.00 | 126.40 | 120.70 | 0.229 | 27.66 | 0.184 | 22.26 |
| 15 | 2001 | 0.00 | 5.70 | 5.70 | 40.60 | 87.00 | 0.00 | 127.60 | 121.90 | 0.205 | 24.94 | 0.162 | 19.74 |
| 16 | 2002 | 0.00 | 5.70 | 5.70 | 45.80 | 83.00 | 0.00 | 128.80 | 123.10 | 0.183 | 22.49 | 0.142 | 17.50 |
| 17 | 2003 | 0.00 | 5.70 | 5.70 | 51.20 | 78.80 | 0.00 | 130.00 | 124.30 | 0.163 | 20.28 | 0.125 | 15.52 |
| 18 | 2004 | 0.00 | 5.70 | 5.70 | 57.00 | 74.50 | 0.00 | 131.50 | 125.80 | 0.146 | 18.32 | 0.110 | 13.79 |
| 19 | 2005 | 0.00 | 5.70 | 5.70 | 62.80 | 70.10 | 0.00 | 132.90 | 127.20 | 0.130 | 16.54 | 0.096 | 12.24 |
| 20 | 2006 | 0.00 | 5.70 | 5.70 | 68.90 | 65.40 | 0.00 | 134.30 | 128.60 | 0.116 | 14.93 | 0.088 | 10.87 |
| 21 | 2007 | 0.00 | 5.70 | 5.70 | 75.20 | 60.60 | 0.00 | 135.80 | 130.10 | 0.104 | 13.49 | 0.074 | 9.66 |
| 22 | 2008 | 0.00 | 5.70 | 5.70 | 81.90 | 55.50 | 0.00 | 137.40 | 131.70 | 0.093 | 12.19 | 0.065 | 8.58 |
| 23 | 2009 | 0.00 | 5.70 | 5.70 | 88.80 | 50.20 | 0.00 | 139.00 | 133.30 | 0.083 | 11.02 | 0.057 | 7.63 |
| 24 | 2010 | 0.00 | 5.70 | 5.70 | 96.00 | 44.70 | 0.00 | 140.70 | 135.00 | 0.074 | 9.96 | 0.050 | 6.78 |
| 25 | 2011 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.066 | 8.92 | 0.044 | 5.97 |
| 26 | 2012 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.059 | 7.95 | 0.039 | 5.24 |
| 27 | 2013 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.053 | 7.11 | 0.034 | 4.60 |
| 28 | 2014 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.047 | 6.35 | 0.030 | 4.04 |
| 29 | 2015 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.042 | 5.67 | 0.026 | 3.55 |
| 30 | 2016 | 4.10 | 5.70 | 9.80 | 97.40 | 43.70 | 0.00 | 141.10 | 131.30 | 0.037 | 4.91 | 0.023 | 3.02 |
| 31 | 2017 | 13.90 | 5.70 | 19.60 | 97.40 | 43.70 | 0.00 | 141.10 | 121.50 | 0.033 | 4.06 | 0.020 | 2.46 |
| 32 | 2018 | 13.40 | 5.70 | 19.10 | 97.40 | 43.70 | 0.00 | 141.10 | 122.00 | 0.030 | 3.64 | 0.018 | 2.17 |
| 33 | 2019 | 9.30 | 5.70 | 15.00 | 97.40 | 43.70 | 0.00 | 141.10 | 126.10 | 0.027 | 3.36 | 0.015 | 1.97 |
| 34 | 2020 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.024 | 3.22 | 0.014 | 1.85 |
| 35 | 2021 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.021 | 2.87 | 0.012 | 1.63 |
| 36 | 2022 | 23.40 | 5.70 | 29.10 | 97.40 | 43.70 | 0.00 | 141.10 | 112.00 | 0.019 | 2.12 | 0.011 | 1.18 |
| 37 | 2023 | 18.90 | 5.70 | 24.60 | 97.40 | 43.70 | 0.00 | 141.10 | 116.50 | 0.017 | 1.97 | 0.009 | 1.08 |
| 38 | 2024 | 4.00 | 5.70 | 9.70 | 97.40 | 43.70 | 0.00 | 141.10 | 131.40 | 0.015 | 1.98 | 0.008 | 1.07 |
| 39 | 2025 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.013 | 1.83 | 0.007 | 0.97 |
| 40 | 2026 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.012 | 1.63 | 0.006 | 0.85 |
| 41 | 2027 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.011 | 1.46 | 0.006 | 0.75 |
| 42 | 2028 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.010 | 1.30 | 0.005 | 0.65 |
| 43 | 2029 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.009 | 1.16 | 0.004 | 0.57 |
| 44 | 2030 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.008 | 1.04 | 0.004 | 0.50 |
| 45 | 2031 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.007 | 0.92 | 0.003 | 0.44 |
| 46 | 2032 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.006 | 0.83 | 0.003 | 0.39 |
| 47 | 2033 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.005 | 0.74 | 0.003 | 0.34 |
| 48 | 2034 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.005 | 0.65 | 0.002 | 0.30 |
| 49 | 2035 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.004 | 0.59 | 0.002 | 0.28 |
| 50 | 2036 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.004 | 0.52 | 0.002 | 0.23 |
| 51 | 2037 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.003 | 0.47 | 0.002 | 0.20 |
| 52 | 2038 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.003 | 0.42 | 0.001 | 0.18 |
| 53 | 2039 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.003 | 0.37 | 0.001 | 0.16 |
| 54 | 2040 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.002 | 0.33 | 0.001 | 0.14 |
| 55 | 2041 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.002 | 0.30 | 0.001 | 0.12 |
| 56 | 2042 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.002 | 0.27 | 0.001 | 0.11 |
| 57 | 2043 | 0.00 | 5.70 | 5.70 | 97.40 | 43.70 | 0.00 | 141.10 | 135.40 | 0.002 | 0.24 | 0.001 | 0.09 |
| *TOTAL* | | 605.70 | 266.00 | 871.70 | 4036.70 | 2297.20 | 0.00 | 6333.90 | 5462.20 | | 63.71 | | -0.00 |

Total construction cost = US\$518.7 mil.
 Replacement cost = US\$87.0 million

kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 348
 Present value (C) = 282
 B/C = 1.2
 B-C = 66
 IRR = 14.0%

Table 13-23 Sensitivity Analysis of FIRR

(402 MW: Cost +10%, Benefit -10%)

| | | COSTS | | | BENEFITS | | | BENEFITS - COSTS | | MILLION US\$ | | | |
|---------|------|-------------|-------------|--------|----------|---------|----------|------------------|----------|--------------|----------|--------|--------|
| NO. | YEAR | INVESTMENT | OPERATION | TOTAL | SALABLE | SALABLE | USEFUL | TOTAL | DISCOUNT | NET | DISCOUNT | NET | |
| | | AND | AND | COSTS | DOMESTIC | EXPORT, | CAPACITY | BENEFITS | | | | | FACTOR |
| | | REPLACEMENT | MAINTENANCE | | | SURPLUS | | | (12.00%) | VALUE | (13.01%) | VALUE | |
| 1 | 1987 | 5.30 | 0.00 | 5.30 | 0.00 | 0.00 | 0.00 | 0.00 | 1.000 | -5.30 | 1.000 | -5.30 | |
| 2 | 1988 | 21.60 | 0.00 | 21.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.893 | -19.29 | 0.885 | -19.11 | |
| 3 | 1989 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.797 | -18.10 | 0.783 | -17.78 | |
| 4 | 1990 | 25.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.712 | -17.79 | 0.693 | -17.32 | |
| 5 | 1991 | 52.80 | 0.00 | 52.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.636 | -33.56 | 0.613 | -32.38 | |
| 6 | 1992 | 82.10 | 0.00 | 82.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.567 | -46.59 | 0.543 | -44.55 | |
| 7 | 1993 | 127.60 | 0.00 | 127.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.507 | -64.65 | 0.480 | -61.27 | |
| 8 | 1994 | 68.50 | 2.10 | 70.60 | 9.40 | 0.00 | 0.00 | 9.40 | 0.452 | -27.68 | 0.425 | -26.01 | |
| 9 | 1995 | 13.30 | 2.10 | 15.40 | 13.40 | 0.00 | 0.00 | 13.40 | 0.404 | -2.00 | 0.376 | -0.75 | |
| 10 | 1996 | 22.00 | 2.10 | 24.10 | 17.40 | 0.00 | 0.00 | 17.40 | 0.361 | -2.42 | 0.333 | -2.23 | |
| 11 | 1997 | 76.90 | 2.10 | 79.00 | 21.70 | 0.00 | 0.00 | 21.70 | 0.322 | -18.45 | 0.294 | -16.87 | |
| 12 | 1998 | 47.20 | 2.10 | 49.30 | 26.10 | 0.00 | 0.00 | 26.10 | 0.287 | -6.67 | 0.261 | -6.05 | |
| 13 | 1999 | 5.70 | 6.30 | 12.00 | 30.70 | 94.50 | 0.00 | 125.20 | 0.257 | 29.06 | 0.231 | 26.10 | |
| 14 | 2000 | 0.00 | 6.30 | 6.30 | 35.60 | 90.80 | 0.00 | 126.40 | 0.229 | 27.52 | 0.204 | 24.50 | |
| 15 | 2001 | 0.00 | 6.30 | 6.30 | 40.60 | 87.00 | 0.00 | 127.60 | 0.205 | 24.82 | 0.181 | 21.90 | |
| 16 | 2002 | 0.00 | 6.30 | 6.30 | 45.80 | 83.00 | 0.00 | 128.80 | 0.183 | 22.38 | 0.160 | 19.57 | |
| 17 | 2003 | 0.00 | 6.30 | 6.30 | 51.20 | 78.80 | 0.00 | 130.00 | 0.163 | 20.18 | 0.141 | 17.49 | |
| 18 | 2004 | 0.00 | 6.30 | 6.30 | 57.00 | 74.50 | 0.00 | 131.50 | 0.146 | 18.23 | 0.125 | 15.66 | |
| 19 | 2005 | 0.00 | 6.30 | 6.30 | 62.80 | 70.10 | 0.00 | 132.90 | 0.130 | 16.46 | 0.111 | 14.02 | |
| 20 | 2006 | 0.00 | 6.30 | 6.30 | 68.90 | 65.40 | 0.00 | 134.30 | 0.116 | 14.86 | 0.098 | 12.54 | |
| 21 | 2007 | 0.00 | 6.30 | 6.30 | 75.20 | 60.60 | 0.00 | 135.80 | 0.104 | 13.42 | 0.087 | 11.23 | |
| 22 | 2008 | 0.00 | 6.30 | 6.30 | 81.90 | 55.50 | 0.00 | 137.40 | 0.093 | 12.13 | 0.077 | 10.06 | |
| 23 | 2009 | 0.00 | 6.30 | 6.30 | 88.80 | 50.20 | 0.00 | 139.00 | 0.083 | 10.97 | 0.068 | 9.01 | |
| 24 | 2010 | 0.00 | 6.30 | 6.30 | 96.00 | 44.70 | 0.00 | 140.70 | 0.074 | 9.92 | 0.060 | 8.07 | |
| 25 | 2011 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.066 | 8.88 | 0.053 | 7.17 | |
| 26 | 2012 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.059 | 7.93 | 0.047 | 6.34 | |
| 27 | 2013 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.053 | 7.08 | 0.042 | 5.61 | |
| 28 | 2014 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.047 | 6.32 | 0.037 | 4.97 | |
| 29 | 2015 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.042 | 5.64 | 0.033 | 4.39 | |
| 30 | 2016 | 4.50 | 6.30 | 10.80 | 97.40 | 43.70 | 0.00 | 141.10 | 0.037 | 4.87 | 0.029 | 3.76 | |
| 31 | 2017 | 15.30 | 6.30 | 21.60 | 97.40 | 43.70 | 0.00 | 141.10 | 0.033 | 3.99 | 0.026 | 3.05 | |
| 32 | 2018 | 14.70 | 6.30 | 21.00 | 97.40 | 43.70 | 0.00 | 141.10 | 0.030 | 3.53 | 0.023 | 2.71 | |
| 33 | 2019 | 10.20 | 6.30 | 16.50 | 97.40 | 43.70 | 0.00 | 141.10 | 0.027 | 3.32 | 0.020 | 2.49 | |
| 34 | 2020 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.024 | 3.20 | 0.018 | 2.38 | |
| 35 | 2021 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.021 | 2.86 | 0.016 | 2.11 | |
| 36 | 2022 | 25.70 | 6.30 | 32.00 | 97.40 | 43.70 | 0.00 | 141.10 | 0.019 | 2.07 | 0.014 | 1.51 | |
| 37 | 2023 | 20.80 | 6.30 | 27.10 | 97.40 | 43.70 | 0.00 | 141.10 | 0.017 | 1.93 | 0.012 | 1.40 | |
| 38 | 2024 | 4.40 | 6.30 | 10.70 | 97.40 | 43.70 | 0.00 | 141.10 | 0.015 | 1.97 | 0.011 | 1.41 | |
| 39 | 2025 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.013 | 1.82 | 0.010 | 1.29 | |
| 40 | 2026 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.012 | 1.62 | 0.008 | 1.15 | |
| 41 | 2027 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.011 | 1.45 | 0.008 | 1.01 | |
| 42 | 2028 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.010 | 1.29 | 0.007 | 0.90 | |
| 43 | 2029 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.009 | 1.15 | 0.006 | 0.79 | |
| 44 | 2030 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.008 | 1.03 | 0.005 | 0.70 | |
| 45 | 2031 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.007 | 0.92 | 0.005 | 0.62 | |
| 46 | 2032 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.006 | 0.82 | 0.004 | 0.55 | |
| 47 | 2033 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.005 | 0.73 | 0.004 | 0.49 | |
| 48 | 2034 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.005 | 0.66 | 0.003 | 0.43 | |
| 49 | 2035 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.004 | 0.59 | 0.003 | 0.38 | |
| 50 | 2036 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.004 | 0.52 | 0.003 | 0.34 | |
| 51 | 2037 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.003 | 0.47 | 0.002 | 0.30 | |
| 52 | 2038 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.003 | 0.42 | 0.002 | 0.26 | |
| 53 | 2039 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.003 | 0.37 | 0.002 | 0.23 | |
| 54 | 2040 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.002 | 0.33 | 0.002 | 0.21 | |
| 55 | 2041 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.002 | 0.30 | 0.001 | 0.18 | |
| 56 | 2042 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.002 | 0.26 | 0.001 | 0.16 | |
| 57 | 2043 | 0.00 | 6.30 | 6.30 | 97.40 | 43.70 | 0.00 | 141.10 | 0.002 | 0.24 | 0.001 | 0.14 | |
| *TOTAL* | | 666.30 | 294.00 | 960.30 | 4036.70 | 2297.20 | 0.00 | 6333.90 | 5373.60 | 37.30 | 0.00 | 0.00 | |

Total construction cost = US\$570.7 mil.

Replacement cost = US\$95.6 million

kwh value (domestic) = 0.056 US\$/kwh

kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%

Present value (B) = 348

Present value (C) = 310

B/C = 1.1

B-C = 38

IRR = 13.0%

Table 13-24 Sensitivity Analysis of FIRR

(402 MW: Power Export Decrease by 20 MW)

UNIT: MILLION US\$

| NO. | YEAR | INVESTMENT AND REPLACEMENT | COSTS OPERATION AND MAINTENANCE | TOTAL COSTS | SALABLE DOMESTIC | BENEFITS SALABLE EXPORT, SURPLUS | USEFUL CAPACITY | TOTAL BENEFITS | BENEFITS - COSTS | DISCOUNT FACTOR (12.00%) | NET PRESENT VALUE | DISCOUNT FACTOR (14.79%) | NET PRESENT VALUE |
|---------|------|----------------------------|---------------------------------|-------------|------------------|----------------------------------|-----------------|----------------|------------------|--------------------------|-------------------|--------------------------|-------------------|
| 1 | 1987 | 4.80 | 0.00 | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 | -4.80 | 1.000 | -4.80 | 1.000 | -4.80 |
| 2 | 1988 | 19.50 | 0.00 | 19.50 | 0.00 | 0.00 | 0.00 | 0.00 | -19.50 | 0.893 | -17.50 | 0.871 | -17.08 |
| 3 | 1989 | 20.60 | 0.00 | 20.60 | 0.00 | 0.00 | 0.00 | 0.00 | -20.60 | 0.797 | -16.42 | 0.759 | -15.62 |
| 4 | 1990 | 22.70 | 0.00 | 22.70 | 0.00 | 0.00 | 0.00 | 0.00 | -22.70 | 0.712 | -16.18 | 0.681 | -15.01 |
| 5 | 1991 | 48.00 | 0.00 | 48.00 | 0.00 | 0.00 | 0.00 | 0.00 | -48.00 | 0.636 | -30.50 | 0.576 | -27.66 |
| 6 | 1992 | 74.60 | 0.00 | 74.60 | 0.00 | 0.00 | 0.00 | 0.00 | -74.60 | 0.567 | -42.33 | 0.502 | -37.44 |
| 7 | 1993 | 116.00 | 0.00 | 116.00 | 0.00 | 0.00 | 0.00 | 0.00 | -116.00 | 0.507 | -58.77 | 0.457 | -50.71 |
| 8 | 1994 | 62.30 | 1.90 | 64.20 | 5.10 | 0.00 | 0.00 | 5.10 | -59.10 | 0.452 | -26.73 | 0.381 | -22.81 |
| 9 | 1995 | 12.10 | 1.90 | 14.00 | 9.40 | 0.00 | 0.00 | 9.40 | -4.60 | 0.404 | -1.86 | 0.332 | -1.53 |
| 10 | 1996 | 20.00 | 1.90 | 21.90 | 13.70 | 0.00 | 0.00 | 13.70 | -8.20 | 0.361 | -2.96 | 0.289 | -2.37 |
| 11 | 1997 | 69.90 | 1.90 | 71.80 | 18.30 | 0.00 | 0.00 | 18.30 | -53.50 | 0.322 | -17.23 | 0.252 | -13.47 |
| 12 | 1998 | 42.90 | 1.90 | 44.80 | 23.10 | 0.00 | 0.00 | 23.10 | -21.70 | 0.287 | -6.24 | 0.219 | -4.76 |
| 13 | 1999 | 5.20 | 5.70 | 10.90 | 28.00 | 118.10 | 0.00 | 146.10 | 135.20 | 0.257 | 34.70 | 0.191 | 25.84 |
| 14 | 2000 | 0.00 | 5.70 | 5.70 | 33.20 | 113.70 | 0.00 | 146.90 | 141.20 | 0.229 | 32.38 | 0.166 | 23.61 |
| 15 | 2001 | 0.00 | 5.70 | 5.70 | 38.60 | 109.10 | 0.00 | 147.70 | 142.00 | 0.205 | 29.05 | 0.145 | 20.60 |
| 16 | 2002 | 0.00 | 5.70 | 5.70 | 44.20 | 104.30 | 0.00 | 148.50 | 142.80 | 0.183 | 26.09 | 0.128 | 18.04 |
| 17 | 2003 | 0.00 | 5.70 | 5.70 | 50.00 | 99.30 | 0.00 | 149.30 | 143.50 | 0.163 | 23.42 | 0.110 | 15.61 |
| 18 | 2004 | 0.00 | 5.70 | 5.70 | 56.10 | 94.00 | 0.00 | 150.10 | 144.40 | 0.146 | 21.03 | 0.098 | 13.85 |
| 19 | 2005 | 0.00 | 5.70 | 5.70 | 62.40 | 88.70 | 0.00 | 151.10 | 145.40 | 0.130 | 18.91 | 0.084 | 12.15 |
| 20 | 2006 | 0.00 | 5.70 | 5.70 | 68.90 | 83.00 | 0.00 | 151.90 | 146.20 | 0.116 | 16.97 | 0.073 | 10.64 |
| 21 | 2007 | 0.00 | 5.70 | 5.70 | 75.70 | 77.20 | 0.00 | 152.90 | 147.20 | 0.104 | 15.26 | 0.063 | 9.33 |
| 22 | 2008 | 0.00 | 5.70 | 5.70 | 82.80 | 71.10 | 0.00 | 153.90 | 148.20 | 0.093 | 13.72 | 0.055 | 8.19 |
| 23 | 2009 | 0.00 | 5.70 | 5.70 | 90.10 | 64.70 | 0.00 | 154.90 | 149.20 | 0.083 | 12.33 | 0.048 | 7.18 |
| 24 | 2010 | 0.00 | 5.70 | 5.70 | 98.00 | 58.10 | 0.00 | 156.10 | 150.40 | 0.074 | 11.10 | 0.042 | 6.31 |
| 25 | 2011 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.066 | 9.97 | 0.037 | 5.53 |
| 26 | 2012 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.059 | 8.90 | 0.032 | 4.81 |
| 27 | 2013 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.053 | 7.95 | 0.028 | 4.19 |
| 28 | 2014 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.047 | 7.10 | 0.024 | 3.65 |
| 29 | 2015 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.042 | 6.33 | 0.021 | 3.18 |
| 30 | 2016 | 4.10 | 5.70 | 9.80 | 104.30 | 52.70 | 0.00 | 157.00 | 147.20 | 0.037 | 5.50 | 0.018 | 2.70 |
| 31 | 2017 | 13.90 | 5.70 | 19.60 | 104.30 | 52.70 | 0.00 | 157.00 | 137.40 | 0.033 | 4.59 | 0.016 | 2.19 |
| 32 | 2018 | 13.40 | 5.70 | 19.10 | 104.30 | 52.70 | 0.00 | 157.00 | 137.90 | 0.030 | 4.11 | 0.014 | 1.92 |
| 33 | 2019 | 9.30 | 5.70 | 15.00 | 104.30 | 52.70 | 0.00 | 157.00 | 142.00 | 0.027 | 3.78 | 0.012 | 1.72 |
| 34 | 2020 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.024 | 3.59 | 0.011 | 1.60 |
| 35 | 2021 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.021 | 3.21 | 0.009 | 1.39 |
| 36 | 2022 | 23.40 | 5.70 | 29.10 | 104.30 | 52.70 | 0.00 | 157.00 | 127.90 | 0.019 | 2.42 | 0.008 | 1.02 |
| 37 | 2023 | 18.90 | 5.70 | 24.60 | 104.30 | 52.70 | 0.00 | 157.00 | 132.40 | 0.017 | 2.24 | 0.007 | 0.92 |
| 38 | 2024 | 4.00 | 5.70 | 9.70 | 104.30 | 52.70 | 0.00 | 157.00 | 147.30 | 0.015 | 2.22 | 0.006 | 0.90 |
| 39 | 2025 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.013 | 2.04 | 0.005 | 0.80 |
| 40 | 2026 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.012 | 1.82 | 0.006 | 0.70 |
| 41 | 2027 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.011 | 1.63 | 0.004 | 0.61 |
| 42 | 2028 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.010 | 1.45 | 0.004 | 0.53 |
| 43 | 2029 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.009 | 1.30 | 0.003 | 0.46 |
| 44 | 2030 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.008 | 1.16 | 0.003 | 0.40 |
| 45 | 2031 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.007 | 1.03 | 0.002 | 0.35 |
| 46 | 2032 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.006 | 0.92 | 0.002 | 0.31 |
| 47 | 2033 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.005 | 0.82 | 0.002 | 0.27 |
| 48 | 2034 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.005 | 0.74 | 0.002 | 0.23 |
| 49 | 2035 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.004 | 0.66 | 0.001 | 0.20 |
| 50 | 2036 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.004 | 0.59 | 0.001 | 0.18 |
| 51 | 2037 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.003 | 0.52 | 0.001 | 0.15 |
| 52 | 2038 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.003 | 0.47 | 0.001 | 0.13 |
| 53 | 2039 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.003 | 0.42 | 0.001 | 0.12 |
| 54 | 2040 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.002 | 0.37 | 0.001 | 0.10 |
| 55 | 2041 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.002 | 0.33 | 0.001 | 0.09 |
| 56 | 2042 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.002 | 0.30 | 0.001 | 0.08 |
| 57 | 2043 | 0.00 | 5.70 | 5.70 | 104.30 | 52.70 | 0.00 | 157.00 | 151.30 | 0.002 | 0.27 | 0.000 | 0.07 |
| *TOTAL* | | 605.70 | 266.00 | 871.70 | 4239.60 | 2820.40 | 0.00 | 7060.00 | 6188.30 | | 102.19 | | -0.00 |

Total construction cost = US\$518.7 mil.
 Replacement cost = US\$87.0 million
 kwh value (domestic) = 0.056 US\$/kwh
 kwh value (export) = 0.048 US\$/kwh

Discount rate = 12%
 Present value (B) = 384
 Present value (C) = 282
 B/C = 1.4
 B-C = 102
 IRR = 14.8%

JICA