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## APPLIED SCIENCE DIVISION



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# IMPACT OF TAX REFORM ON RENEWABLE ENERGY AND COGENERATION PROJECTS*

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## EXECUTIVE SUMMARY

The development of certain cogeneration and renewable energy technologies has been influenced by favorable federal and state legislation enacted in the late 1970's. The legislation provided subsidies for either the investment in or output from specific renewable technologies. In addition, the Public Utilities Regulatory Policies Act of 1978 (PURPA) created a market for electricity from such projects by requiring utilities to purchase their output at avoided cost. As a direct result of these policies, several renewable energy technologies and industrial cogeneration have experienced accelerated development. The status of current renewable energy incentives changes significantly at the end of 1985 as all renewable energy investment tax credits expire. Key provisions of the *President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity* also affect renewable energy and cogeneration projects. The most significant provisions are:

- repeal of 10 percent investment tax credit
- lower corporate and individual tax rates
- replacement of accelerated cost recovery system (ACRS) with capital cost recovery system (CCRS)
- non-deductibility of state taxes on federal income tax returns
- institute an alternative minimum tax for corporations

In this study, we analyze the impact of the President's Tax Proposals and the scheduled expiration of energy investment tax credits on seven selected energy projects. Projects were selected that were representative of the best technologies currently available and which had high expected returns under current tax law. They are actual projects either in operation or in the advanced development stage. We have attempted to simulate the criteria investors would use when deciding to undertake renewable energy or conservation projects. Spread sheets of project revenue, cost, and tax data were developed for each project. We then estimated the investor's after-tax internal rate of return (IRR) under several scenarios:

- current law (before December 31, 1985)
- current law (after 1985) and
- the President's Tax Proposals.

By analyzing changes in the profitablility of these projects, we can develop an initial assessment of how currently scheduled and proposed revisions in tax law will affect the development of these and similar renewable energy and cogeneration projects.

The impact of the President's Tax Proposals on the investor's leveraged rate of return is shown in Table S1.

**Table S1. Rate of return on equity for selected projects.**[a]

| | Geothermal[b] | Gas-fired Cogeneration | Coal-fired Cogeneration | Landfill Gas[c] | Wind | Small Hydro | Wood - Electric |
|---|---|---|---|---|---|---|---|
| Current Law | 0.39 (0.54) | 0.41 | 0.40 | 0.28 | 0.47 | 0.27 | 0.26 |
| Current Law after Dec. 31, 1985 | 0.23 (0.33) | 0.41 | 0.40 | 0.028 | 0.14 | 0.14 | 0.20 |
| President's Tax Proposal | 0.09 (0.17) | 0.24 | 0.27 | 0.10 | 0.12 | 0.07 | 0.15 |

[a] The geothermal, cogeneration, and landfill gas projects are corporate-financed while the wind, small hydroelectric, and electricity from wood waste projects are financed by limited partnerships.

[b] IRR in parentheses is for geothermal project without transmission costs.

[c] All equity

Uniformly, the President's Tax Proposal lowers these returns. However, returns on cogeneration projects are still quite favorable (24-26 percent) and the President's Proposal tends to reinforce its emergence as the dominant small power technology.

After December 1985, with the expiration of the energy tax credits (ETC), very high investor rates of return disappear for wind turbines, small hydro, geothermal, and wood-fired electricity (to a lesser extent). The effect is most dramatic for wind-turbines and small hydro. The equity returns on these projects fall to a level that is unlikely to attract much capital. The President's proposal also has a very adverse impact on the landfill gas recovery project due principally to the repeal of the alternative fuels production credit (AFPC), as evidenced by the drop in the rate of return from 28 to 10 percent. This project is analyzed on an all-equity basis. The sponsor's minimum return requirement is 15 percent on this basis, hence the project is no longer viable. Geothermal and wood-electric projects are still financially viable under current law after 1985.

Rates of return on equity for the five renewable energy technologies are in the 7 to 15 percent range under the President's proposal. It is unlikely that projects with such returns could attract capital since the IRR on equity is at or below the cost of debt. However, a geothermal project unburdened by the need to provide transmission facilities would fare somewhat better.

The analysis of selected projects gives a characterization of the change in returns associated with different tax regimes. These changes do not constitute a forecast of the market for such projects. In this study, we develop a methodology that illustrates how results from a financial analysis of representative projects can be extended to develop a forecasting approach to the market for renewable technologies and cogeneration. We assume that investment will occur if a project meets the "hurdle rate," some specified minimum rate of return target. The hurdle rate must be greater than the cost of debt to compensate for the added risk. We believe that the hurdle rate lies somewhere between 15 and 20 percent return on equity capital. We then attempt to estimate and quantify endogenous project variability (e.g., distribution of technical and cost characteristics) and exogenous sources of risk (e.g., deviations of input fuel costs or output product prices from their expected level) in order to develop a distribution of returns on a family of similar projects.

We apply this approach to two of our typical projects, wind turbine generators and large-scale gas-fired cogeneration. The single most uncertain variable associated with wind turbine technology is its technical performance. How much output can wind turbine machines produce? The distribution of technical characteristics which is of most interest for gas turbine cogenerators does not involve performance uncertainties, but rather capital cost and sizing issues. These applications occur in industrial process activities where the precise mix of power production to steam use can be quite variable. The coefficient of variation is lower for the cogeneration project than the wind turbine project, which suggests that the returns for these type of projects are less variable.

Additional information and research in the following areas are necessary in order to translate change in investor returns on selected projects into a forecast of the market for such projects:

- analysis of the distribution of technical characteristics
- a national survey of avoided cost prices
- examination of issues related to technical progress
- analysis of the sensitivity of the results to macro-economic factors (e.g., interest rates).

Improved forecasting capability does not depend equally on all these efforts. The most important issue is the availability and analysis of market data on the nature of projects within a given technology.

## 1. INTRODUCTION

The President has recently proposed major changes in the U.S. tax code. These changes will have a significant effect on the profitability of renewable energy investments. The most significant provisions are:

- repeal of 10 percent investment tax credit
- lower corporate and individual tax rates
- replacement of accelerated cost recovery system (ACRS) with capital cost recovery system (CCRS)
- non-deductibility of state taxes on federal income tax returns
- phase out of percentage depletion (affects geothermal projects).

The President's tax proposals would also repeal the remaining incentives for alternative and alcohol fuel production while grandfathering production incentives to facilities completed before the end of 1985 and sold before 1990 (Treasury Department, 1985).

In this study, we analyze the impact of the scheduled expiration of energy investment tax credits and the President's Tax Proposals on eight selected energy projects. We focus on the direct impacts of tax law changes on conservation and renewable projects, and do not assess the impact of possible changes in macroeconomic factors (e.g., changes in interest rates, aggregate demand, and fuel markets) that might occur under the President's Tax Proposal. The projects selected represent real projects either in operation or in the advanced development stage. Three of the projects are located either in California or constructed for that market, reflective of the predominance of the California market for these technologies. We have attempted to simulate the criteria investors would use when deciding to undertake renewable energy or conservation projects. Spread sheets of project revenue, cost, and tax data were developed for each project. We then estimated the investor's after-tax internal rate of return (IRR) under several scenarios:

- current law (before December 31, 1985)
- current law (after 1985) and
- the President's Tax Proposals.

By analyzing changes in the profitablility of these projects, we can develop an initial assessment of how currently scheduled and proposed revisions in tax law will affect the development of these and similar renewable energy and cogeneration projects.

The report is organized in the following manner. We first discuss the technical and economic characteristics of the selected projects (section 2). We then examine the market and prices for power and describe the financing arrangements that are typical for such projects (section 3). Relevant provisions in the current tax code and changes proposed by the President are described in Section 4. We then discuss the method and assumptions used in calculating the after-tax rate of return and present results for selected projects (section 5). Finally, we examine factors which must be accounted for in translating returns from selected projects to a forecast of the market for such projects (section 6).

## 2. PROJECT DESCRIPTION

In this section, we describe the renewable energy and cogeneration projects including their technical characteristics, project costs, and engineering performance. The projects selected for analysis are representative of the best technologies currently available. Key technical and economic characteristics are summarized in Table 1.

**Table 1. Technical and economic characteristics of selected projects.**[a]

| Project | Capacity (MW) | Capacity Factor | Installed Cost ($/kW) | O&M Costs | Project Lead Time (Years) |
|---|---|---|---|---|---|
| Geothermal | 18 | 0.77 | 2500[b] | 3% of Power Plant Cost; 5% of Field Cost | 2 |
| Gas-fired Industrial Cogeneration | 75 | 0.92 | 730 | 7% of Capital Cost | 1 |
| Coal-fired Industrial Cogeneration | 75 | 0.85 | 970 | 4% of Capital Cost | 2 |
| Wind Turbine | 0.75 | 0.25 | 1640 | 10% of Annual Revenues | 1 |
| Small Hydroelectric | 2.2 | 0.49 | 2910 | 5% of Annual Revenues | 2 |
| Electricity from Wood Waste | 10 | 0.70 | 1440 | $270,000/yr plus $.015/kWh | 1 |

[a] Data provided by project developers on a confidential basis.

[b] Based on capital costs of 45.1 million, which excludes transmission costs. The power plant alone has an installed cost of $1400/kW.

The expected capacity factor is one performance indicator and can be defined as:

$$Capacity\ factor = \frac{Electricity\ Production}{Max.\ Potential\ Output\ *\ 8760\ hours} \qquad [1]$$

The cogeneration projects have an expected capacity factor of 85-92%, much higher than that obtained by the renewable energy projects. The large-scale industrial cogeneration projects are the least capital-intensive of the technologies with an installed cost per kilowatt (kW) of $700-$1000. Wind turbines and the electricity from wood waste project have an installed cost of approximately $1400-1600 per kilowatt while the small hydroelectric project is the most capital-intensive technology at $2900/kW. The time period from when the limited partner/corporation contributes equity and the plant begins commercial operation is defined as the project lead time. Lead times typically range between one and two years. A more detailed description of each project is provided below.

## 2.1 Geothermal Steam Power Generation

This project is an 18 MW generator driven by geothermal steam from a major Western U.S. geothermal resource area in initial phases of development. The resource potential at this field is large, and the quality of the resource is sufficiently good to attract major investors. The only other comparable resource in the United States is the Geysers in Northern California, where electric generating capacity will eventually reach the 2000 MW level. This resource may eventually support at least 1000 MW of electrical generation. The main obstacle to development is the remote location of the resource with respect to existing transmission facilities.

The estimated total capital cost to develop this project is $55.1 million. The principal cost components include $15.4 million to develop the geothermal steam field, including the producing wells, injection wells and the steam gathering system, $25.2 million for the cost of the power plant, and $10 million for transmission costs. Projects at less remote sites would not have to bear transmission costs. However, in this case, there would be no project without the developers building a line to connect with the utility grid. The estimate for this cost assumes that other developers will share in the expenses. Operations and maintenance costs are three percent of power plant cost plus five percent of field cost in the first year, escalating at the rate of inflation. Other costs include an annual charge of three percent of revenues for overhead and royalty payments. This project is expected to have a two year lead time, due partly to the fact that it is necessary to develop the geothermal steam supply before financing for the power plant can be secured.

### 2.2 Cogeneration Projects

As late as the 1940's, industrial cogeneration accounted for a significant fraction (18 percent) of all U.S. electric power (OTA, 1983; EIA, 1983). Cogeneration market share slipped steadily during the post World War II era (5 percent by 1975). In the late 1970's, interest in and legislative support for cogeneration increased. Favorable laws were enacted such as the Crude Oil Windfall Profits Tax Act and the Public Utilities Regulatory Policies Act, which, among other provisions, required that electric utilities purchase cogenerated electricity at avoided cost.

The cogeneration market is large, complex, and diversified, and cannot be characterized by one prototypical project. For example, Hagler, Bailly and Company (1982) developed seven generic cogeneration plants in an attempt to represent the spectrum of industrial cogeneration projects. Projects were delineated based on such factors as choice of fuel, technology, and plant size (from 20 to 300 MW). We have selected two projects that reflect significant cogeneration market segments: 1) large scale gas turbine cogenerator and 2) large scale coal-fired cogeneration.

#### 2.2.1 Large-scale Gas Turbine Cogenerator

This project is a 75 MW gas-turbine generator coupled to a waste-heat recovery boiler that produces process steam for industrial use. This configuration is essentially the General Electric "frame-7" module which has been installed in several recent projects. One such project is the 300 MW Kern River Field project in Kern County, California where the steam is used for enhanced oil recovery (Williams, 1985). This project is just four GE "frame-7" units. Similar projects are proposed or under construction at facilities in the food processing and petrochemical industries (Tuvell et al, 1985).

The gas turbine projects produce a high proportion of electricity relative to process steam, compared to steam turbine cogeneration projects that are fueled by coal. Gas turbine configurations are chosen where the value of electricity is great, typically in California and Texas. The variation of useful heat to power output can vary by more than a factor of three for these type of projects (Hess et al, 1983). In this analysis, we assume that process steam output is 150 million Btu (MBtu) per hour, toward the lower end of this range. The fuel input requirement for the "frame-7" module is 700 MBtu/hour. This information can then be used to calculate the net electric heat rate (NEHR), an indicator of the efficiency of the overall process. NEHR is defined as:

$$NEHR = \frac{Fuel\ Input - Process\ Steam\ Output}{Electricity\ Output} \qquad [2]$$

To produce 75 MWh of electricity takes 550 MBtu, or 7333 Btu/kWh. The NEHR compares favorably with the most efficient gas-fired utility generation, which have heat rates of about 8500 Btu/kWh.

Annual operations and maintenance costs are estimated to be seven percent of the capital cost in the first year and escalate with inflation. It is assumed that the construction lead time for this project is one year.

### 2.2.2 Large-scale Coal-fired cogeneration

This system is a pulverized coal-fired steam/electric plant designed for a nominal electrical output of 75 MW. The proposed project will supply steam to a textile plant located in the Southeastern U.S. The most significant expenses include fuel cost ($11.2 million), rail transport ($6.1 million), operations and maintenance ($3.1 million), and interest on debt. In year 1, the fuel cost including transport is approximately $0.031 for each kilowatt-hour generated. Steam revenues account for approximately 30 percent of total revenues in the coal-fired cogeneration project, a much higher fraction than found in the gas-fired project. Steam demand is estimated at 300,000 pounds per hour with a capacity factor of 91 percent. This project will be financed by a lease arrangement, which we have converted to a debt/equity basis with an equivalent annuity payment.

## 2.3 Landfill Gas Recovery

There are approximately 19,000 active landfills in the United States. It is estimated that approximately 0.4 Quads ($10^{15}$ Btu) per year can be economically recovered using existing technology, although annual production is far lower (3.7 x $10^{12}$ Btu in 1982) at the 14 on-line facilities (Zimmerman et al, 1985; Wilkey and Walsh 1982).* Landfill gas normally has a methane content of 40 to 55% with a heating value of approximately 500 Btu per standard cubic foot (scf), although there are several plants that produce a high-Btu product (1000 Btu/scf) equivalent to natural gas by removing the carbon dioxide. At most existing recovery sites, the raw landfill gas is controlled by covering the landfill with an impermeable layer and withdrawing the gas from wells drilled into the landfill. (Wilkey et al, 1982) Contaminants and particulates are removed from the dehyrated gas. There are three generic types of landfill gas projects: 1) medium-Btu gas for an industrial customer 2) high-Btu gas for a utility and 3) gas produced as input to a 1-5 MW electric generator.

The project selected for this study is under development in Texas and is expected to produce 277,000 MBtu per year of medium Btu methane gas for a nearby industrial user. The project has a capital cost of approximately $1.2 million. Annual operation and maintenance costs are quite high (over $500 thousand in 1987). The project developer estimates that it will take almost 2 years for the plant to reach full production.

## 2.4 Small Scale Wind Turbines

This project is a 75 kW wind turbine generator. These machines are deployed in large numbers (several hundred at a time) to form a "wind farm" that is then interconnected with the utility power grid. Each machine is mounted on a tower and has its own generator. The nameplate capacity is 75 kW, which is the maximum power output at a windspeed of approximately 20 miles per hour. When windspeeds are less than this rated value, power output is correspondingly less.

The costs of this machine were derived from a Prospectus offered by the Arbutus Corporation. These machines have an installed cost of $1600/kW. Project sponsors typically estimate wind turbine capacity factors for this kind of equipment to be approximately 30-35 percent. (EPRI, 1985b) Actual performance has been much lower. For example, in 1984, the highest capacity factor for individual developers in California was 15 percent. (Smith, 1985) While some of this discrepancy may be due to shake-down problems or climate variations, it may also be due to undue developer optimism. We assume a capacity factor of 25 percent in this analysis. Operations and maintenance costs are estimated at 10 percent of annual revenues, a very substantial sum compared to those costs for other renewable technologies. Other costs include an annual fee for land rent at 5 percent of revenues, which also includes developers' fees.

* Development is proceeding at a fast pace as the California Energy Commission lists 25 landfill gas projects that are producing in California alone as of 1985.

### 2.5 Small Hydroelectric

Small hydroelectric power is experiencing a rebirth of interest and investment. (EPRI, 1985a) Historically, relatively small hydro developments (between 500 kW and 15 MW) have been somewhat neglected, although they offer a significant resource. The Army Corps of Engineers site inventory includes about 5300 MW of potential small hydro capacity. The small hydro market is not homogenous, as there are significant variations in characteristics of the resource. For example, in the New England region, many of the sites are at retired hydropower facilities and the flow at the site is not controllable (run-of-river). In contrast, in California, most of the sites have dams but no existing hydropower facilities. (EPRI, 1985a)

The project chosen for analysis is a 2.2 MW hydroelectric facility in New York State. It is typical of "run-of-river" hydroelectric projects and would operate using flows historically available at the diversion point. The typical seasonal runoff pattern is one of concentrated winter and spring floods and meager summer flows. The expected capacity factor is 49 percent, which we believe approximates the mean of the performance distribution for this type of project. For example, in California, developers have found that a capacity factor in the 50 percent range is required for a feasible project, unless capacity has some value. (CH2M Hill, 1984) Capital costs are high, with an installed cost per kilowatt of approximately $2900. Operating and maintenance costs are estimated at 5 percent of total project revenues.

### 2.6 Electricity from Wood Waste

Resource availability and the avoided cost price are key constraints on the use of biomass to produce electricity. Biomass projects located in the Northeast and North Central states typically rely on wood chips from large forest "thinnings", while those in the Pacific Northwest or California utilize a captive source, e.g., a paper or lumber mill. Projects in the Southeast are hampered by low avoided costs, although there are plentiful wood resources in the region. We evaluated a New Hampshire project that has a 10 MW steam boiler fired by wood chips. It is representative of similar projects in New York State. New York State prices for power were used because we felt that they were closer to the average avoided cost price, although they are lower than prices available for New Hampshire projects. The plant has a capacity factor of 70 percent and a heat rate of 12150 Btu/kWh. Initial fuelwood costs are estimated at $2.22/MBtu and are based on the productivity levels of work crews (125 green tons/day), the energy content of the wood (8.5 MBtu/ton), and price paid for wood thinnings ($18/ton). Operation and maintenance costs are calculated based on plant output ($0.015/kWh) plus a fixed cost of $270 thousand.

## 3. MARKETS AND FINANCING

### 3.1 Price for Power

Renewable energy and cogeneration projects have flourished in regions of the country in which electricity is highly valued. The avoided cost prices for energy and capacity for selected projects are shown in Table 2. We did not consider the effect of the new tax structure on utility avoided costs because it it is indeterminate and because most of the selected projects have signed fixed contracts (in many cases project financing is contingent on a fixed contract). Avoided cost prices for the renewable energy projects range between $0.068/kWh and $0.086/kWh (including energy and capacity). Prices offered to cogenerators are somewhat lower.

**Table 2. Avoided cost prices for selected projects.**

| Project | Energy Payments ($/kWh) Year 1 | 1997 | Comments |
|---|---|---|---|
| Geothermal | 0.06 | 0.136 | • SCE Long Run Offer No. 4<br>• Avoided capacity cost is $0.021/kWh each year |
| Gas-fired Industrial Cogeneration | 0.033 | 0.055 | • SCE Long Run Offer No. 4, Option 3 (Indexed to industrial gas prices)<br>• Capacity cost is $0.0187/kWh<br>• DRI Industrial gas prices to 1990; 6% escalation thereafter |
| Coal-fired Industrial Cogeneration | 0.043 | 0.074 | • On-peak prices<br>• Capacity cost is $0.0176/kWh |
| Wind Turbine | 0.057 | 0.136 | • SCE Long Run Offer No. 4<br>• Avoided capacity cost is $0.011/kWh in first year |
| Small Hydroelectric | 0.08 | 0.133 | • Avoided cost prices from New York |
| Electricity from Wood Waste | 0.07 | 0.122 | • Avoided cost prices from New York<br>• Avoided capacity cost is $0.016/kWh (1986) rising to $0.028/kWh (1997). |

Electricity produced from three of the projects will be sold in California. The predominance of development in California is due both to the inherently large value of electricity in this region, but also to the favorable pricing policies adopted by the California Public Utilities Commission (CPUC). The most important of these policies is the Long Run Interim Standard Offer SO4 developed in the summer of 1983. This offer amounts to a ten-year fixed price for power that can be taken in either escalating or levelized form. After fall 1984, the Standard Offer contracts were not available to cogeneration projects over 50 MW; no size limitation was placed on geothermal projects aside from the requirement for QF status. In April 1985, Standard Offer SO4 was suspended by the CPUC. We have used SO4 provisions for the gas-fired cogeneration and geothermal project, even though the offer has been suspended, because project developers typically negotiate a price formula with the utilities that closely resembles the standard offer. In addition, there are a tremendous backlog of projects that have signed this offer and are in various stages of development; hence SO4 provisions will still govern avoided costs for a significant fraction of the QF market.

The Long Run Interim Standard Offer includes provisions for payment of avoided capacity. The value of capacity is based on the cost of a combustion turbine. It is paid to small power producers based on their delivery at the time of the greatest need on the utility grid. Sellers have the option of signing long-term contracts for capacity (up to 30 years) and can be paid on a levelized basis. To determine the capacity payment for a particular project, one must specify the start date, the contract length, and the load characteristics of the project.

The CPUC standard offer also includes an option, called the "heat rate" factor, which is particularly important for cogenerators. The utility promises payment based on its future cost of natural gas converted at a certain efficiency or heat-rate that corresponds to the prices in the fixed price offer. For example, the rates offered by Southern California Edison (SCE, 1985) under these terms fluctuate in the vicinity of 8800 Btu/kWh. We use a forecast of industrial gas prices through 1990 produced by Data Resources Incorporated (DRI, 1985) to estimate utility gas costs.

Pricing for cogeneration projects is complex because there are so many possible configurations, and the choice of configuration is based on the expected relative values of steam and power. Typical practice is to value steam at the cost of fuel adjusted for the conversion losses in the conventional boilers that would be supplying steam. In some situations there are additional benefits of cogeneration in terms of reduced operations and maintenance expense on-site. We have not included this additional benefit, since it is very site specific.

### 3.2 Project Financial Arrangements

Project specific analysis, even of a generic nature, must take account of financing arrangements. At a minimum, it is necessary to decide the investor's tax status and to specify the degree of leverage. In this study, we ignore leasing arrangements.

The wind, wood waste, and small hydroelectric projects are financed by a limited partnership arrangement. A general partner typically organizes and manages the investments using equity investment from limited partners. The limited partner receives cash and tax benefits, both of which are accounted for in his personal income tax form. Thus, the value of depreciation allowances and operating losses are a function of the marginal tax rate of the investor. We have assumed that the limited partners are high income individuals whose marginal tax rate is at the maximum. Limited partnership analysis typically assumes an essentially infinite tax liability for the equity investor. In fact, such investors are increasingly affected by the alternative minimum tax which limits the availability of tax benefits. This complicating factor is not accounted for in our analysis.

Limited partnerships are more attractive as the fraction of equity financing is decreased. The increased leverage provides larger tax benefits for the same amount of equity investment. However, these projects also operate under a cash flow constraint. The project must generate enough cash to pay all out-of-pocket expenses including debt service. These expenses cannot be paid if there is too much debt. The project then either defaults on its debt, or the equity investor must make up the difference with cash contributions. Our analysis has assumed the maximum level of leveraging which is also consistent with lenders' requirements to have a high likelihood of debt repayment.

The cash flow constraint interacts with uncertainties affecting project revenues. For example, in the wind turbine project, if the capacity factor is higher (e.g. 35%), then a greater degree of leverage can be tolerated; and conversely. The 25% capacity factor used in the prototypical wind project implies an upper limit on debt of approximately 50%.

Three of the projects (geothermal, large scale industrial cogeneration, and landfill gas) are corporate investments. Corporate financing traditionally relies on substantially less leverage than limited partnerships. It is difficult to impute a particular debt fraction for a project that is financed by a corporation other than what the debt fraction of the corporation is as a whole. The debt-equity ratios of these projects were taken from actual project data and range from 0 to 70 percent debt (landfill gas and geothermal projects respectively). The corporate decision maker is likely to place as much weight on the unleveraged internal rate of return of after-tax cash flows as on the leveraged rate. Consequently, we also calculated the internal rate of return of after-tax cash flows for each corporate project assuming no debt (100% equity financing).

# 4. SUMMARY OF PRESIDENT'S TAX PROPOSAL AND CURRENT LAW

## 4.1 Depreciation

The Accelerated Cost Recovery System (ACRS) was established by the Economic Recovery Tax Act of 1981 and governs depreciation allowances for tangible property. Machinery and equipment used by small power producers can be recovered over 5 years. The ACRS rules provide for deductions of 15% in the first year, 22% in the second and 21% in each of years three through five. These percentages apply to the "depreciable basis" of the asset, which is the capital cost less one half the dollar value of any federal tax credit claimed. There is an alternative procedure under which credits are reduced and depreciable basis is not, but this is not typically used.

The proposed Capital Cost Recovery System (CCRS) alters ACRS in several important respects. CCRS features six asset recovery classes and allows cost recovery on the inflation-adjusted cost of depreciable assets rather than the original cost. Renewable energy and cogeneration projects are placed in recovery class 5, which includes "plant and equipment used for the generation, transmission, and distribution of electricity, gas and other power." (Teasury Department, 1985, pg. 143). The expected lifetime in Class 5 is 11 years. Under CCRS, the depreciable basis of an asset is increased to allow for inflation effects, thereby increasing annual depreciation allowances as inflation increases. We assumed an annual inflation rate of five percent over the entire analysis period, which allowed us to use the depreciation allowances given in Table 7.01-10 (Chapter 7) of the President's Tax Proposal. All other costs are consistent with this inflation rate.

## 4.2. Tax Credits

All capital investment currently qualifies for a 10% investment tax credit (ITC). The President's Tax Proposal would repeal the ITC. In addition, there are special tax credits available for business firms to encourage investments in conservation and renewable energy technologies. These incentives can be grouped into three major categories: 1) Energy Investment Tax Credits 2) Production Tax Credits and 3) Alcohol Fuels Credit. Energy investment tax credits range between 10-15 percent of the capital investment depending on the renewable energy technology (see Table 3).

**Table 3. Current federal and state energy tax credits.**

| Project | Federal | State |
|---|---|---|
| **Energy Investment Tax Credits** | | |
| Geothermal | 15% | |
| Wind Turbine | 15% | California - • 25% of system cost |
| Small Hydroelectric | 11% | New York - • 6% of system cost |
| Electricity from Wood Waste | 10% | |
| **Production Tax Credits** | | |
| Landfill Gas | • $3/barrel of oil equivalent • adjusted for inflation • credit phases out as average well-head price of domestic crude oil rises from $23 to $29 per barrel | |
| **Alcohol Fuels Credit** | | |
| Alcohol Fuels | • $0.60/gal. tax credit is provided for alcohol used in gasohol mixtures with gasoline or diesel fuel | |

Gas produced from biomass (i.e., the landfill gas project) qualifies for the production tax credit of up to $3/barrel of oil equivalent. This credit is linked directly to the average wellhead price of domestic crude oil. All energy investment tax credits expire on December 31, 1985, while production incentives for alternative fuels and alcohol fuels remain in place beyond 1990. The President's Tax Proposal would allow the business energy investment tax credits to lapse and repeal the production and alcohol fuels credit.

Certain capital costs do not qualify for tax credits. For example, in the geothermal project, costs which are expensed do not qualify for tax credits of any kind (see sec. 3.3 below). Capital costs associated with the development of transmission facilities ($10 million) do not qualify for the ETC although they are eligible for an investment tax credit.

A number of states also have enacted state tax credits for certain renewable technologies. The California tax credits for solar energy are particularly important. It provides for a 25 percent credit against state income taxes for wind turbines and solar-electric technologies. (CEC, 1983) Unlike the federal credits, half of the state credit can be used in each of the first two years. New York allows a six percent tax credit on capital expenses for small hydroelectric projects.

### 4.3 Deductibilility of State Taxes on Federal Return

The President's Tax Proposal would repeal the deductibility of state and local taxes. Under current law, state income taxes are an itemized deduction on an individual's federal tax return. In effect, this means that the value of state credits to the investor is reduced by the value of the lost deduction. This provision complicates the financial analysis of those projects which include state tax credits. To represent this interaction, the state credits are discounted by one minus the highest applicable tax rate for individuals (e.g. 50 to 35 percent depending on the scenario under consideration). The value of the state tax credits increases when the deductibility of state taxes is revoked, because the discount factor is removed in those cases where state tax deductibility is assumed.

### 4.4 Personal and Corporate Income Tax Rates

The President's Tax Proposal would eliminate the present system of 14 personal income tax rate brackets ranging from 11 to 50 percent and replace it with a three-bracket system with tax rates of 15, 25, and 35 percent. We assume that the typical investor is a high income individual whose marginal tax rate is at the maximum. The highest corporate income tax rate would be reduced from 46 to 33 percent under the President's proposal.

### 4.5 Intangible Drilling Costs and Depletion Allowance

Provisions of the President's Tax Proposal that relate to intangible drilling costs (IDC) and depletion allowances will have impacts on geothermal projects. In some technical respects, a geothermal plant resembles an oil or gas drilling project; thus, a fraction of the projects' costs are allocated under the provisions of oil and gas tax law. The depletion allowance is considerably less important than the expensing of intangible drilling costs in terms of financial impact. This is due principally to questions of timing. Depletion allowances are not given if pre-tax income (PTI) is not positive. With any form of accelerated depreciation, pre-tax income tends to be negative in the early years of a project. Only when PTI becomes positive is the depletion allowance relevant. When the investors cash flows are discounted to calculate the internal rate of return, items in the early years are particularly important, especially at the kinds of rates that we are interested in, i.e. in excess of 20%. For this reason, the expensing of intangible drilling costs is important because it involves the lead time period before commercial operation and the generation of revenues.

Three cost categories are eligible for expensing as intangibles. These are the cost of producing wells, injection wells and the surface gathering system. Injection well costs can be 100% expensed, while the other costs are 70% expensed. In the geothermal project, $11.4 million out of $15.4 million is eligible for expensing as intangibles. The timing of these costs is typically in the two years before commercial operation of the power plant.

### 4.6 Alternative Minimum Tax for Corporations

The President proposes to revise the corporate minimum tax and institute an alternative minimum tax. Alternative minimum taxable income would be computed by adding to taxable income the excess of preference items over $25,000, subtracting net operating loss carryovers, taxed at a 20 percent rate. Excess depreciation allowances and eight percent of intangible drilling costs incurred in the current year (in the case of the geothermal project) are items of tax preference included in the corporate-financed projects. Excess depreciation is calculated as the difference between CCRS rates and "economic depreciation" as embodied in the RCRS depreciation schedules proposed by the Treasury in November 1984. (Office of the Secretary of the Treasury, 1984; Hulten and Wykoff, 1981) It can not exceed 25 percent of interest payments.

## 5. RESULTS

### 5.1 Methodology

Our approach attempts to simulate the criteria investors would use when deciding to undertake renewable energy or conservation projects. Spread sheets of project revenue, cost and tax data were developed for each selected project (see Appendix A). The spread sheet includes an abbreviated income statement, sources and uses of funds statement, and projections of investors' return. The cash flows are projected out to 1997, the last year for which we have a reliable forecast of electricity prices. Key financial indicators include funds available for dividend, the internal rate of return (IRR) on equity, and the project IRR (i.e., assumes 100% equity). Sources of funds include pre-tax income (given as revenues minus expenses), depreciation, and equity and debt funds. Funds are needed to repay the debt and pay for the capital equipment. The net of sources and uses is Funds Available which represents the cash flow constraint on project financing; it must be positive. The internal rate of return is calculated from the after-tax net equity cash flows (ATNEC) in each year. ATNEC includes:

$$ATNEC = (PTI + DEPREC) + TAX - EQFUNDS - DEBTPAY \qquad [3]$$

where

PTI is pre-tax income,
DEPREC is depreciation*,
TAX is tax savings or liability,
EQFUNDS is equity funds,
and DEBTPAY is the principal repayment (Kahn, 1984).

By convention, negative taxes are assumed to be tax savings to investors from net operating losses generated by the project.

We also calculate an all-equity return which replaces debt funds with equity and removes debt service expenses and their attendant tax benefits. We refer to this resulting cash stream as the Project Cash Flow and compute a Project IRR from this stream.

### 5.2 Rate of Return

For each project, we estimate the investor's after-tax internal rate of return (IRR) under several conditions:

- current law (before December 31, 1985)
- current law (after 1985) and
- the President's Tax Proposals.

The impact of the President's Tax Proposals on the investor's leveraged rate of return are presented for individual provisions phased in sequentially and as a complete package (see Table 4). It is worth noting that the order in which these are modeled affects the individual results. For projects financed by limited partnership, the investment tax credit (ITC) is removed first; next, the change in depreciation schedules is examined; then, the impact of lower individual tax rates is included, and finally, where relevant, the impact on project returns of non-deductibility of state taxes is explored. For projects that are corporate investments, the ITC is removed and corporate tax rates are lowered; next, the change in depreciation rates is analyzed; and then the impact of the alternative minimum tax on project returns is estimated.

The expiration of energy tax credits has a significant effect on all of the projects that receive them: wind, small hydroelectric, electricity from wood waste, and geothermal. The elimination of the energy tax credit causes a decline in the IRR which ranges from seven percent in the wood project to 34 percent in the wind project. The cogeneration projects are not affected by the expiration of the energy tax credits, since they do not receive them. Therefore, their rates of return would be unchanged before and after 1985.

Landfill gas projects forego the energy tax credit in lieu of the more important alternative fuel production credit (AFPC). The repeal of the AFPC alone has a very adverse impact on the landfill gas recovery project, as evidenced by the drop in the rate of return from 27.5 to 8.8 percent. This project is analyzed on an all-equity basis. The sponsor's minimum return requirement is 15 percent on this basis, hence the project is no longer viable.

To summarize, the President's Tax Proposal reinforces the expected short term decline in renewable energy project profitability. Highly capital intensive projects (e.g., with installed costs per kilowatt above $2500), such as geothermal and small hydroelectric, suffer the most under the President's proposal. However, a geothermal project unburdened by the need to provide transmission facilities would fare somewhat better. The IRR on equity for this project is 50 percent under current law, decreasing to 17 percent under the President's proposal. Rates of return

* Depreciation is included in ATNEC for cash flow purposes.

**Table 4. Rate of return on equity for selected projects.[a]**

| | Geothermal[b] | Gas-fired Cogeneration | Coal-fired Cogeneration | Landfill Gas[c] | Wind | Small Hydro | Wood - Electric |
|---|---|---|---|---|---|---|---|
| Current Law | 0.39 (0.54) | 0.41 | 0.40 | 0.28 | 0.47 | 0.27 | 0.26 |
| Current Law after Dec. 31, 1985 | 0.23 (0.33) | 0.41 | 0.40 | 0.28 | 0.14 | 0.14 | 0.20 |
| No AFPC[d] | | | | 0.09 | | | |
| No ETC, No ITC[e] | 0.13 (0.25) | 0.29 | 0.26 | 0.09 | 0.07 | 0.06 | 0.15 |
| No ETC, No ITC, CCRS instead of ACRS | 0.13 (0.20) | 0.25 | 0.28 | 0.10 | 0.08 | 0.08 | 0.14 |
| CCRS + Alt. Min. Tax | 0.09 (0.17) | 0.24 | 0.27 | - | | | |
| CCRS, Personal Tax Rate of 35% | | | | | 0.08 | 0.06 | 0.15 |
| No ETC, No ITC, CCRS, Non-deductibility of State Taxes | | | | | 0.12 | 0.07 | |
| Elimination of State Tax Credit | | | | | 0.03 | | |
| President's Tax Proposal | 0.09 (0.17) | 0.24 | 0.27 | 0.10 | 0.12 | 0.07 | 0.15 |

[a] The geothermal, cogeneration, and landfill gas projects are corporate-financed while the wind, small hydroelectric, and electricity from wood waste projects are financed by limited partnerships.

[b] IRR in parentheses is for geothermal project without transmission costs.

[c] All equity

[d] Assumes Alternate Fuels Production Credit (AFPC) is repealed.

[e] Corporate tax rate is reduced from 46 to 33% for geothermal, cogeneration and landfill gas projects.

**Table 5. Project rate of return for selected projects.[a]**

| | Geothermal[b] | Gas-fired Cogeneration | Coal-fired Cogeneration | Landfill Gas | Wind | Small Hydro | Wood - Electric |
|---|---|---|---|---|---|---|---|
| Current Law | 0.16 (0.20) | 0.24 | 0.18 | 0.28 | 0.16 | 0.13 | 0.18 |
| Current Law after Dec. 31, 1985 | 0.13 (0.17) | 0.24 | 0.18 | 0.28 | 0.11 | 0.10 | 0.15 |
| No AFPC[c] | | | | 0.09 | | | |
| No ETC, No ITC[d] | 0.12 (0.15) | 0.22 | 0.18 | 0.09 | 0.08 | 0.08 | 0.12 |
| No ETC, No ITC, CCRS instead of ACRS | 0.16 (0.15) | 0.18 | 0.17 | 0.10 | 0.08 | 0.080 | 0.12 |
| CCRS + Alt. Min. Tax | 0.11 | 0.17 | 0.16 | - | | | |
| CCRS, Personal Tax Rate of 35% | | | | | 0.09 | 0.09 | 0.13 |
| No ETC, No ITC, CCRS, Non-deductibility of State Taxes | | | | | 0.12 | 0.09 | |
| Elimination of State Tax Credit | | | | | 0.06 | | |
| President's Tax Proposal | 0.11 | 0.17 | 0.16 | 0.10 | 0.12 | 0.09 | 0.13 |

[a] The internal rate of return of after-tax cash flows is calculated for each project assuming no debt (100 percent equity).

[b] IRR in parentheses is for geothermal project without transmission costs.

[c] Assumes Alternate Fuels Production Credit (AFPC) is repealed.

[d] Corporate tax rate is reduced from 46 to 33% for geothermal, cogeneration and landfill gas projects.

on equity for the five renewable energy technologies are in the 7 to 15 percent range under the President's proposal. It is unlikely that projects with such returns could attract capital since the IRR on equity is at or below the cost of debt. However, if the President's proposal results in lower interest rates, equity returns would increase somewhat, and therefore some of these projects would become viable. We make no estimate of this effect. The cogeneration projects are impacted the least by the President's proposals. They still have rates of return in the 24-26 percent range, due in part to their lower capital intensity. This implies that cogeneration would dominate the small power market even more under the President's proposals than it currently does.

Not surprisingly, the project (or unleveraged) rates of return are much lower than rates of return on equity under current law before and after 1985 (Table 5). It is interesting to separate the effects of leverage from the underlying all-equity rate of return. The all-equity return is a better indicator of the fundamental economics of the projects. It also allows a more natural comparison of projects without the distorting effects of leverage. It should be noted that when the all-equity return is less than the cost of debt (adjusted for tax benefits), leverage is counterproductive, i.e., the levered return is less than the unlevered return. In general, relative results using both measures are consistent. Cogeneration remains the most attractive of all projects. Since it is the levered return that is the developer's decision variable, we place most emphasis on this measure in our analysis.

It is instructive to examine the results from several projects in more detail. The relative impact on investor returns of various aspects of the President's Tax Proposal will be discussed drawing upon examples from the wind, cogeneration, and geothermal projects. The discussion will focus on several issues: 1) the value of the tax credits, 2) the impact of changes in depreciation rules and schedules, 3) the treatment of pre-commercial cash flows, 4) the value of expensing intangible drilling costs, and 5) the alternative minimum tax.

### 5.3 Value of Tax Credits.

Under current law, wind turbines and geothermal projects without transmission costs have the highest rate of return (IRR) on equity of the selected projects (47 to 54 percent). Wind project returns are driven principally by tax benefits (both federal and state) which return almost 75% of the equity investment in the first year (Table 6).

**Table 6. Ratio of Tax Credits to Equity Funds.**

| Project | Current Law | Current Law after Dec. 31, 1985 | President's Proposal |
|---|---|---|---|
| Geothermal | 0.57 | 0.26 | 0.00 |
| Large Industrial Gas-fired Cogeneration | 0.25 | 0.25 | 0.00 |
| Wind Turbine | 0.75 | 0.46 | 0.50[a] |

[a] Includes the California State Tax Credits.

The project's cash flow is quite weak in terms of its expenses, reflecting the high degree of leverage that is typical of wind projects relative to their debt capacity. At the end of 1985, the business energy tax credit for wind expires and the IRR would decline to 14.0 percent. The after-tax net equity cash flow is very negative in years 1 and 2 (around -$15000), hence, relative to current law, net costs to the investor are increased in these years (Figure 1). An investor would recover roughly 46 percent of his equity through tax credits after 1985 when the federal energy credits expire. The poor cash flow is more burdensome without the large tax benefits. The relative impact of **federal** tax credits can be seen most clearly in the geothermal project, as the ratio of tax credits to equity funds declines from 57 percent under current law to 26 percent under current law after 1985.

### 5.4 Impact of Depreciation

The net present value of depreciation allowances (at a 15 percent discount rate) are roughly equivalent under current law (ACRS) compared to the President's proposal (CCRS), although the proposed changes alter the pattern of cash flows in a significant way. For example, in the wind project, under current law, investor returns are negative in years 7 through 11 (Figure 1). This is due to the end of depreciation deductions that shelter income and to the high debt repayment burden. Given this uneven pattern of returns, investors might be inclined to sell the project in year 6 of commercial operation or even give it away to a non-profit entity and claim a charitable deduction. The CCRS rules spread depreciation allowances for class 5 assets over 11 years, hence investor returns are negative only in year 1 of commercial operation. As depreciation rates are lowered, the variation in annual earnings is reduced. This generally means higher earnings in the later years of production, but less value to the investor initially.

### 5.5 Importance of pre-commercial cash flows

It is important to note that the IRR is quite sensitive to the exact timing of pre-commercial equity payments and the availability of tax credits in projects with lead times of only one to two years. For example, for the gas-fired cogeneration project, we have assumed that 30 percent of the equity contribution is paid in the year before operation of the facility (1984) and that the 10 percent investment tax credit (ITC) is claimed in Year 1 of operation (1985). The pre-commercial equity payment results in a $6.6 million deficit in the 1984 After Tax Net Equity Cash Flow (ATNEC). If the equity contribution in the year before operation is increased from 30 to 50 percent of the total, the IRR declines by five percent (Table 7). However, if the project were to elect the option of taking a 30 percent "progress payment" on ITC in the pre-commercial year, then the IRR is three percent higher than the base case because the ATNEC in Year 1 is less negative.

**Table 7. Impact of pre-commercial cash flows on the IRR.**

| Gas-fired Cogeneration Project | IRR on Equity | Comments |
|---|---|---|
| Basecase | 0.412 | • 30% of equity contributed in year before commercial operation<br>• ITC in year 1 of commercial operation |
| Case 1 | 0.362 | • 50% of equity contributed in year before commercial operation |
| Case 2 | 0.445 | • 30% of equity contributed in year before commercial operation<br>• 30% of ITC as progress payment |

### 5.6 Value of expensing intangible drilling costs

In the geothermal project, the intangible drilling costs (IDC) are modelled as equity cash flows, with over 75% of these costs occurring before any revenue is produced. Expensing these costs reduces the burden of the lead time on the investor. The power plant and remaining facilities are financed with construction loans whose interest cost is capitalized into the permanent financing when the plant becomes commercial and sells electricity.

We analyzed a hypothetical case in which intangible drilling costs are not expensed in order to quantify its impact. Two effects are observed. First, there is no reduction in *negative* After Tax Net Equity Cash Flow during the project lead time due to the tax benefit of expensing. Offsetting this to some degree is the increased depreciation basis of $11.0 million that had been previously expensed and increased tax benefits due to higher federal tax credits. The net of these two effects is slightly positive, the IRR increases by less than one percent, although the geothermal industry might be concerned about the year to year cash flow effects if IDC was eliminated (e.g. after tax net equity cash flows are worse in the project's initial years).

### 5.7 Alternative Minimum Tax

An alternative minimum tax would be imposed on excess depreciation and the expensing of IDC's (see section 4.6) as part of the President's Proposal. The incremental impact of the alternative minimum tax is to reduce returns on equity by one to three percent respectively in the cogeneration and geothermal projects (see Table 4).

## 6.0 REPRESENTATIVE PROJECTS AND MARKET FORECASTS

The analysis of the selected projects summarized in the previous section gives a precise characterization of the change in returns associated with different tax regimes. These changes do not constitute a forecast of the market for such projects. There are many factors that must be accounted for before such a translation is possible. In this section we will review those factors and illustrate the requirements for making the appropriate estimates.

We adopt a "hurdle rate" orientation toward this problem. This means that we seek to establish a linkage between project returns and the decision to invest. If a project meets some specified minimum rate of return target, the "hurdle rate," then we assume that investment will occur. There are many subtleties to this approach. Among the most formidable is the aggregation problem. If we are looking at projects in detail one at a time, how can one ever hope to cover the population of such potential projects? There is obviously a resource limit in the case of many renewable energy projects. Small hydro, geothermal and landfill gas are the obvious examples. But even where these limits are less binding, there is a distribution of project characteristics that must be dealt with in any forecast methodology.

In addition to the variability in project characteristics, there are clearly various exogenous sources of risk that can affect the returns of an energy project. These include deviations of input fuel costs or output product prices from their expected level. Both endogenous project variability and the exogenous sources of risk can be compared and quantified by expanding our notion of project returns to a more general concept involving a distribution of returns on a family of similar projects.

In section 6.1, we introduce such a concept and describe a procedure for using it. This procedure can be thought of as a way to organize systematically the kind of sensitivity analysis that is normally done for project evaluations. We then apply this approach to two of our typical projects, wind turbine generators and large scale gas-fired cogeneration. It is particularly important to take account of technical progress for some of the renewable projects. In section 6.3, we examine this issue in the context of timing issues associated with wind turbine generators. Finally, in section 6.4, we discuss how the hurdle rate concept should be incorporated into a market forecast. This discussion will include such issues as risk and return trade-offs and changes in the hurdle rate due to macro-economic changes.

## 6.1 The Distribution of Returns

To generalize our project specific results, we must take account of the variability of technical and cost characteristics for all projects of a particular type. Thus, for example, although the selected gas-fired cogeneration project had an installed cost of \$733/kW and produced approximately 150,000 lbs/hour of steam, there are other such projects with different parameters. In section 6.2, we will consider a project of this type that has a higher capital cost (\$1000/kW) and a higher steam output (250,000 lbs/hr). In both cases, the projects serve the same kind of loads, steam generation for enhanced oil recovery. The principal difference is the incremental capital cost to serve incremental steam requirements. To account for this variation we can treat these configurations as points on a probability distribution.

This approach requires that we assume our typical or representative project is at the mean of the distribution of technical and cost characteristics for that project type. Such an assumption is in keeping with the motivation for selecting these projects. It cannot be argued rigorously, however, that this is the case without an extensive survey and analysis of the market for the project type in question.

To make our approach consistent when considering exogenous uncertainties, we must also assume that our representative project corresponds to the expected value of outcomes. For example, this is a natural assumption in the case of fuel costs in which it is assumed that the best forecast of natural gas prices or fuelwood cost is the expected value of some underlying probability distribution. It is not plausible, however, to apply the probability interpretation to the prices for power that projects receive. The reason for this lies primarily in the financing structures that are commonly used for such projects. Whether the framework is corporate or limited partnership, these projects typically borrow a substantial part of their capital requirements. Lenders require a fixed price power sales contract in these situations, or at least a stable form of price indexing (Danziger and DeVito, 1984). The whole purpose of this requirement is to eliminate the risk of changing prices. This means we cannot really examine the output price risk in our analysis, because it is structured out of existence in these arrangements. There is one slight exception to this that we will consider in section 6.2 involving a price indexing scheme for gas-fired cogeneration.

To construct a distribution of project returns requires that we have estimates of the distributions of technical characteristics and exogenous uncertainties. These distributions can be combined by a Monte Carlo procedure such as that used by Greenberg (1980). Such procedures are complex and can be controversial. We will instead rely on some rather rough approximations, whose purpose is to allow us to organize and interpret sensitivity analysis systematically.

It is common in sensitivity analysis to consider "high" and "low" values of important variables in addition to a "base case." The natural probability interpretation of this procedure is to assume that the base case corresponds to the distribution's mean value, and that the high and low cases represent one standard deviation above and below that mean value. We would like to combine more than one distribution, hence, it is necessary to have an aggregation procedure. This amounts to a constraint on our underlying probability distributions. If the calculation of returns were just an additive process, then the entire problem could be cast easily in the framework of normal probability distributions. In this case, the sum (or difference) of two normal variables is itself normal. The variance is the sum of the variances. In the case of products, however, this relationship does not hold. The product of two random variables is typically log-normally distributed. To simplify our method of analysis, it is necessary to appeal to the rough similarity of normal and log-normal distributions in the central region of probability (Bury, 1975, p.279-80).

A final practical point concerns the issue of truncation of the distribution of returns below some threshold of viability. The hurdle rate concept assumes that projects must generate some minimum rate of return or they cannot attract capital. Identifying this rate can be difficult in practice, because it will change over time with macroeconomic conditions. In no case, however, can this rate be less than the interest rate on debt discounted for the deductibility of interest. If the return on equity is less than that rate, the project would be better off without leverage. Even when projects are analyzed on an all-equity basis, the hurdle rate is greater than the tax-adjusted cost of debt. Intuition suggests that the leveraged hurdle rate must be a few percentage points greater than the nominal interest rate on debt. This kind of relationship is often cited in studies of the cost of equity capital for utility ratemaking. For our purposes we assume that the hurdle rate lies somewhere between 15 and 20 percent return on equity capital. A comparable estimate is the 18 percent minimum return used in a recent DOE-sponsored study of solar thermal electric power technologies (Habib-Agahi, 1985).

### 6.2 Sample Estimates

In this section, we consider the distribution of technical characteristics for both the wind turbine and the large scale gas-fired cogeneration projects. A measure of the relative dispersion of returns is obtained through a comparison of these two technologies. We also examine the risk associated with gas prices for the cogeneration project. This risk is complex because it affects both the cost of inputs and the value of outputs. The problem of aggregating the two distributions is discussed for the case of the gas-fired cogeneration project.

#### 6.2.1 Wind Turbine Project

The single most uncertain variable associated with wind turbine technology is its technical performance. How much output can wind turbine machines produce? A related concern is the level of operating and maintenance expense necessary for this equipment. To model these issues, we begin with a base case that reflects current law after 1985. In this case, the IRR on equity is 14 percent (see Table 4). Since this case is arguably already below the threshold of economic viability, it make little sense to sample the lower tail of the performance distribution. That would only result in a project with poorer returns than the base case. Instead, we consider the upper tail of the performance distribution, where equity returns can only increase compared to the base case.

To model the impact of the performance distribution on the IRR, we must estimate the standard deviation of this distribution. It is reasonable to expect that it will be at least as great as the standard deviation of the central station power plant performance distribution. We assume that the standard deviation in this case is roughly equal to the full capacity forced outage rate. For central station plants the full capacity forced outage rate is approximately 15 percent. Interpreting the existing data on wind power production is complicated by the mix of machines that have been deployed. Some of these represent technologies which will not survive. It would not be appropriate to rely on such data to estimate the performance distribution. Instead we rely upon performance data provided by one of the largest California wind producers.

In general, the wind turbine industry has not achieved expected performance levels during its initial years. As a rule of thumb, most wind project partnerships anticipated capacity factors of 30 percent on their machines. The average performance to date has been less than half of that. This average includes projects that will not achieve long-term economic viability, thus, it is more meaningful to examine the best performers. One major developer has achieved production equal to 80% of its expected value in the calendar year 1984 (Galbraith, 1985). This corresponds approximately to the 25 percent capacity factor used in the base case analysis of the wind project. Given this history, it is probably better to view the 30 percent capacity factor goal as an optimistic value. Our technical interpretation is to assume that a capacity factor of 30 percent is likely to be one standard deviation above the mean, rather than the mean value of the distribution; additional operating experience will help refine this estimate. In probability language this means that the standard deviation is five percent in capacity factor (i.e., 30 minus 25) or 20 percent of the expected performance (i.e., 5/25).

Table 8 shows the distribution of returns as the technical performance is varied for the wind turbine project. The standard deviation of returns for each case is calculated as the difference between the base case (i.e., mean) IRR and the resulting IRR. The IRR on equity goes from 14 percent (without the ETC) at 25% capacity factor to 21 percent at 30% capacity factor. This means that the standard deviation of the return is 7 percent and the coefficient of variation (CV) of the returns, defined as the ratio of the standard deviation to the mean, is 0.50. The coefficient of variation provides an interesting statistic for characterizing the distribution of returns of different projects. In this analysis, we do not alter the operations and maintenance (O&M) cost assumption, which links those costs to output levels. This just means that O&M costs are completely variable, which is not unreasonable.

**Table 8. Distribution of rate of return for wind projects.**

| Case | Capacity Factor (%) | $IRR_{eq}$ (%) | St. Dev. of IRR (%) | Coefficient of Variation |
|---|---|---|---|---|
| Base case | 25 | 14 | | |
| "High" performance case | 30 | 21 | 7 | 0.50 |
| High performance case with 30% CV of performance | 32.5 | 24.1 | 10.1 | 0.71 |

It should be noted that the estimate of the CV of returns would be even greater if a larger estimate for the CV of performance is used than the 20 percent assumption tested. Suppose the CV of wind turbine performance were 30 percent. Then the capacity factor at one standard deviation above the mean would be 32.5 percent (1.3*25 = 32.5). Using this performance in our financial model produces an equity IRR of 24.1 percent compared to an IRR of 14 percent in the base case. The CV of returns increases from 0.50 to 0.71 under these assumptions (Table 8).

### 6.2.2 Large Scale Gas-fired Cogeneration

The distribution of technical characteristics which is of most interest for gas turbine cogenerators does not involve performance uncertainties, but rather capital cost and sizing issues. These applications occur in industrial process activities where the precise mix of power production to steam use can be quite variable. In addition, there are site specific considerations that can contribute to substantial variation in installed capital costs. The base case project has capital costs of $733/kW, which are about at the average. For a similar configuration at the 20 MW scale, a recent DOE study cited 1985 installed costs of $775/kW (Hagler, Bailly and Co., 1982). For comparison, a 385 MW gas-fired cogeneration project recently announced by ARCO will cost only $520/kW (Energy Daily, 7/8/85), whereas a 100 MW Tosco project of the same kind will cost $1000/kW (Energy Daily,7/23/85).

Estimates of the total steam potential for this technology normalized by the electrical output are fairly consistent, although actual usage patterns vary substantially among given sites. For example, estimates of steam potential vary between 6.3 MBtu/hour per MW (EPRI, 1984) and 6.6 MBtu/hour per MW (Hagler, Bailly and Co., 1982). However, data on projected utilization for specific projects range from as little as 10 percent of that total potential to as much as 75 percent. Most projects appear to cluster in the range of 30-40 percent utilization of the potential steam generated. The process steam output in the base case project is 150 MBtu/hour for 75 MW or 2.0 MBtu/hour per MW. This is approximately 30 percent of the total potential steam generated.

To examine the effect of sampling the distribution of project technical characteristics upon the distribution of returns, we look at a case that represents one standard deviation above the expected installed cost with a corresponding one standard deviation increase in steam utilization. On the basis of our somewhat limited survey of large scale gas-fired cogeneration projects, we conclude that $1000/kW and 2.7 MBtu/hour per MW represent the appropriate technical configuration. This is equivalent to assuming that a given percentage increase in cost produces the same percentage increase in usable steam. This is plausible in enhanced oil recovery projects where the steam distribution system can typically be expanded to absorb additional steam.

The result from this case is an IRR on equity of 24.3 percent compared to 41.2 percent in the base case (see Table 9). This implies that the standard deviation of returns is 16.9 percent with a corresponding coefficient of variation of 0.41. These results suggest that the returns on gas-fired cogeneration projects are less variable than wind turbine projects (i.e., CV of 0.50-0.70).

**Table 9. Distribution of rate of return for gas-fired cogeneration projects.**

| Case | | Capital Cost ($/kW) | Actual Steam Utilization (MBtu/hr/MW) | Gas Prices ($/MBtu) | $IRR_{eq}$ (%) | St. Dev. of IRR[a] (%) | CV |
|---|---|---|---|---|---|---|---|
| 1) | Base case | 733 | 2.0 | DRI forecast (3.75 in yr. 1) | 41.2 | | |
| 2) | Higher Capital Cost | 1000 | 2.7 | DRI forecast (3.75 in yr. 1) | 24.3 | 16.9 | 0.41 |
| 3) | Lower Gas Price | 733 | 2.0 | 2.50 in yr. 1, esc. at 6%/yr. | 34.0 | 7.2 | 0.17 |
| 4) | Joint Impact of Case 2 and Case 3 | 1000 | 2.7 | 2.50 in yr. 1, esc at 6%/yr. | 15.3 | 18.5[b] | 0.44 |

a Standard Deviation of IRR calculated as the difference between basecase $IRR_{eq}$ and IRR in cases 2 and 3.

b Standard Deviation of IRR estimated as $\sqrt{(SD_{case\ 2})^2 + (SD_{case\ 3})^2}$

Gas-fired cogeneration projects face an important exogenous uncertainty that involves the evolution of natural gas prices. The fluctuations in natural gas prices since 1980 have been substantially more extreme than the movement in crude oil prices. The price trajectory used in our base case is the Summer 1985 DRI forecast for industrial gas rates up to 1990 followed by an average escalation rate of 6% per year. This trajectory starts at $3.75/MBtu in 1985, drops to $3.50 by 1987 and increases thereafter. Current spot market prices for natural gas are as low as $2.50/MBtu.

Both revenues and expenses of the "typical" gas-fired cogeneration project are impacted by lower gas prices due to the provisions of the "heat rate" version of Standard Offer No. 4 for California projects (see section 3.2). Revenues and fuel costs move in tandem. This linkage of revenues and expenses tends to dampen the favorable impact of lower costs and the unfavorable impact of lower revenues. The IRR on equity declines to 34 percent if we assume that the gas price in year 1 is the spot market rate ($2.50/MBtu), which is then escalated uniformly at 6% per year (Table 9). If we assume that this price trajectory represents one standard deviation below the expected gas price trajectory, then the standard deviation of returns is 7.2 percent with respect to the fuel price uncertainty. The low CV (0.17) implies that cogeneration is reasonably robust with respect to fuel prices, at least in the base case.

Finally, we examine the joint effect of both the distribution of project characteristics and the gas price uncertainty. We focus on the lower tail of the distribution of returns (i.e., a case with both low gas prices and high capital costs). The IRR on equity is 15.3 percent under these conditions, suggesting that the project is now only marginally feasible.

It is worth noting that there are some technical complications centering on the question of how to aggregate two distributions. We will use the results of each separate test to estimate the variance of the joint distribution by invoking the standard property of the normal probability function that the variance of the sum of two normal random variables is the sum of the variances of each. In our case this means squaring the standard deviations from the distribution of technical characteristics (16.9%) and the gas price distribution (7.2%). The square root of this sum is 18.5%, which we take to be the standard deviation of the joint distribution. The IRR of 15.3 percent is 25.9 points below the base case IRR (41.2 percent). This is 1.4 standard deviations (=25.9/18.5). Therefore the test case represents the 8 percent cumulative probability level, which is the point on the cumulative normal curve at 1.4 standard deviations below the mean. In other words, we can expect 92 percent of projects to have greater returns than the test case.

### 6.3 Technical Progress and Timing

A factor that we have not yet considered is the impact of technical progress. Forecasting the penetration of renewable technologies depends strongly on expectations concerning technical progress and the increasing value of energy over time. There is reason to believe that the capital costs now quoted in the market for renewable technologies may decline in real terms in the future. As production experience is gained and the size of the market increases, manufacturing costs can be expected to decline. It has also been suggested that current costs may be inflated due to the availability of tax credits. The main evidence of over-pricing is the concessionary credit terms offered by manufacturers of equipment to the limited partners who invest in these projects. This phenomenon is more widespread in real-estate finance, where low mortgage rates are financed by developers who increase prices to compensate for the favorable terms.

To test the effect of technical progress on small scale wind turbine projects, we consider a case in which real costs decline by about 15 percent. Since this would not occur instantaneously, we model it by starting the wind project in 1988, using our 1985 capital costs. Fixing the capital costs of the equipment at 1985 prices is equivalent to a decline in real costs of approximately 15 percent, because all other costs increase with inflation at 5 percent per year between 1985 and 1988. First year electricity prices (in 1988) are now 22 percent higher than for 1985 ($0.083/kWh vs. $0.068/kWh), due to the terms available to wind producers under SCE's Standard Offer No. 4. The IRR on equity for this case is 22.3 percent compared with a return of 14 percent for the project in the base case.

The higher rate of return is due to two effects, the real cost decrease for equipment, and the higher electricity prices from later installation. When each effect is modeled separately, the real cost decrease in equipment costs turns out to be the dominant effect, accounting for approximately 2/3 of the increase in the rate of return.

The results suggest that forecasting technical progress is a key factor in estimating the future market for renewable energy projects. This is an engineering task. It is likely that results will be more favorable for some technologies (e.g., wind turbines and biomass) than others (e.g., small hydroelectric). It is certain that the future market for various renewable technologies will be underestimated if no technical progress is assumed. Because technical progress takes time, the future market for renewable technologies will also be influenced by an expected increase in energy prices. In the wind project example both factors contribute to higher returns. Lower capital costs improve IRR as well as higher unit revenues.

### 6.4 The Hurdle Rate Concept and Market Forecasts

To make the hurdle rate notion operative for the purpose of forecasting, we must take account of the risk and return trade-off and changes of a macro-economic nature. The macroeconomic issues are easier to deal with conceptually. On the average we may assume that if a project meets a certain minimum rate of return goal, then it will attract investment capital. The level of this minimum rate depends on the returns of competing projects. As inflationary expectations and tax laws change, the minimum hurdle rate on the average can also be expected to change. We expect that the hurdle rate on average lies in the 15-20 percent range under current conditions. This is one to six percent above the cost of bank debt. A few years ago, when interest rates were higher, the hurdle rate would have had to be greater than the 15-20 percent range. The administration expects that its tax reform proposals would lead to a further decline in the minimum hurdle rate as the returns available in the market declined with the elimination of tax subsidies. There is no estimate of this effect, which might be considerable.

Changes in the average hurdle rate may or may not effect the risk-return trade-off. A probabilistic interpretation of the hurdle rate concept is a natural way to incorporate our analysis of risk and variability into a forecasting mode. Instead of assuming that the hurdle rate was an "all-or-nothing" phenomenon, we can think of a probability of investment function parameterized by rate-of-return. Thus a given project with a 15 percent rate of return may have some suitably small probability of attracting capital (e.g., 10%), whereas a project of the same type with an expected 20 percent rate of return may have a 50% probability of attracting capital.

The shape of the probability of investment function should vary with the underlying risk of a given project type. For example, our results suggest that wind turbine projects have greater inherent risk compared to gas-fired cogeneration projects. This should translate into a lower rate of return requirement for cogeneration at a given probability of investment than for wind. While this principle is intuitively plausible, there has been relatively little empirical work estimating probability of investment functions. One example is RPA (1980) in which such functions are estimated for various industries that might adopt cogeneration. Due to changes in macroeconomic conditions, these functions are not directly usable for our representative projects.

## 7.0 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

### 7.1 Summary of Major Findings

In this study we examined the sensitivity of returns on small power projects to variation in the federal tax code. Projects were selected with high expected returns under current tax law. Uniformly, the President's Tax Proposal lowers these returns. However, returns on cogeneration projects are still quite favorable and the President's Proposal tends to reinforce its emergence as the dominant small power technology. This position stems from its fundamentally more economic nature. As tax benefits to investment are reduced, the relative position of cogeneration projects tends to improve.

We also found that it is useful to estimate separately the impact of the expiration of energy tax credits (ETC) from the impact of the President's proposal in analyzing the economic viability of selected renewable energy projects. High investor rates of return disappear for wind turbines, small hydro, geothermal and wood-fired electricity with the expiration of the ETC. The effect is most dramatic for wind-turbines and small hydro, leaving their returns at a level that is unlikely to attract much capital. Geothermal and wood-electric projects are still financially viable under current law after 1985. It is important to note that the underlying project data may mask technological and market trends; hence, these results are not forecasts. Under the provisions of current law after 1985 (i.e., without ETC), wind turbine projects might remain viable, at least in California (assuming continuation of state energy tax credits), if there is significant improvement in technical performance or reduction in installed costs. Similarly, as geothermal resource areas are developed, incremental projects will not have to bear transmission costs, and will therefore become more viable. In the case of wood-fired electricity, added pollution control costs or increased fuel wood prices could threaten economic viability.

Relative to current law after 1985, reductions in investor returns on equity under the President's proposal range from 2 to 17 percent among the selected projects. Only the cogeneration projects and geothermal without transmission costs remain financially viable under these tax provisions. The IRR on equity for the wood electric project is at the low end of the investor hurdle rate range. However, investors are not well compensated for their added risk, as equity returns are only slightly above the interest rate on debt on this project. The IRR on equity would improve for all projects if interest rates decline as a result of the President's tax proposal. We have not made any estimate of this effect. In the scenarios analyzed in this study, the principal effect of the President's proposal would be to eliminate all technologies except cogeneration. Due to declining returns on all investment, the relative position of cogeneration projects improves under the proposed tax changes.

### 7.2 Recommendations for Future Work

The methodology developed in this study to analyze the impact of tax changes can be extended to develop a forecasting approach to the market for renewable technologies and cogeneration. This market is growing in many regions of the U.S. and will impact electricity planning in the future. Better information and additional research are necessary in four areas in order to translate change in investor returns on selected projects into a forecast of the market for such projects:

- analysis of the distribution of technical characteristics,
- a national survey of avoided cost prices,
- examination of issues related to technical progress, and
- analysis of the sensitivity of results to macro-economic factors such as interest rates and tax policy.

We briefly discuss possible approachs for each of these research areas.

In section 6 we discussed at some length the variation in project characteristics for a given technology. Data are available to estimate these variations, although there has been no systematic effort to collect and analyze it. However, in an encouraging development, the Federal Energy Regulatory Commission (FERC) recently announced that it would conduct a follow up survey of Qualifying Facility applicants. Analysis of such data will give a much better picture of the market for these technologies than we currently have. In particular, the variations in technical configurations, costs and performance should become clearer.

It is particularly important to explore the cogeneration market in more detail. There are important segments of this market that have not been analyzed in this study. The most important is the small-scale systems designed to compete against retail rates as opposed to avoided costs. These projects will earn greater revenues per unit of output than larger scale projects, because retail rates are now generally higher than avoided costs. This helps to offset their higher capital cost per unit of electric output, due principally to diseconomies of small-scale cogeneration technology. "Dispatchable" cogeneration projects that are designed to follow utility load fluctuations are another interesting market segment that warrants additional analysis. These projects are becoming increasingly popular in the important California market.

This study illustrates the importance of avoided cost prices for the development of renewables and cogeneration. Our projects tend to be clustered in a few regions of the country where avoided cost prices are known to be high and the markets are well developed. The terms of power purchase contracts are also important. However, relatively little is known about contract terms, except in the case of standard offers. To improve forecasting capability on a national scale, it is be necessary to compile price and contract data systematically.

Any forecast of the market for renewable technologies must take account of trends toward increased productivity. Making estimates of such improvements is basically an engineering task. We addressed the issue of technical progress briefly in a sensitivity analysis of a wind project with reduced installed costs in a future year (section 6.3). There is reason to believe that wind turbine technology could show substantial improvement in its productivity. Optimism with respect to other technologies is more limited.

Finally, forecasting methods must be sufficiently flexible to account for macroeconomic changes that affect the viability of projects. For example, this study illustrates the impact of leverage on the economic viability of projects. The ability of projects to bear debt varies inversely with interest rates. Our analysis is based on market conditions that reflect real rates of interest that are high by historical standards. The viability of all projects will improve should these rates decrease. A more subtle issue involves changes in the hurdle rate and the probability of investment function. These will obviously change with the level of interest rates. The more difficult question involves how they will change with the growth and maturation of these markets. For example, the need for large investor risk premiums should be reduced as renewable energy technologies mature and small power projects become more widespread. Effects such as these should also be incorporated in the ideal forecasting method.

Improved forecasting capability does not depend equally on all these efforts. The most important issue is the availability and analysis of market data on the nature of projects within a given technology. Many approaches to the question of economic viability are possible. What is important is attention to consistency of assumptions in a forecast. Power prices, project costs, market interest rates and inflation assumptions must all be consistent with one another. Achieving this consistency requires careful attention to how these markets are developing.

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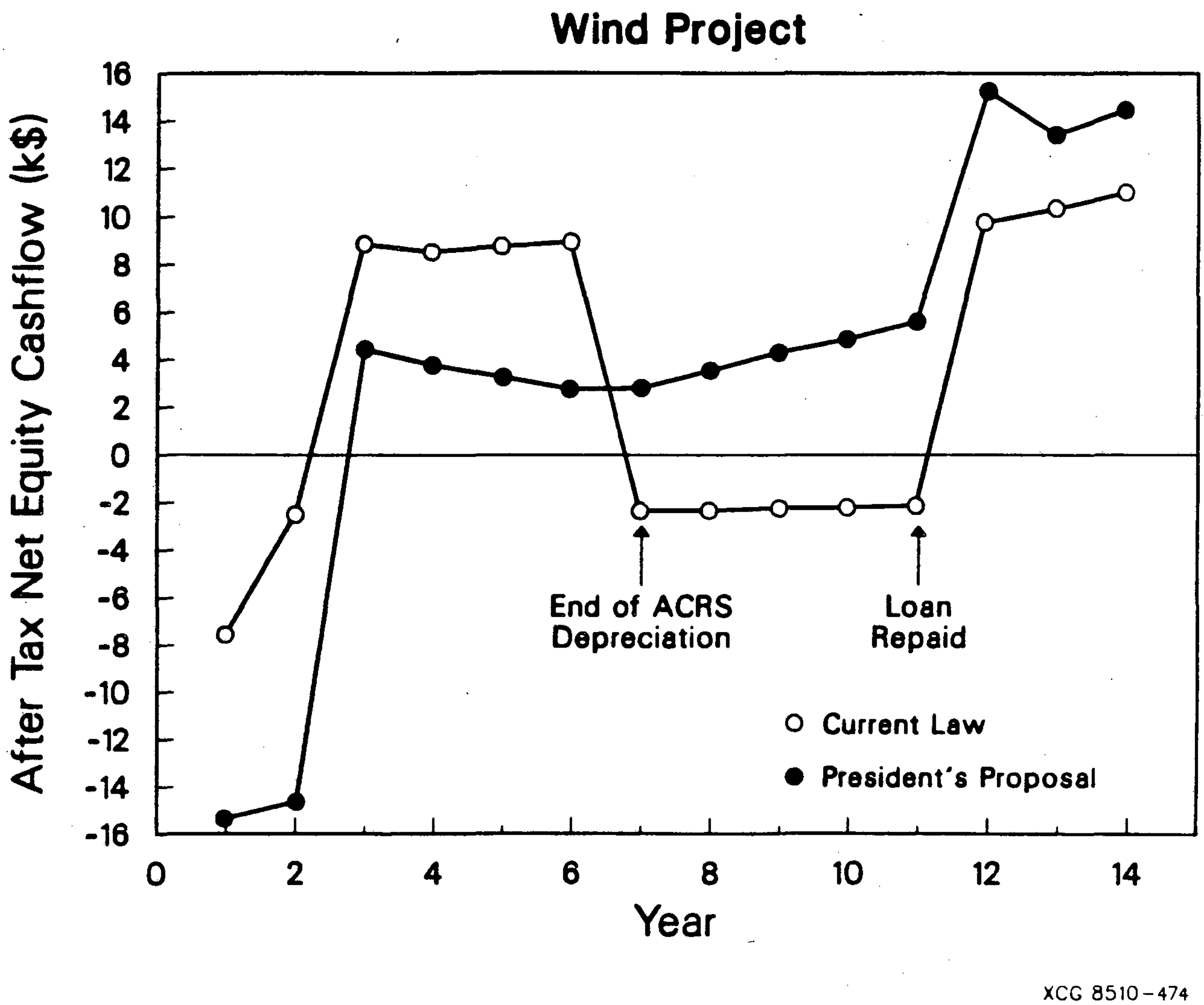


Fig. 1. After tax net equity cash flows until 1997 for a wind turbine project under current law and the President's proposal.

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# APPENDIX A: PROJECT SPREADSHEETS

BASECASE

Geothermal Project: Remote Location Requires Transmission (10/8/85)

| | | | |
|---|---|---|---|
| | | Assumptions | |
| Capacity (MW) | 18 | Avoided | |
| Capital Cost (Million $) | 55.1 | Cost | SCE S04 |
| Intangible Drilling Costs | 11.0 | | |
| Field Costs | 15.4 (70% expensed) | | |
| Transmission Line | 10.0 | | |
| Power Plant Costs | 25.2 | | |
| Capacity Factor | 0.77 | | |
| Debt Fraction | 0.70 | Tax Credits | |
| Loan Term (yrs) | 10 | ETC | 0.15 |
| Interest Rate | 0.14 | ITC | 0.10 |
| Tax Rate | 0.46 | Lead Time | 2 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | | 60.00 | 64.00 | 69.00 | 76.80 | 81.00 | 86.00 | 93.00 | 101.00 | 109.00 | 118.00 | 126.00 | 136.00 |
| Capacity | | | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 |
| Revenue (000s) | | | 9909.78 | 10395.43 | 11002.50 | 11852.40 | 12459.46 | 13066.53 | 13916.43 | 14887.74 | 15859.04 | 16951.77 | 17923.08 | 19137.21 |
| **Income Statement** | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 1526 | 1602 | 1682 | 1767 | 1855 | 1948 | 2045 | 2147 | 2255 | 2367 | 2486 | 2610 |
| Gen & Admin | | | 297 | 312 | 330 | 356 | 374 | 392 | 417 | 447 | 476 | 509 | 538 | 574 |
| Royalty | | | 805 | 845 | 888 | 932 | 978 | 1027 | 1079 | 1133 | 1189 | 1249 | 1311 | 1377 |
| Interest | | | 5400 | 5121 | 4803 | 4440 | 4026 | 3554 | 3017 | 2404 | 1704 | 908 | | |
| Depreciation ACRS | | | 5901 | 8654 | 8261 | 8261 | 8261 | | | | | | | |
| Intangibles | 4200 | 4200 | 2600 | | | | | | | | | | | |
| Total Expenses | 4200 | 4200 | 16530 | 16534 | 15964 | 15755 | 15494 | 6921 | 6558 | 6130 | 5624 | 5033 | 4335 | 4561 |
| Pre-Tax Income | -4200 | -4200 | -6620 | -6139 | -4961 | -3902 | -3034 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| **Pre-Tax Cash Flow** | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | -4200 | -4200 | -719 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Debt Funds | | | 38570 | | | | | | | | | | | |
| Equity Funds | 4200 | 4200 | 8400 | | | | | | | | | | | |
| Total Sources | 4200 | 4200 | 46251 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 4200 | 4200 | 46700 | | | | | | | | | | | |
| Debt Repayment | | | 1995 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Total Uses | 4200 | 4200 | 48695 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Funds Available | 0 | 0 | -2444 | 241 | 708 | 1404 | 1858 | 2305 | 2980 | 3766 | 4545 | 5432 | 13588 | 14576 |
| **Tax Effect on Equity** | | | | | | | | | | | | | | |
| Pre-Tax Income | -4200 | -4200 | -6620 | -6139 | -4961 | -3902 | -3034 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Income Taxes 46% | -1932 | -1932 | -3045 | -2824 | -2282 | -1795 | -1396 | 2827 | 3385 | 4028 | 4708 | 5483 | 6251 | 6705 |
| Tax Credits | | | 9525 | | | | | | | | | | | |
| Tax Savings (Liability) | 1932 | 1932 | 12570 | 2824 | 2282 | 1795 | 1396 | -2827 | -3385 | -4028 | -4708 | -5483 | -6251 | -6705 |
| After Tax Net Equity Cash Flow | -2268 | -2268 | 1456 | 3065 | 2990 | 3199 | 3253 | -522 | -404 | -262 | -164 | -50 | 7338 | 7871 |
| IRR on Equity | 0.391 | | | | | | | | | | | | | |
| Project Cash Flow | -2268 | -2268 | -32203 | 8104 | 8175 | 8551 | 8796 | 5238 | 5603 | 6027 | 6447 | 6927 | 7338 | 7871 |
| Project IRR | 0.156 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 25936.79 | | | | | | | | | | | | | |

NO ENERGY TAX CREDIT

Geothermal Project: Remote Location Requires Transmission (10/8/85)

| | | Assumptions | |
|---|---|---|---|
| Capacity (MW) | 18 | Avoided | |
| Capital Cost (Million $) | 55.1 | Cost | SCE S04 |
| Intangible Drilling Costs | 11.0 | | |
| Field Costs | 15.4 | (70% expensed) | |
| Transmission Line | 10.0 | | |
| Power Plant Costs | 25.2 | | |
| Capacity Factor | 0.77 | | |
| Debt Fraction | 0.70 | Tax Credits | |
| Loan Term (yrs) | 10 | ETC | 0.00 |
| Interest Rate | 0.14 | ITC | 0.10 |
| Tax Rate | 0.46 | Lead Time | 2 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | | 60.00 | 64.00 | 69.00 | 76.00 | 81.00 | 86.00 | 93.00 | 101.00 | 109.00 | 118.00 | 126.00 | 136.00 |
| Capacity | | | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 |
| Revenue (000s) | | | 9909.78 | 10395.43 | 11002.50 | 11852.40 | 12459.46 | 13066.53 | 13916.43 | 14887.74 | 15859.04 | 16951.77 | 17923.08 | 19137.21 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 1526 | 1602 | 1682 | 1767 | 1855 | 1948 | 2045 | 2147 | 2255 | 2367 | 2486 | 2610 |
| Gen & Admin | | | 297 | 312 | 330 | 356 | 374 | 392 | 417 | 447 | 476 | 509 | 538 | 574 |
| Royalty | | | 805 | 845 | 888 | 932 | 978 | 1027 | 1079 | 1133 | 1189 | 1249 | 1311 | 1377 |
| Interest | | | 5400 | 5121 | 4803 | 4440 | 4026 | 3554 | 3017 | 2404 | 1704 | 908 | | |
| Depreciation ACRS | | | 6284 | 9217 | 8798 | 8798 | 8798 | | | | | | | |
| Intangibles | 4200 | 4200 | 2600 | | | | | | | | | | | |
| Total Expenses | 4200 | 4200 | 16913 | 17097 | 16501 | 16292 | 16031 | 6921 | 6558 | 6130 | 5624 | 5033 | 4335 | 4561 |
| Pre-Tax Income | -4200 | -4200 | -7003 | -6702 | -5498 | -4439 | -3571 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | -4200 | -4200 | -719 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Debt Funds | | | 38570 | | | | | | | | | | | |
| Equity Funds | 4200 | 4200 | 8400 | | | | | | | | | | | |
| Total Sources | 4200 | 4200 | 46251 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 4200 | 4200 | 46700 | | | | | | | | | | | |
| Debt Repayment | | | 1995 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Total Uses | 4200 | 4200 | 48695 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Funds Available | 0 | 0 | -2444 | 241 | 708 | 1404 | 1858 | 2305 | 2980 | 3766 | 4545 | 5432 | 13588 | 14576 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | -4200 | -4200 | -7003 | -6702 | -5498 | -4439 | -3571 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Income Taxes 46% | -1932 | -1932 | -3222 | -3083 | -2529 | -2042 | -1643 | 2827 | 3385 | 4028 | 4708 | 5483 | 6251 | 6705 |
| Tax Credits | | | 4410 | | | | | | | | | | | |
| Tax Savings (Liability) | 1932 | 1932 | 7632 | 3083 | 2529 | 2042 | 1643 | -2827 | -3385 | -4028 | -4708 | -5483 | -6251 | -6705 |
| After Tax Net Equity Cash Flow | -2268 | -2268 | -3482 | 3324 | 3237 | 3446 | 3500 | -522 | -404 | -262 | -164 | -50 | 7338 | 7871 |
| IRR on Equity | 0.226 | | | | | | | | | | | | | |
| Project Cash Flow | -2268 | -2268 | -37141 | 8363 | 8422 | 8798 | 9043 | 5238 | 5603 | 6027 | 6447 | 6927 | 7338 | 7871 |
| Project IRR | 0.130 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 27623.05 | | | | | | | | | | | | | |

NO ITC, TAX RATE = 33%

Geothermal Project: Remote Location Requires Transmission (10/8/85)

| | | | |
|---|---|---|---|
| | | Assumptions | |
| Capacity (MW) | 18 | Avoided | |
| Capital Cost (Million $) | 55.1 | Cost SCE S04 | |
| Intangible Drilling Costs | 11.0 | | |
| Field Costs | 15.4 (70% expensed) | | |
| Transmission Line | 10.0 | | |
| Power Plant Costs | 25.2 | | |
| Capacity Factor | 0.77 | | |
| Debt Fraction | 0.70 | Tax Credits | |
| Loan Term (yrs) | 10 | ETC | 0.00 |
| Interest Rate | 0.14 | ITC | 0.00 |
| Tax Rate | 0.33 | Lead Time | 2 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | | 60.00 | 64.00 | 69.00 | 76.00 | 81.00 | 86.00 | 93.00 | 101.00 | 109.00 | 118.00 | 126.00 | 136.00 |
| Capacity | | | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 |
| Revenue (000s) | | | 9909.78 | 10395.43 | 11002.58 | 11852.40 | 12459.46 | 13066.53 | 13916.43 | 14887.74 | 15859.04 | 16951.77 | 17923.08 | 19137.21 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 1526 | 1602 | 1682 | 1767 | 1855 | 1948 | 2045 | 2147 | 2255 | 2367 | 2486 | 2610 |
| Gen & Admin | | | 297 | 312 | 330 | 356 | 374 | 392 | 417 | 447 | 476 | 509 | 538 | 574 |
| Royalty | | | 805 | 845 | 888 | 932 | 978 | 1027 | 1079 | 1133 | 1189 | 1249 | 1311 | 1377 |
| Interest | | | 5400 | 5121 | 4803 | 4440 | 4026 | 3554 | 3017 | 2404 | 1704 | 908 | | |
| Depreciation ACRS | | | 6615 | 9702 | 9261 | 9261 | 9261 | | | | | | | |
| Intangibles | 4200 | 4200 | 2600 | | | | | | | | | | | |
| Total Expenses | 4200 | 4200 | 17244 | 17582 | 16964 | 16755 | 16494 | 6921 | 6558 | 6130 | 5624 | 5033 | 4335 | 4561 |
| Pre-Tax Income | -4200 | -4200 | -7334 | -7187 | -5961 | -4902 | -4034 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | -4200 | -4200 | -719 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Debt Funds | | | 38570 | | | | | | | | | | | |
| Equity Funds | 4200 | 4200 | 8400 | | | | | | | | | | | |
| Total Sources | 4200 | 4200 | 46251 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 4200 | 4200 | 46700 | | | | | | | | | | | |
| Debt Repayment | | | 1995 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Total Uses | 4200 | 4200 | 48695 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Funds Available | 0 | 0 | -2444 | 241 | 708 | 1404 | 1858 | 2305 | 2980 | 3766 | 4545 | 5432 | 13588 | 14576 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | -4200 | -4200 | -7334 | -7187 | -5961 | -4902 | -4034 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Income Taxes 33% | -1386 | -1386 | -2420 | -2372 | -1967 | -1618 | -1331 | 2028 | 2428 | 2890 | 3378 | 3933 | 4484 | 4810 |
| Tax Credits | | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | 1386 | 1386 | 2420 | 2372 | 1967 | 1618 | 1331 | -2028 | -2428 | -2890 | -3378 | -3933 | -4484 | -4810 |
| After Tax Net Equity Cash Flow | -2814 | -2814 | -8693 | 2613 | 2675 | 3021 | 3189 | 277 | 552 | 877 | 1167 | 1499 | 9104 | 9766 |
| IRR on Equity | 0.129 | | | | | | | | | | | | | |
| Project Cash Flow | -2814 | -2814 | -41651 | 8318 | 8485 | 8951 | 9255 | 6499 | 6951 | 7478 | 7999 | 8594 | 9104 | 9766 |
| Project IRR | 0.123 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 29076.90 | | | | | | | | | | | | | |

Geothermal Project: Remote Location Requires Transmission (10/8/85)

| | Assumptions | | |
|---|---|---|---|
| Capacity (MW) | 18 | Avoided | |
| Capital Cost (Million $) | 55.1 | Cost | SCE S04 |
| Intangible Drilling Costs | 11.0 | | |
| Field Costs | 15.4 | (70% expensed) | |
| Transmission Line | 10.0 | | |
| Power Plant Costs | 25.2 | | |
| Capacity Factor | 0.77 | | |
| Debt Fraction | 0.70 | Tax Credits | |
| Loan Term (yrs) | 10 | ETC | 0.00 |
| Interest Rate | 0.14 | ITC | 0.00 |
| Tax Rate | 0.33 | Lead Time | 2 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 | 121414 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | | 60.00 | 64.00 | 69.00 | 76.00 | 81.00 | 86.00 | 93.00 | 101.00 | 109.00 | 118.00 | 126.00 | 136.00 |
| Capacity | | | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 | 21.62 |
| Revenue (000s) | | | 9909.70 | 10395.43 | 11002.50 | 11852.40 | 12459.46 | 13066.53 | 13916.43 | 14887.74 | 15859.04 | 16951.77 | 17923.08 | 19137.21 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 1526 | 1602 | 1682 | 1767 | 1855 | 1948 | 2045 | 2147 | 2255 | 2367 | 2486 | 2610 |
| Gen & Admin | | | 297 | 312 | 330 | 356 | 374 | 392 | 417 | 447 | 476 | 509 | 538 | 574 |
| Royalty | | | 805 | 845 | 888 | 932 | 978 | 1027 | 1079 | 1133 | 1189 | 1249 | 1311 | 1377 |
| Interest | | | 5400 | 5121 | 4803 | 4440 | 4026 | 3554 | 3017 | 2404 | 1704 | 908 | | |
| Depreciation CCRS C5 | | | 3749 | 7108 | 6262 | 5460 | 4763 | 4454 | 4675 | 4895 | 5160 | 5380 | 2822 | |
| Intangibles | 4200 | 4200 | 2600 | | | | | | | | | | | |
| Total Expenses | 4200 | 4200 | 14377 | 15068 | 13965 | 12962 | 11995 | 11375 | 11233 | 11026 | 10784 | 10413 | 7157 | 4561 |
| Pre-Tax Income (000s) | -4200 | -4200 | -4468 | -4673 | -2963 | -1110 | 464 | 1691 | 2684 | 3862 | 5075 | 6539 | 10766 | 14576 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | -4200 | -4200 | -719 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Debt Funds | | | 38570 | | | | | | | | | | | |
| Equity Funds | 4200 | 4200 | 8400 | | | | | | | | | | | |
| Total Sources | 4200 | 4200 | 46251 | 2515 | 3300 | 4359 | 5227 | 6145 | 7358 | 8757 | 10235 | 11919 | 13588 | 14576 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 4200 | 4200 | 46700 | | | | | | | | | | | |
| Debt Repayment | | | 1995 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Total Uses | 4200 | 4200 | 48695 | 2274 | 2592 | 2955 | 3369 | 3841 | 4378 | 4991 | 5690 | 6487 | | |
| Funds Available (000s) | 0 | 0 | -2444 | 241 | 708 | 1404 | 1858 | 2305 | 2980 | 3766 | 4545 | 5432 | 13588 | 14576 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | -4200 | -4200 | -4468 | -4673 | -2963 | -1110 | 464 | 1691 | 2684 | 3862 | 5075 | 6539 | 10766 | 14576 |
| Income Taxes 33% | -1386 | -1386 | -1474 | -1542 | -978 | -366 | 153 | 558 | 886 | 1275 | 1675 | 2158 | 3553 | 4810 |
| Tax Credits | | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | 1386 | 1386 | 1474 | 1542 | 978 | 366 | -153 | -558 | -886 | -1275 | -1675 | -2158 | -3553 | -4810 |
| After Tax Net Equity Cash Flow | -2814 | -2814 | -9639 | 1783 | 1685 | 1770 | 1704 | 1747 | 2095 | 2492 | 2870 | 3275 | 10036 | 9766 |
| IRR on Equity | 0.125 | | | | | | | | | | | | | |
| Project Cash Flow | -2814 | -2814 | -42597 | 7488 | 7495 | 7699 | 7771 | 7969 | 8494 | 9093 | 9702 | 10370 | 10036 | 9766 |
| Project IRR | 0.156 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 18306.98 | | | | | | | | | | | | | |
| Alternative Minimum Tax | | | | | | | | | | | | | | |
| 25% of Interest Payments | 0 | 0 | 1350 | 1280 | 1201 | 1110 | 1006 | 889 | 754 | 601 | 426 | 227 | 0 | 0 |
| Excess Depreciation | | | 1103 | 1985 | 1455 | 1014 | 662 | 662 | 1147 | 1632 | 2161 | 2602 | 265 | |
| Tax Preference | | | 1103 | 1280 | 1201 | 1014 | 662 | 662 | 754 | 601 | 426 | 227 | 0 | 0 |
| 8% of IDCs | 336 | 336 | 208 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alt Min Taxable Income | -3864 | -3864 | -3157 | -3393 | -1762 | -96 | 1125 | 2353 | 3438 | 4463 | 5501 | 6766 | 10766 | 14576 |
| Alt Min Tax | -773 | -773 | -631 | -679 | -352 | -19 | 225 | 471 | 688 | 893 | 1100 | 1353 | 2153 | 2915 |
| Binding Tax | -773 | -773 | -631 | -679 | -352 | -19 | 225 | 558 | 886 | 1275 | 1675 | 2158 | 3553 | 4810 |
| Delta Base Case | -613 | -613 | -843 | -864 | -625 | -347 | -72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| After Tax Net Equity Cash Flow | -3427 | -3427 | -10482 | 920 | 1060 | 1423 | 1632 | 1747 | 2095 | 2492 | 2870 | 3275 | 10036 | 9766 |
| Equity IRR adj for Alt Min Tax | 0.093 | | | | | | | | | | | | | |
| Project Cash Flows | -3427 | -3427 | -43440 | 6625 | 6870 | 7352 | 7699 | 7969 | 8494 | 9093 | 9702 | 10370 | 10036 | 9766 |
| Project IRR | 0.106 | | | | | | | | | | | | | |

BASECASE

Large Scale Gas-Fired Cogeneration (10/8/85)

Assumptions

| | | | |
|---|---|---|---|
| | | | (MBtu/hr) |
| Capacity (MW) | 75 | Fuel Input | 700 |
| Capital Cost (Million $) | 55.0 | Steam Output | 150 |
| Capacity Factor | 0.92 | Avoided | |
| Debt Fraction | 0.60 | Cost | 50% |
| Loan Term (yrs) | 10 | Gas Esc. Rate | 1.06 |
| Interest Rate (%) | 0.14 | (%) | after 1990 |
| Tax Rate | 0.46 | Gas Price | 3.75 ($/MBtu) |
| Federal Tax Credits | 0.10 | Lead Time (yrs | 1 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | 33.45 | 31.13 | 31.15 | 32.04 | 35.94 | 37.46 | 39.13 | 41.48 | 43.97 | 46.60 | 49.40 | 52.36 | 55.51 |
| Capacity | | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 |
| Electric Revenue (000s) | | 31201 | 29801 | 29811 | 30349 | 32706 | 33627 | 34634 | 36053 | 37557 | 39152 | 40842 | 42634 | 44533 |
| Steam Sales (MBtu) | | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 |
| Gas Price ($/MBtu) | | 3.75 | 3.51 | 3.50 | 3.60 | 3.98 | 4.22 | 4.47 | 4.74 | 5.02 | 5.33 | 5.65 | 5.98 | 6.34 |
| Steam Revenue (000s) | | 5667 | 5304 | 5289 | 5440 | 6014 | 6375 | 6758 | 7163 | 7593 | 8048 | 8531 | 9043 | 9586 |
| Total Revenue (000s) | | 36868 | 35105 | 35100 | 35789 | 38720 | 40002 | 41392 | 43216 | 45150 | 47200 | 49373 | 51677 | 54118 |
| **Income Statement** | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Fuel | | 21155 | 19801 | 19745 | 20309 | 22453 | 23800 | 25228 | 26742 | 28346 | 30047 | 31850 | 33761 | 35787 |
| O & M | | 3850 | 4043 | 4245 | 4457 | 4680 | 4914 | 5159 | 5417 | 5688 | 5973 | 6271 | 6585 | 6914 |
| Interest | | 4290 | 4057 | 3794 | 3496 | 3161 | 2780 | 2352 | 1867 | 1319 | 700 | | | |
| Depreciation ACRS | | 7838 | 11495 | 10973 | 10973 | 10973 | | | | | | | | |
| Total Expenses (000s) | | 37133 | 39396 | 38756 | 39235 | 41266 | 31494 | 32739 | 34026 | 35354 | 36719 | 38121 | 40346 | 42701 |
| Pre-Tax Income (000s) | | -265 | -4291 | -3656 | -3446 | -2546 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| **Pre-Tax Cash Flow** | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 7572 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Debt Funds | | 33000 | | | | | | | | | | | | |
| Equity Funds | 6600 | 15400 | | | | | | | | | | | | |
| Total Sources | 6600 | 55972 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 6600 | 48400 | | | | | | | | | | | | |
| Debt Repayment | | 1791 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | | | |
| Total Uses | 6600 | 50191 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | | | |
| Funds Available (000s) | 0 | 5781 | 5180 | 5029 | 4942 | 5506 | 5207 | 4923 | 4975 | 5034 | 5099 | 11252 | 11331 | 11418 |
| **Tax Effect on Equity** | | | | | | | | | | | | | | |
| Pre-Tax Income | | -265 | -4291 | -3656 | -3446 | -2546 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Income Taxes 46% | | -122 | -1974 | -1682 | -1585 | -1171 | 3914 | 3980 | 4227 | 4506 | 4821 | 5176 | 5212 | 5252 |
| ITC | | 5500 | | | | | | | | | | | | |
| Tax Savings (Liability) | | 5622 | 1974 | 1682 | 1585 | 1171 | -3914 | -3980 | -4227 | -4506 | -4821 | -5176 | -5212 | -5252 |
| After Tax Net Equity Cash Flow | -6600 | -3997 | 7154 | 6711 | 6527 | 6678 | 1293 | 943 | 748 | 527 | 277 | 6076 | 6119 | 6166 |
| IRR on Equity | 0.412 | | | | | | | | | | | | | |
| Project Cash Flows | -6600 | -31345 | 12829 | 12413 | 12258 | 12442 | 7096 | 6789 | 6643 | 6477 | 6289 | 6076 | 6119 | 6166 |
| Project IRR | 0.241 | | NPV Deprec.@15% | 34450.52 | | | | | | | | | | |

NO ITC, TAX RATE = 33%

Large Scale Gas-Fired Cogeneration (10/8/85)

| | | | | | |
|---|---|---|---|---|---|
| | | Assumptions | | | |
| | | | (MBtu/hr) | | |
| Capacity (MW) | 75 | Fuel Input | | 700 | |
| Capital Cost (Million $) | 55.0 | Steam Output | | 150 | |
| Capacity Factor | 0.92 | Avoided | | | |
| Debt Fraction | 0.60 | Cost | 504 | | |
| Loan Term (yrs) | 10 | Gas Esc. Rate | | 1.06 | |
| Interest Rate (%) | 0.14 | (%) | after 1990 | | |
| Tax Rate | 0.33 | Gas Price | | 3.75 | ($/MBtu) |
| Federal Tax Credits | 0.00 | Lead Time (yrs | | 1 | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | 33.45 | 31.13 | 31.15 | 32.04 | 35.94 | 37.46 | 39.13 | 41.48 | 43.97 | 46.60 | 49.40 | 52.36 | 55.51 |
| Capacity | | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 |
| Electric Revenue (000s) | | 31201 | 29801 | 29811 | 30349 | 32706 | 33627 | 34634 | 36053 | 37557 | 39152 | 40842 | 42634 | 44533 |
| Steam Sales (MBtu) | | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 |
| Gas Price ($/MBtu) | | 3.75 | 3.51 | 3.50 | 3.60 | 3.98 | 4.22 | 4.47 | 4.74 | 5.02 | 5.33 | 5.65 | 5.98 | 6.34 |
| Steam Revenue (000s) | | 5667 | 5304 | 5289 | 5440 | 6014 | 6375 | 6758 | 7163 | 7593 | 8048 | 8531 | 9043 | 9586 |
| Total Revenue (000s) | | 36868 | 35105 | 35100 | 35789 | 38720 | 40002 | 41392 | 43216 | 45150 | 47200 | 49373 | 51677 | 54118 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Fuel | | 21155 | 19801 | 19745 | 20309 | 22453 | 23800 | 25228 | 26742 | 28346 | 30047 | 31850 | 33761 | 35787 |
| O & M | | 3850 | 4043 | 4245 | 4457 | 4680 | 4914 | 5159 | 5417 | 5688 | 5973 | 6271 | 6585 | 6914 |
| Interest | | 4290 | 4057 | 3794 | 3496 | 3161 | 2780 | 2352 | 1867 | 1319 | 700 | | | |
| Depreciation ACRS | | 8250 | 12100 | 11550 | 11550 | 11550 | | | | | | | | |
| Total Expenses (000s) | | 37545 | 40001 | 39333 | 39812 | 41843 | 31494 | 32739 | 34026 | 35354 | 36719 | 38121 | 40346 | 42701 |
| Pre-Tax Income (000s) | | -678 | -4896 | -4233 | -4023 | -3123 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 7572 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Debt Funds | | 33000 | | | | | | | | | | | | |
| Equity Funds | 6600 | 15400 | | | | | | | | | | | | |
| Total Sources | 6600 | 55972 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 6600 | 48400 | | | | | | | | | | | | |
| Debt Repayment | | 1791 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | | | |
| Total Uses | 6600 | 50191 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | | | |
| Funds Available (000s) | 0 | 5781 | 5180 | 5029 | 4942 | 5506 | 5207 | 4923 | 4975 | 5034 | 5099 | 11252 | 11331 | 11418 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | -678 | -4896 | -4233 | -4023 | -3123 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Income Taxes 33% | | -224 | -1616 | -1397 | -1328 | -1031 | 2808 | 2855 | 3033 | 3233 | 3459 | 3713 | 3739 | 3768 |
| ITC | | 0 | | | | | | | | | | | | |
| Tax Savings (Liability) | | 224 | 1616 | 1397 | 1328 | 1031 | -2808 | -2855 | -3033 | -3233 | -3459 | -3713 | -3739 | -3768 |
| After Tax Net Equity Cash Flow | -6600 | -9395 | 6796 | 6426 | 6270 | 6537 | 2399 | 2068 | 1942 | 1801 | 1640 | 7539 | 7592 | 7650 |
| IRR on Equity | 0.285 | | | | | | | | | | | | | |
| Project Cash Flows | -6600 | -36314 | 12877 | 12507 | 12351 | 12618 | 8480 | 8149 | 8024 | 7883 | 7722 | 7539 | 7592 | 7650 |
| Project IRR | 0.221 | | NPV Deprec.@15% | 36263.71 | | | | | | | | | | |

CCRS + ALT. MIN. TAX

Large Scale Gas-Fired Cogeneration (10/18/85)

| | | Assumptions | (MBtu/hr) |
|---|---|---|---|
| Capacity (MW) | 75 | Fuel Input | 700 |
| Capital Cost (Million $) | 55.0 | Steam Output | 150 |
| Capacity Factor | 0.92 | Avoided | |
| Debt Fraction | 0.60 | Cost | 90% SO4 |
| Loan Term (yrs) | 10 | Gas Esc. Rate | 1.06 |
| Interest Rate (%) | 0.14 | (%) | |
| Tax Rate | 0.33 | Gas Price | 3.75 |
| Federal Tax Credits | 0.0 | ($/MBtu) | |
| Lead Time (yrs) | 1 | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 | 604440 |
| Avoided Cost ($/MWh) | | | | | | | | | | | | | | |
| Energy | | 33.45 | 31.13 | 31.15 | 32.04 | 35.94 | 37.46 | 39.13 | 41.48 | 43.97 | 46.60 | 49.40 | 52.36 | 55.51 |
| Capacity | | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 | 18.17 |
| Electric Revenue (000s) x.9Energy | | 31201 | 29801 | 29811 | 30349 | 32706 | 33627 | 34634 | 36053 | 37557 | 39152 | 40842 | 42634 | 44533 |
| Steam Sales (MBtu) | | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 | 1208880 |
| Gas Price ($/MBtu) | | 3.75 | 3.51 | 3.50 | 3.60 | 3.98 | 4.22 | 4.47 | 4.74 | 5.02 | 5.33 | 5.65 | 5.98 | 6.34 |
| Steam Revenue (000s) | | 5667 | 5304 | 5289 | 5440 | 6014 | 6375 | 6758 | 7163 | 7593 | 8048 | 8531 | 9043 | 9586 |
| Total Revenue (000s) | | 36868 | 35105 | 35100 | 35789 | 38720 | 40002 | 41392 | 43216 | 45150 | 47200 | 49373 | 51677 | 54118 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Fuel | | 21155 | 19801 | 19745 | 20309 | 22453 | 23800 | 25228 | 26742 | 28346 | 30047 | 31850 | 33761 | 35787 |
| O & M | | 3850 | 4043 | 4245 | 4457 | 4680 | 4914 | 5159 | 5417 | 5688 | 5973 | 6271 | 6585 | 6914 |
| Interest | | 4290 | 4057 | 3794 | 3496 | 3161 | 2788 | 2352 | 1867 | 1319 | 700 | | | |
| Depreciation CCRS C5 | | 4675 | 8965 | 7810 | 6820 | 5940 | 5555 | 5830 | 6105 | 6435 | 6710 | 3520 | | |
| Total Expenses | | 33970 | 36866 | 35593 | 35082 | 36233 | 37049 | 38569 | 40131 | 41789 | 43429 | 41641 | 40346 | 42701 |
| Pre-Tax Income | | 2897 | -1761 | -493 | 787 | 2487 | 2953 | 2823 | 3085 | 3362 | 3771 | 7732 | 11331 | 11418 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 7572 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Debt Funds | | 33000 | | | | | | | | | | | | |
| Equity Funds | 6600 | 15400 | | | | | | | | | | | | |
| Total Sources | 6600 | 55972 | 7204 | 7317 | 7527 | 8427 | 8508 | 8653 | 9190 | 9797 | 10481 | 11252 | 11331 | 11418 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 6600 | 48400 | | | | | | | | | | | | |
| Debt Repayment | | 1791 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | | | |
| Total Uses | 6600 | 50191 | 2024 | 2287 | 2585 | 2920 | 3301 | 3729 | 4215 | 4763 | 5382 | 0 | 0 | 0 |
| Funds Available (000s) | 0 | 5781 | 5180 | 5029 | 4942 | 5506 | 5207 | 4923 | 4975 | 5034 | 5099 | 11252 | 11331 | 11418 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | 2897 | -1761 | -493 | 707 | 2487 | 2953 | 2823 | 3085 | 3362 | 3771 | 7732 | 11331 | 11418 |
| Income Taxes @ 33% | | 956 | -581 | -163 | 233 | 821 | 974 | 931 | 1018 | 1109 | 1244 | 2552 | 3739 | 3768 |
| ITC | | 0 | | | | | | | | | | | | |
| Tax Savings (Liability) | | -956 | 581 | 163 | -233 | -821 | -974 | -931 | -1018 | -1109 | -1244 | -2552 | -3739 | -3768 |
| After Tax Net Equity Cash Flow | -6600.00 | -10574.72 | 5761.14 | 5192.02 | 4708.67 | 4685.85 | 4232.58 | 3991.67 | 3957.03 | 3924.41 | 3854.24 | 8700.47 | 7591.71 | 7649.83 |
| IRR on Equity | 0.250 | | | | | | | | | | | | | |
| Project Cash Flows | -6600.00 | -38909.43 | 10503.41 | 10021.11 | 9635.91 | 9723.78 | 9396.12 | 9296.[illegible] | 9422.81 | 9570.99 | 9705.20 | 8700.47 | 7591.71 | 7649.83 |
| Project IRR | 0.177 | | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 33665.30 | | | | | | | | | | | | | |
| Alternative Minimum Tax | | | | | | | | | | | | | | |
| 25% of Interest Payments | | 1072 | 1014 | 948 | 874 | 790 | 695 | 588 | 467 | 330 | 175 | 0 | 0 | 0 |
| Excess Depreciation | | 1375 | 2475 | 1815 | 1265 | 825 | 825 | 1430 | 2035 | 2695 | 3245 | 330 | | |
| Tax Preference | | 1072 | 1014 | 948 | 874 | 790 | 695 | 588 | 467 | 330 | 175 | 0 | 0 | 0 |
| Alt. Min. Taxable Income | | 3945 | -771 | 430 | 1556 | 3252 | 3623 | 3385 | 3527 | 3666 | 3921 | 7707 | 11306 | 11393 |
| Alt. Min. Tax | | 789 | -154 | 86 | 311 | 650 | 725 | 677 | 705 | 733 | 784 | 1541 | 2261 | 2279 |
| Binding Tax | | 956 | -154 | 86 | 311 | 821 | 974 | 931 | 1018 | 1109 | 1244 | 2552 | 3739 | 3768 |
| Delta Base Case | | 0 | -427 | -249 | -78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| After Tax Net Equity Cash Flow | -6600.00 | -10575 | 5334 | 4943 | 4631 | 4686 | 4233 | 3992 | 3957 | 3924 | 3854 | 8700 | 7592 | 7650 |
| Equity IRR adj for Alt Min Tax | 0.242 | | | | | | | | | | | | | |

# BASECASE

Coal-Fired Cogeneration (10/8/85)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Assumptions | | | | | | | Esc. |
| Capacity (MW) | 75 | Energy Payment | ($/kWh) | Cap. Factor | Load Profile(hrs/day) | | ($/ton) | | Factor |
| Capital Cost (Million$) | 73.0 | On-Peak | 0.0435 | 0.92 | 10.71 | Coal | 32.80 | | 1.05 |
| Capacity Factor (Avg.) | 0.85 | Off-Peak | 0.0285 | 0.81 | 13.29 | Rail | 17.92 | | 1.05 |
| Debt Fraction (%) | 0.70 | Cap. Payment | | | | | | | |
| Loan Term (Yrs) | 10 | On-Peak | 0.0176 | | | | Coal | | |
| Interest Rate (%) | 0.14 | Steam Price | 4.50 ($/1000 lbs) | | | Quality | 12800 | (Btu/lb) | |
| Tax Rate (%) | 0.46 | Steam Demand | 300000 (lbs/hr.) | | | Use | 46.24 | (ton/hr) | |
| Lead Time (yrs) | 2 | | | | | | | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 |
| Off-Peak | | | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 |
| Energy Payment ($/MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 43.50 | 45.68 | 47.96 | 50.36 | 52.87 | 55.52 | 58.29 | 61.21 | 64.27 | 67.48 | 70.86 | 74.40 |
| Off-Peak | | | 28.52 | 29.95 | 31.44 | 33.02 | 34.67 | 36.40 | 38.22 | 40.13 | 42.14 | 44.24 | 46.46 | 48.78 |
| Electric Revenue (000s) | | | | | | | | | | | | | | |
| Energy | | | 20138 | 21145 | 22202 | 23312 | 24478 | 25702 | 26987 | 28336 | 29753 | 31240 | 32802 | 34443 |
| Capacity | | | 4758 | 4996 | 5246 | 5508 | 5783 | 6073 | 6376 | 6695 | 7030 | 7381 | 7750 | 8138 |
| Steam Revenue (000s) | | | 10800 | 11340 | 11907 | 12502 | 13127 | 13784 | 14473 | 15197 | 15957 | 16754 | 17592 | 18472 |
| Total Revenue (000s) | | | 35696 | 37481 | 39355 | 41322 | 43389 | 45558 | 47836 | 50228 | 52739 | 55376 | 58145 | 61052 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Coal | | | 11293 | 11858 | 12451 | 13073 | 13727 | 14413 | 15134 | 15891 | 16685 | 17519 | 18395 | 19315 |
| Rail | | | 6169 | 6477 | 6801 | 7141 | 7498 | 7873 | 8267 | 8680 | 9114 | 9570 | 10049 | 10551 |
| O & M | | | 3146 | 3366 | 3602 | 3338 | 3572 | 3822 | 4089 | 4375 | 4682 | 5009 | 5360 | 5735 |
| Interconnection Fee | | | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| Insurance | | | 567 | 595 | 625 | 656 | 689 | 724 | 760 | 798 | 838 | 880 | 924 | 970 |
| Property Taxes | | | 554 | 568 | 582 | 597 | 612 | 627 | 642 | 659 | 675 | 692 | 709 | 727 |
| Management Fee | | | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| Interest | | | 7154 | 6784 | 6362 | 5881 | 5333 | 4709 | 3996 | 3184 | 2258 | 1203 | | |
| Depreciation ACRS | | | 10403 | 15257 | 14564 | 14564 | 14564 | | | | | | | |
| Total Expenses (000s) | | | 41446 | 47066 | 47147 | 47410 | 48154 | 34328 | 35048 | 35747 | 36412 | 37033 | 37597 | 39458 |
| Pre-Tax Income | | | -5750 | -9585 | -7792 | -6088 | -4766 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI+ Depreciation | | | 4653 | 5672 | 6772 | 8476 | 9798 | [illegible] | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Debt Funds | | | 51100 | | | | | | | | | | | |
| Equity Funds | 3285 | 3285 | [illegible] | | | | | | | | | | | |
| Total Sources | 3285 | 3285 | 71083 | 5672 | 6772 | 8476 | 9798 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 3285 | 3285 | 66430 | | | | | | | | | | | |
| Debt Repayment | | | 2642 | 3012 | 3434 | 3915 | 4463 | 5088 | 5800 | 6612 | 7538 | 8593 | | |
| Total Uses | 3285 | 3285 | 69072 | 3012 | 3434 | 3915 | 4463 | 5088 | 5800 | 6612 | 7538 | 8593 | | |
| Funds Available (000s) | 0 | 0 | 2011 | 2660 | 3338 | 4561 | 5335 | 6142 | 6987 | 7869 | 8789 | 9750 | 20548 | 21594 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -5750 | -9585 | -7792 | -6088 | -4766 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Income Taxes @ 46% | | | -2645 | -4409 | -3584 | -2800 | -2192 | 5166 | 5882 | 6661 | 7510 | 8438 | 9452 | 9933 |
| Federal Tax Credit | | | 7300 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 9945 | 4409 | 3584 | 2800 | 2192 | -5166 | -5882 | -6661 | -7510 | -8438 | -9452 | -9933 |
| After Tax Net Equity Cash Flow | -3285 | -3285 | -3374 | 7069 | 6922 | 7361 | 752[illegible] | 976 | 1105 | 1208 | 1279 | 1312 | 11096 | 11661 |
| IRR on Equity | 0.402 | | | | | | | | | | | | | |
| Project Cash Flow | -3285 | -3285 | -47969 | 13744 | 13791 | 14452 | 14870 | 8607 | 9063 | 9539 | 10036 | 10555 | 11096 | 11661 |
| Project IRR | 0.184 | | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 45725.24 | | | | | | | | | | | | | |

A-8

# NO ITC, TAX RATE= 33%

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Coal-Fired Cogeneration | (10/8/85) | | | | | | | | | |
| | | Assumptions | | | | | | | | Esc. |
| Capacity (MW) | 75 | Energy Payment | | ($/kWh) | Cap. Factor | Load Profile(hrs/day) | | | ($/ton) | Factor |
| Capital Cost (Million$) | 73.0 | On-Peak | 0.0435 | | 0.92 | 10.71 | Coal | | 32.80 | 1.05 |
| Capacity Factor (Avg.) | 0.85 | Off-Peak | 0.0285 | | 0.81 | 13.29 | Rail | | 17.92 | 1.05 |
| Debt Fraction (%) | 0.70 | Cap. Payment | | | | | | | | |
| Loan Term (Yrs) | 10 | On-Peak | 0.0176 | | | | | | Coal | |
| Interest Rate (%) | 0.14 | Steam Price | 4.50 | ($/1000 lbs) | | | Quality | | 12800 | (Btu/lb) |
| Tax Rate (%) | 0.33 | Steam Demand | 300000 | (lbs/hr.) | | | Use | | 46.24 | (ton/hr) |
| Lead Time (yrs) | 2 | | | | | | | | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 |
| Off-Peak | | | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 |
| Energy Payment ($/MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 43.50 | 45.68 | 47.96 | 50.36 | 52.87 | 55.52 | 58.29 | 61.21 | 64.27 | 67.48 | 70.86 | 74.40 |
| Off-Peak | | | 28.52 | 29.95 | 31.44 | 33.02 | 34.67 | 36.40 | 38.22 | 40.13 | 42.14 | 44.24 | 46.46 | 48.78 |
| Electric Revenue (000s) | | | | | | | | | | | | | | |
| Energy | | | 20138 | 21145 | 22202 | 23312 | 24478 | 25702 | 26987 | 28336 | 29753 | 31240 | 32802 | 34443 |
| Capacity | | | 4758 | 4996 | 5246 | 5508 | 5783 | 6073 | 6376 | 6695 | 7030 | 7381 | 7750 | 8138 |
| Steam Revenue (000s) | | | 10800 | 11340 | 11907 | 12502 | 13127 | 13784 | 14473 | 15197 | 15957 | 16754 | 17592 | 18472 |
| Total Revenue (000s) | | | 35696 | 37481 | 39355 | 41322 | 43389 | 45558 | 47836 | 50228 | 52739 | 55376 | 58145 | 61052 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Coal | | | 11293 | 11858 | 12451 | 13073 | 13727 | 14413 | 15134 | 15891 | 16685 | 17519 | 18395 | 19315 |
| Rail | | | 6169 | 6477 | 6801 | 7141 | 7498 | 7873 | 8267 | 8680 | 9114 | 9570 | 10049 | 10551 |
| O & M | | | 3146 | 3366 | 3602 | 3338 | 3572 | 3822 | 4089 | 4375 | 4682 | 5009 | 5360 | 5735 |
| Interconnection Fee | | | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| Insurance | | | [illegible] | 595 | 625 | 656 | 689 | 724 | 760 | 798 | 838 | 880 | 924 | 970 |
| Property Taxes | | | 554 | 568 | 582 | 597 | 612 | 627 | 642 | 659 | 675 | 692 | 709 | 727 |
| Management Fee | | | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| Interest | | | 7154 | 6784 | 6362 | 5881 | 5333 | 4709 | 3996 | 3184 | 2258 | 1203 | | |
| Depreciation ACRS | | | 10950 | 16060 | 15330 | 15330 | 15330 | | | | | | | |
| Total Expenses (000s) | | | 41993 | 47869 | 47913 | 48177 | 48921 | 34328 | 35048 | 35747 | 36412 | 37033 | 37597 | 39458 |
| Pre-Tax Income | | | -6297 | -10388 | -8558 | -6854 | -5532 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI+ Depreciation | | | 4653 | 5672 | 6772 | 8476 | 9798 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Debt Funds | | | 51100 | | | | | | | | | | | |
| Equity Funds | 3285 | 3285 | 15330 | | | | | | | | | | | |
| Total Sources | 3285 | 3285 | 71083 | 5672 | 6772 | 8476 | 9798 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 3285 | 3285 | 66430 | | | | | | | | | | | |
| Debt Repayment | | | 2642 | 3012 | 3434 | 3915 | 4463 | 5088 | 5800 | 6612 | 7538 | 8593 | | |
| Total Uses | 3285 | 3285 | 69072 | 3012 | 3434 | 3915 | 4463 | 5088 | 5800 | 6612 | 7538 | 8593 | | |
| Funds Available (000s) | 0 | 0 | 2011 | 2660 | 3338 | 4561 | 5335 | 6142 | 6987 | 7869 | 8789 | 9750 | 20548 | 21594 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -6297 | -10388 | -8558 | -6854 | -5532 | 11230 | 12787 | 14481 | 16327 | 18343 | 20548 | 21594 |
| Income Taxes @ 33% | | | -2078 | -3428 | -2824 | -2262 | -1826 | 3706 | 4220 | 4779 | 5388 | 6053 | 6781 | 7126 |
| Federal Tax Credit | | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 2078 | 3428 | 2824 | 2262 | 1826 | -3706 | -4220 | -4779 | -5388 | -6053 | -6781 | -7126 |
| After Tax Net Equity Cash Flow | -3285 | -3285 | -11241 | 6088 | 6162 | 6823 | 7160 | 2436 | 2768 | 3090 | 3401 | 3697 | 13767 | 14468 |
| IRR on Equity | 0.259 | | | | | | | | | | | | | |
| Project Cash Flow | -3285 | -3285 | -54906 | 13645 | 13858 | 14678 | 15197 | 10679 | 11245 | 11836 | 12452 | 13096 | 13767 | 14468 |
| Project IRR | 0.175 | | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 48131.83 | | | | | | | | | | | | | |

CCRS + ALT. MIN. TAX

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Coal-Fired Cogeneration | (10/8/85) | | | | | | | | | |
| | | Assumptions | | | | | | | | Esc. |
| Capacity (MW) | 75 | Energy Payment | | ($/kWh) | Cap. Factor | Load Profile(hrs/day) | | | ($/ton) | Factor |
| Capital Cost (Million$) | 73.0 | On-Peak | 0.0435 | | 0.92 | 10.71 | Coal | | 32.80 | 1.05 |
| Capacity Factor (Avg.) | 0.85 | Off-Peak | 0.0285 | | 0.81 | 13.29 | Rail | | 17.92 | 1.05 |
| Debt Fraction | 0.70 | Cap. Payment | | | | | | | | |
| Loan Term (Yrs) | 10 | On-Peak | 0.0176 | | | | | | Coal | |
| Interest Rate (%) | 0.14 | Steam Price | 4.50 ($/1000 lbs) | | | | Quality | | 12800 | (Btu/lb) |
| Tax Rate (%) | 0.33 | Steam Demand | 300000 (lbs/hr.) | | | | Use | | 46.24 | (ton/hr) |
| Lead Time (yrs) | 2 | | | | | | | | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Electric Output (MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 | 269731 |
| Off-Peak | | | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 | 294689 |
| Energy Payment ($/MWh) | | | | | | | | | | | | | | |
| On-Peak | | | 43.50 | 45.68 | 47.96 | 50.36 | 52.87 | 55.52 | 58.29 | 61.21 | 64.27 | 67.48 | 70.86 | 74.40 |
| Off-Peak | | | 28.52 | 29.95 | 31.44 | 33.02 | 34.67 | 36.40 | 38.22 | 40.13 | 42.14 | 44.24 | 46.46 | 48.78 |
| Electric Revenue (000s) | | | | | | | | | | | | | | |
| Energy | | | 20138 | 21145 | 22202 | 23312 | 24470 | 25702 | 26987 | 28336 | 29753 | 31240 | 32802 | 34443 |
| Capacity | | | 4750 | 4996 | 5246 | 5508 | 5783 | 6073 | 6376 | 6695 | 7030 | 7381 | 7750 | 8138 |
| Steam Revenue (000s) | | | 10800 | 11340 | 11907 | 12502 | 13127 | 13784 | 14473 | 15197 | 15957 | 16754 | 17592 | 18472 |
| Total Revenue (000s) | | | 35696 | 37481 | 39355 | 41322 | 43389 | 45558 | 47836 | 50228 | 52739 | 55376 | 58145 | 61052 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| Coal | | | 11293 | 11858 | 12451 | 13073 | 13727 | 14413 | 15134 | 15891 | 16685 | 17519 | 18395 | 19315 |
| Rail | | | 6169 | 6477 | 6801 | 7141 | 7498 | 7873 | 8267 | 8680 | 9114 | 9570 | 10049 | 10551 |
| O & M | | | 3146 | 3366 | 3602 | 3338 | 3572 | 3822 | 4089 | 4375 | 4682 | 5009 | 5360 | 5735 |
| Interconnection Fee | | | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| Insurance | | | 567 | 595 | 625 | 656 | 689 | 724 | 760 | 798 | 838 | 880 | 924 | 970 |
| Property Taxes | | | 554 | 568 | 582 | 597 | 612 | 627 | 642 | 659 | 675 | 692 | 709 | 727 |
| Management Fee | | | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 | 2000 |
| Interest | | | 6132 | 5815 | 5453 | 5041 | 4571 | 4036 | 3425 | 2729 | 1936 | 1031 | 0 | 0 |
| Depreciation CCRS C5 | | | 6205 | 11099 | 10366 | 9052 | 7884 | 7373 | 7738 | 8183 | 8541 | 8986 | 4672 | |
| Total Expenses (000s) | | | 36226 | 42739 | 42040 | 41059 | 40713 | 41020 | 42215 | 43395 | 44631 | 45767 | 42269 | 39458 |
| Pre-Tax Income | | | -530 | -5258 | -2685 | 264 | 2676 | 4530 | 5620 | 6833 | 8108 | 9609 | 15876 | 21594 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI+ Depreciation | | | 5675 | 6641 | 7681 | 9316 | 10560 | 11903 | 13358 | 14936 | 16649 | 18515 | 20548 | 21594 |
| Debt Funds | | | 51100 | | | | | | | | | | | |
| Equity Funds | 3285 | 3285 | 15330 | | | | | | | | | | | |
| Total Sources | 3285 | 3285 | 72105 | 6641 | 7681 | 9316 | 10560 | 11903 | 13358 | 14936 | 16649 | 18515 | 20548 | 21594 |
| of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 3285 | 3285 | 66430 | | | | | | | | | | | |
| Debt Repayment | | | 2265 | 2582 | 2944 | 3356 | 3826 | 4361 | 4972 | 5668 | 6461 | 7366 | 0 | 0 |
| Total Uses | 3285 | 3285 | 68695 | 2582 | 2944 | 3356 | 3826 | 4361 | 4972 | 5668 | 6461 | 7366 | | |
| Funds Available (000s) | 0 | 0 | 3410 | 4059 | 4737 | 5960 | 6734 | 7542 | 8386 | 9268 | 10188 | 11149 | 20548 | 21594 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -530 | -5258 | -2685 | 264 | 2676 | 4530 | 5620 | 6833 | 8108 | 9609 | 15876 | 21594 |
| Income Taxes @ 33% | | | -175 | -1735 | -886 | 87 | 883 | 1495 | 1855 | 2255 | 2676 | 3171 | 5239 | 7126 |
| Federal Tax Credit | | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 175 | 1735 | 886 | -87 | -883 | -1495 | -1855 | -2255 | -2676 | -3171 | -5239 | -7126 |
| After Tax Net Equity Cash Flow | -3285 | -3285 | -11745 | 5794 | 5623 | 5073 | 5051 | 6047 | 6532 | 7013 | 7512 | 7978 | 15309 | 14468 |
| IRR on Equity | 0.283 | | | | | | | | | | | | | |
| Project Cash Flow | -3285 | -3285 | -56472 | 12272 | 12220 | 12606 | 12739 | 13112 | 13790 | 14510 | 15271 | 16035 | 15309 | 14468 |
| Project IRR | 0.168 | | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 30054.81 | | | | | | | | | | | | | |


| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| After Tax Net Equity Cash Flow | -3285 | -3285 | -11745 | 5794 | 5623 | 5073 | 5051 | 6047 | 6532 | 7013 | 7512 | 7978 | 15309 | 14468 |
| IRR on Equity | 0.283 | | | | | | | | | | | | | |
| Project Cash Flow | -3285 | -3285 | -56472 | 12272 | 12220 | 12606 | 12739 | 13112 | 13790 | 14510 | 15271 | 16035 | 15309 | 14468 |
| Project IRR | 0.168 | | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 30054.81 | | | | | | | | | | | | | |


| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alternative Minimum Tax | | | | | | | | | | | | | | |
| 20% of Interest Payments | | | 1533 | 1454 | 1363 | 1260 | 1143 | 1009 | 856 | 682 | 484 | 258 | 0 | 0 |
| Excess Depreciation | | | 1025 | 3205 | 2409 | 1679 | 1095 | 1095 | 1090 | 2701 | 3577 | 4307 | 438 | |
| Tax Preference | | | 1533 | 1454 | 1363 | 1260 | 1095 | 1009 | 856 | 682 | 484 | 258 | 0 | 0 |
| Alt. Min. Taxable Income | | | 970 | -3029 | -1347 | 1499 | 3746 | 5514 | 6452 | 7490 | 8567 | 9841 | 15051 | 21569 |
| Alt. Min. Tax | | | 196 | -766 | -269 | 300 | 749 | 1103 | 1290 | 1498 | 1713 | 1968 | 3170 | 4314 |
| Ending Tax | | | 196 | -766 | -269 | 300 | 883 | 1495 | 1855 | 2255 | 2676 | 3171 | 5239 | 7126 |
| Delta Base Case | | | -371 | -969 | -617 | -213 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| After Tax Net Equity Cash Flow | -3285 | -3285 | -12116 | 4025 | 5006 | 5660 | 5051 | 6047 | 6532 | 7013 | 7512 | 7978 | 15309 | 14468 |

Equity IRR adj for Alt Min Tax 0.265

BASE CASE

Landfill Gas Recovery (11/10/85)
Medium Btu/ Industrial User Texas 2MMCf/d

| | |
|---|---|
| Capacity | 2MMCf/d |
| Capital Cost | $1.217 M |
| Full Year Output | 277000 MBtu/yr |
| First Full Year O&M | $568 K |
| Year 1 APFC | $0.784/MBtu |
| Debt Fraction | 0 |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production (MMMBtu/yr) | | 139 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 |
| Price ($/MMBtu) | | 3.26 | 3.46 | 3.66 | 3.88 | 4.12 | 4.36 | 4.62 | 4.9 | 5.2 | 5.51 | 5.84 | 6.19 |
| Royalty (%) | | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| Net Revenue (000) | | 396 | 839 | 887 | 940 | 999 | 1057 | 1120 | 1188 | 1260 | 1335 | 1415 | 1500 |
| Expenses (000) | | | | | | | | | | | | | |
| O & M | 58 | 275 | 568 | 599 | 628 | 663 | 697 | 734 | 776 | 819 | 863 | 911 | 961 |
| Intangibles | 128 | 0 | 116 | 129 | 134 | 140 | 145 | 151 | 158 | 164 | 172 | 180 | 189 |
| Depreciation ACRS | | 155 | 228 | 217 | 217 | 217 | | | | | | | |
| Interest | | | | | | | | | | | | | |
| Debt Repayment | | | | | | | | | | | | | |
| Total Expenses | 186 | 430 | 912 | 945 | 979 | 1020 | 842 | 885 | 934 | 983 | 1035 | 1091 | 1150 |
| Pre-Tax Income | -186 | -34 | -73 | -58 | -39 | -22 | 215 | 235 | 254 | 277 | 300 | 324 | 350 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Income Taxes @46% | -86 | -15 | -34 | -27 | -18 | -10 | 99 | 108 | 117 | 128 | 138 | 149 | 161 |
| ITC | | 109 | | | | | | | | | | | |
| AFPC | | 95 | 200 | 211 | 224 | 237 | 251 | 266 | 283 | 288 | 306 | 324 | 343 |
| NPV @15% AFPC | 1210.7 | | | | | | | | | | | | |
| Tax Loss and ITC Carryforward method | | | | | | | | | | | | | |
| Total Carryforward | -86 | -210 | -244 | -270 | -288 | -298 | -199 | -91 | 0 | 0 | 0 | 0 | 0 |
| Taxes Paid | | | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 128 | 138 | 149 | 161 |
| Adjusted Net Equity Cash Flow | -1275 | 216 | 355 | 370 | 402 | 433 | 466 | 501 | 511 | 438 | 468 | 499 | 532 |
| IRR | 0.275 | | | | | | | | | | | | |
| NPV Depreciation @15% | 682.08 | | | | | | | | | | | | |

NO ITC, TAX RATE 33%

Landfill Gas Recovery (11/10/85)
Medium Btu/ Industrial User Texas 2MMCf/d

| | |
|---|---|
| Capacity | 2MMCf/d |
| Capital Cost | $1.217 M |
| Full Year Output | 277000 MBtu/yr |
| First Full Year O&M | $568 K |
| Year 1 APFC | $0.784/MBtu |
| Debt Fraction | 0 |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production (MMMBtu/yr) | | 139 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 |
| Price ($/MMBtu) | | 3.26 | 3.46 | 3.66 | 3.88 | 4.12 | 4.36 | 4.62 | 4.9 | 5.2 | 5.51 | 5.84 | 6.19 |
| Royalty (%) | | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| Net Revenue (000) | | 396 | 839 | 887 | 940 | 999 | 1057 | 1120 | 1188 | 1260 | 1335 | 1415 | 1500 |
| Expenses (000) | | | | | | | | | | | | | |
| O & M | 58 | 275 | 568 | 599 | 628 | 663 | 697 | 734 | 776 | 819 | 863 | 911 | 961 |
| Intangibles | 128 | 0 | 116 | 129 | 134 | 140 | 145 | 151 | 158 | 164 | 172 | 180 | 189 |
| Depreciation ACRS | | 163 | 240 | 229 | 229 | 229 | | | | | | | |
| Interest | | | | | | | | | | | | | |
| Debt Repayment | | | | | | | | | | | | | |
| Total Expenses | 186 | 438 | 924 | 957 | 991 | 1032 | 842 | 885 | 934 | 983 | 1035 | 1091 | 1150 |
| Pre-Tax Income | -186 | -42 | -85 | -70 | -50 | -33 | 215 | 235 | 254 | 277 | 300 | 324 | 350 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Income Taxes @33% | -61 | -14 | -28 | -23 | -17 | -11 | 71 | 77 | 84 | 92 | 99 | 107 | 116 |
| ITC | | 0 | | | | | | | | | | | |
| Tax Loss and ITC Carryforward method | | | | | | | | | | | | | |
| Total Carryforward | -61 | -75 | -103 | -126 | -143 | -154 | -83 | -5 | 0 | 0 | 0 | 0 | 0 |
| Taxes Paid | | | 0 | 0 | 0 | 0 | 0 | 0 | 78 | 92 | 99 | 107 | 116 |
| Adjusted Net Equity Cash Flow | -1275 | 121 | 155 | 159 | 178 | 196 | 215 | 235 | 175 | 186 | 201 | 217 | 235 |
| IRR | 0.094 | | | | | | | | | | | | |

NPV Depreciation @15% 718.02

NO AFPC

Landfill Gas Recovery (11/10/85)
Medium Btu/ Industrial User Texas 2MMCf/d

| | |
|---|---|
| Capacity | 2MMCf/d |
| Capital Cost | $1.217 M |
| Full Year Output | 277000 MBtu/yr |
| First Full Year O&M | $568 K |
| Year 1 APFC | $0.784/MBtu |
| Debt Fraction | 0 |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Production (MMMBtu/yr) | | 139 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 | 277 |
| Price ($/MMBtu) | | 3.26 | 3.46 | 3.66 | 3.88 | 4.12 | 4.36 | 4.62 | 4.9 | 5.2 | 5.51 | 5.84 | 6.19 |
| Royalty (%) | | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |
| Net Revenue (000) | | 396 | 839 | 887 | 940 | 999 | 1057 | 1120 | 1188 | 1260 | 1335 | 1415 | 1500 |
| Expenses (000) | | | | | | | | | | | | | |
| O & M | 58 | 275 | 568 | 599 | 628 | 663 | 697 | 734 | 776 | 819 | 863 | 911 | 961 |
| Intangibles | 128 | 0 | 116 | 129 | 134 | 140 | 145 | 151 | 158 | 164 | 172 | 180 | 189 |
| Depreciation ACRS | | 155 | 228 | 217 | 217 | 217 | | | | | | | |
| Interest | | | | | | | | | | | | | |
| Debt Repayment | | | | | | | | | | | | | |
| Total Expenses | 186 | 430 | 912 | 945 | 979 | 1020 | 842 | 885 | 934 | 983 | 1035 | 1091 | 1150 |
| Pre-Tax Income | -186 | -34 | -73 | -58 | -39 | -22 | 215 | 235 | 254 | 277 | 300 | 324 | 350 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Income Taxes @46% | -86 | -15 | -34 | -27 | -18 | -10 | 99 | 108 | 117 | 128 | 138 | 149 | 161 |
| ITC | | 109 | | | | | | | | | | | |
| Tax Loss and ITC Carryforward method | | | | | | | | | | | | | |
| Total Carryforward | -86 | -210 | -244 | -270 | -288 | -298 | -199 | -91 | 0 | 0 | 0 | 0 | 0 |
| Taxes Paid | | | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 128 | 138 | 149 | 161 |
| Adjusted Net Equity Cash Flow | -1275 | 121 | 155 | 159 | 178 | 196 | 215 | 235 | 228 | 150 | 162 | 175 | 189 |
| IRR | 0.088 | | | | | | | | | | | | |

NPV Depreciation @15% 682.08

Small Scale Wind Turbine: Limited Partnership (9/27/85)

| | | Assumptions | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.50 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.25 | | |
| CA State Credits | 0.25 (over 2 yrs) | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation ACRS | | 16111 | 23629 | 22555 | 22555 | 22555 | | | | | | | | |
| Total Expenses | | 26978 | 34162 | 32717 | 32300 | 31852 | 8707 | 8012 | 7297 | 6421 | 5389 | 4205 | 4466 | 4777 |
| Pre-Tax Income | | -15809 | -22336 | -20070 | -18668 | -16905 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30688 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | 30688 | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -15809 | -22336 | -20070 | -18668 | -16905 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Income Taxes @ 50% | | -7904 | -11168 | -10035 | -9334 | -8453 | 3613 | 4453 | 5632 | 6809 | 8064 | 9477 | 10168 | 10998 |
| Federal Tax Credits | 15344 | 15344 | | | | | | | | | | | | |
| State Tax Credits Net | 7672 | 7672 | | | | | | | | | | | | |
| Tax Savings (Liability) | 23016 | 30920 | 11168 | 10035 | 9334 | 8453 | -3613 | -4453 | -5632 | -6809 | -8064 | -9477 | -10168 | -10998 |
| After Tax Net Equity Cash Flow | -7672 | -2638 | 8843 | 8396 | 8520 | 8743 | -2498 | -2513 | -2309 | -2244 | -2256 | 9477 | 10168 | 10998 |
| IRR on Equity | | 0.472 | | | | | | | | | | | | |
| Project Cash Flow | -7672 | -56545 | 16535 | 16341 | 16753 | 17305 | 6440 | 6852 | 7544 | 8165 | 8786 | 9477 | 10168 | 10998 |
| Project IRR | | 0.162 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | | 70817.25 | | | | | | | | | | | | |

NO ENERGY TAX CREDIT

Small Scale Wind Turbine: Limited Partnership (9/27/85)

| | | Assumptions | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.50 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.10 | | |
| CA State Credits | 0.25 (over 2 yrs) | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation ACRS | | 17492 | 25655 | 24489 | 24489 | 24489 | | | | | | | | |
| Total Expenses | | 28359 | 36188 | 34650 | 34234 | 33785 | 8707 | 8012 | 7297 | 6421 | 5389 | 4205 | 4466 | 4777 |
| Pre-Tax Income | | -17190 | -24362 | -22003 | -20601 | -18839 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30688 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | 30688 | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -17190 | -24362 | -22003 | -20601 | -18839 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Income Taxes @ 50% | | -8595 | -12181 | -11002 | -10300 | -9419 | 3613 | 4453 | 5632 | 6809 | 8064 | 9477 | 10168 | 10998 |
| Federal Tax Credits | 6138 | 6138 | | | | | | | | | | | | |
| State Tax Credits Net | 7672 | 7672 | | | | | | | | | | | | |
| Tax Savings (Liability) | 13809 | 22404 | 12181 | 11002 | 10300 | 9419 | -3613 | -4453 | -5632 | -6809 | -8064 | -9477 | -10168 | -10998 |
| After Tax Net Equity Cash Flow | -16878 | -11154 | 9856 | 9363 | 9486 | 9710 | -2498 | -2513 | -2309 | -2244 | -2256 | 9477 | 10168 | 10998 |
| IRR on Equity | | 0.140 | | | | | | | | | | | | |
| Project Cash Flow | -16878 | -65060 | 17547 | 17307 | 17720 | 18272 | 6440 | 6852 | 7544 | 8165 | 8786 | 9477 | 10168 | 10998 |
| Project IRR | | 0.107 | | | | | | | | | | | | |

NPV Depreciation @ 15% 76887.30

NO ETC, NO ITC

Small Scale Wind Turbine: Limited Partnership (9/27/85)

Assumptions

| | | | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.50 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.00 | | |
| CA State Credits | 0.25 (over 2 yrs) | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation ACRS | | 18413 | 27005 | 25778 | 25778 | 25778 | | | | | | | | |
| Total Expenses | | 29279 | 37538 | 35939 | 35523 | 35074 | 8707 | 8012 | 7297 | 6421 | 5389 | 4205 | 4466 | 4777 |
| Pre-Tax Income | | -18110 | -25712 | -23292 | -21890 | -20127 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30688 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | 30688 | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -18110 | -25712 | -23292 | -21890 | -20127 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Income Taxes @ 50% | | -9055 | -12856 | -11646 | -10945 | -10064 | 3613 | 4453 | 5632 | 6809 | 8064 | 9477 | 10168 | 10998 |
| Federal Tax Credits | 0 | 0 | | | | | | | | | | | | |
| State Tax Credits Net | 7672 | 7672 | | | | | | | | | | | | |
| Tax Savings (Liability) | 7672 | 16727 | 12856 | 11646 | 10945 | 10064 | -3613 | -4453 | -5632 | -6809 | -8064 | -9477 | -10168 | -10998 |
| After Tax Net Equity Cash Flow | -23016 | -16831 | 10531 | 10007 | 10131 | 10354 | -2498 | -2513 | -2309 | -2244 | -2256 | 9477 | 10168 | 10998 |
| IRR on Equity | | 0.072 | | | | | | | | | | | | |
| Project Cash Flow | -23016 | -70738 | 18223 | 17952 | 18364 | 18916 | 6440 | 6852 | 7544 | 8165 | 8786 | 9477 | 10168 | 10998 |
| Project IRR | | 0.080 | | | | | | | | | | | | |

NPV Depreciation @ 15% 80934.00

CCRS

Small Scale Wind Turbine: Limited Partnership (9/27/85)

| | | Assumptions | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.50 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.00 | | |
| CA State Credits | 0.25 | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation CCRS C5 | | 10434 | 20008 | 17431 | 15221 | 13257 | 12398 | 13012 | | | | | | |
| Total Expenses | | 21301 | 30541 | 27592 | 24966 | 22554 | 21105 | 21024 | 7297 | 6421 | 5389 | 4205 | 4466 | 4777 |
| Pre-Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30687 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Income Taxes @ 50% | | -5066 | -9358 | -7473 | -5667 | -3803 | -2586 | -2053 | 5632 | 6809 | 8064 | 9477 | 10168 | 10998 |
| Federal Tax Credits | 0 | 0 | | | | | | | | | | | | |
| State Tax Credits Net | 7672 | 7672 | | | | | | | | | | | | |
| Tax Savings (Liability) | 7672 | 12738 | 9358 | 7473 | 5667 | 3803 | 2586 | 2053 | -5632 | -6809 | -8064 | -9477 | -10168 | -10998 |
| After Tax Net Equity Cash Flow | -23016 | -20821 | 7032 | 5834 | 4852 | 4094 | 3701 | 3993 | -2309 | -2244 | -2256 | 9477 | 10168 | 10998 |
| IRR on Equity | | 0.082 | | | | | | | | | | | | |
| Project Cash Flow | -23016 | -74727 | 14724 | 13778 | 13086 | 12656 | 12639 | 13358 | 7544 | 8165 | 8786 | 9477 | 10168 | 10998 |
| Project IRR | | 0.084 | | | | | | | | | | | | |

NPV Depreciation @ 15% 75134.83

CCRS, TAX RATE = 35%

Small Scale Wind Turbine: Limited Partnership (9/27/85)

| | | Assumptions | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.35 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.00 | | |
| CA State Credits | 0.25 | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation CCRS CS | | 10434 | 20008 | 17431 | 15221 | 13257 | 12398 | 13012 | 13625 | 14362 | 14976 | 7856 | | |
| Total Expenses | | 21301 | 30541 | 27592 | 24966 | 22554 | 21105 | 21024 | 20922 | 20783 | 20364 | 12061 | 4466 | 4777 |
| Pre-Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | -2362 | -744 | 1152 | 11098 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30687 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | -2362 | -744 | 1152 | 11098 | 20335 | 21996 |
| Income Taxes @ 35% | | -3546 | -6550 | -5231 | -3967 | -2662 | -1810 | -1437 | -827 | -260 | 403 | 3884 | 7117 | 7699 |
| Federal Tax Credits | 0 | 0 | | | | | | | | | | | | |
| State Tax Credits Net | 9973 | 9973 | | | | | | | | | | | | |
| Tax Savings (Liability) | 9973 | 13520 | 6550 | 5231 | 3967 | 2662 | 1810 | 1437 | 827 | 260 | -403 | -3884 | -7117 | -7699 |
| After Tax Net Equity Cash Flow | -20714 | -20039 | 4225 | 3592 | 3152 | 2953 | 2925 | 3377 | 4150 | 4826 | 5404 | 15070 | 13218 | 14297 |
| IRR on Equity | | 0.078 | | | | | | | | | | | | |
| Project Cash Flow | -20714 | -72656 | 13139 | 12683 | 12446 | 12476 | 12711 | 13462 | 14575 | 15641 | 16663 | 15070 | 13218 | 14297 |
| Project IRR | | 0.094 | | | | | | | | | | | | |

NPV Depreciation @ 15% 75134.83

NON-DEDUCTIBILITY OF STATE TAXES

Small Scale Wind Turbine: Limited Partnership (9/27/85)

| | Assumptions | | |
|---|---|---|---|
| Capacity (kW) | 75.00 | | |
| Capital Cost (000s) | 122.75 | O&M Cost | 0.10 (of revenues) |
| Capacity Factor | 0.25 | Avoided | |
| Debt Fraction | 0.50 | Cost | SCE S04 |
| Interest Rate | 0.14 | Lead Time (yrs) | 1 |
| Tax Rate | 0.35 | Loan Term (yrs) | 10 |
| Federal Tax Credits | 0.00 | | |
| CA State Credits | 0.25 | | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (kWh) | | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 | 164250 |
| Avoided Cost ($/kWh) | | | | | | | | | | | | | | |
| Energy | | 0.057 | 0.060 | 0.064 | 0.069 | 0.076 | 0.081 | 0.086 | 0.093 | 0.101 | 0.109 | 0.118 | 0.126 | 0.136 |
| Capacity | | 0.011 | 0.012 | 0.013 | 0.014 | 0.015 | 0.016 | 0.017 | 0.020 | 0.021 | 0.022 | 0.023 | 0.025 | 0.027 |
| Total | | 0.068 | 0.072 | 0.077 | 0.083 | 0.091 | 0.097 | 0.103 | 0.113 | 0.122 | 0.131 | 0.141 | 0.151 | 0.163 |
| Revenue | | 11169 | 11826 | 12647 | 13633 | 14947 | 15932 | 16918 | 18560 | 20039 | 21517 | 23159 | 24802 | 26773 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses | | | | | | | | | | | | | | |
| O & M | | 1117 | 1183 | 1265 | 1363 | 1495 | 1593 | 1692 | 1856 | 2004 | 2152 | 2316 | 2480 | 2677 |
| Property Tax | | 600 | 612 | 624 | 637 | 649 | 662 | 676 | 689 | 703 | 717 | 731 | 746 | 761 |
| Land Rent | | 558 | 591 | 632 | 682 | 747 | 797 | 846 | 928 | 1002 | 1076 | 1158 | 1240 | 1339 |
| Interest | | 8592 | 8147 | 7640 | 7063 | 6405 | 5655 | 4799 | 3823 | 2712 | 1444 | | | |
| Depreciation CCRS C5 | | 10434 | 20008 | 17431 | 15221 | 13257 | 12398 | 13012 | 13625 | 14362 | 14976 | 7856 | | |
| Total Expenses | | 21301 | 30541 | 27592 | 24966 | 22554 | 21105 | 21024 | 20922 | 20783 | 20364 | 12061 | 4466 | 4777 |
| Pre-Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | -2362 | -744 | 1152 | 11098 | 20335 | 21996 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | 302 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Debt Funds | | 61375 | | | | | | | | | | | | |
| Equity Funds | 30688 | 30688 | | | | | | | | | | | | |
| Total Sources | 30687 | 92365 | 1293 | 2485 | 3888 | 5650 | 7225 | 8905 | 11264 | 13618 | 16128 | 18954 | 20335 | 21996 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 30688 | 92063 | | | | | | | | | | | | |
| Debt Repayment | | 3173 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Total Uses | | 95235 | 3618 | 4124 | 4702 | 5359 | 6111 | 6966 | 7940 | 9052 | 10320 | | | |
| Funds Available | | -2871 | -2325 | -1639 | -814 | 291 | 1115 | 1940 | 3323 | 4565 | 5808 | 18954 | 20335 | 21996 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre -Tax Income | | -10132 | -18715 | -14945 | -11333 | -7607 | -5172 | -4106 | -2362 | -744 | 1152 | 11098 | 20335 | 21996 |
| Income Taxes @ 35% | | -3546 | -6550 | -5231 | -3967 | -2662 | -1810 | -1437 | -827 | -260 | 403 | 3884 | 7117 | 7699 |
| Federal Tax Credits | 0 | 0 | | | | | | | | | | | | |
| State Tax Credits Net | 15344 | 15344 | | | | | | | | | | | | |
| Tax Savings (Liability) | 15344 | 18890 | 6550 | 5231 | 3967 | 2662 | 1810 | 1437 | 827 | 260 | -403 | -3884 | -7117 | -7699 |
| After Tax Net Equity Cash Flow | -15344 | -14669 | 4225 | 3592 | 3152 | 2953 | 2925 | 3377 | 4150 | 4826 | 5404 | 15070 | 13218 | 14297 |
| IRR on Equity | | 0.122 | | | | | | | | | | | | |
| Project Cash Flow | -15344 | -67286 | 13139 | 12683 | 12446 | 12476 | 12711 | 13462 | 14575 | 15641 | 16663 | 15070 | 13218 | 14297 |
| Project IRR | | 0.119 | | | | | | | | | | | | |

BASECASE

Small Hydro Project: Limited Partnership (10/7/85)

| | Assumptions |
|---|---|
| Capacity (MW) | 2.2 |
| Capital Cost (Million $) | 6.4 |
| Capacity Factor | 0.49 |
| Debt Fraction | 0.56 |
| Loan Term (yrs) | 12 |
| Interest Rate | 0.135 |
| Avoided Cost ($/MWh) | 80 |
| Federal Tax Credits | 0.21 |
| NY State ITC | 0.06 |
| Lead Time (yrs) | 2 |
| Tax Rate | 0.50 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation ACRS | | | 859 | 1260 | 1203 | 1203 | 1203 | | | | | | | |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1412 | 1798 | 1724 | 1703 | 1680 | 451 | 420 | 386 | 346 | 300 | 248 | 188 |
| Pre-Tax Income (000s) | | | -657 | -1013 | -906 | -853 | -788 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -657 | -1013 | -906 | -853 | -788 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Income Taxes @50% | | | -328 | -506 | -453 | -427 | -394 | 243 | 282 | 324 | 370 | 419 | 474 | 534 |
| Federal Tax Credits | | | 1344 | | | | | | | | | | | |
| State Tax Credits Net | | | 192 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 1864 | 506 | 453 | 427 | 394 | -243 | -282 | -324 | -370 | -419 | -474 | -534 |
| After Tax Net Equity Cash Flow | -563 | -282 | -40 | 600 | 575 | 577 | 583 | -13 | -9 | -6 | -5 | -6 | -9 | -14 |
| IRR on Equity | 0.274 | | | | | | | | | | | | | |
| Project Cash Flow | -563 | -282 | -3245 | 988 | 973 | 988 | 1007 | 426 | 447 | 470 | 493 | 518 | 544 | 571 |
| Project IRR | 0.128 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 3776.700 | | | | | | | | | | | | | |

NO ENERGY TAX CREDIT (ETC)

| Small Hydro Project: | Limited Partnership Assumptions | (10/7/85) |
|---|---|---|
| Capacity (MW) | 2.2 | |
| Capital Cost (Million $) | 6.4 | |
| Capacity Factor | 0.49 | |
| Debt Fraction | 0.56 | |
| Loan Term (yrs) | 12 | |
| Interest Rate | 0.135 | |
| Avoided Cost ($/MWh) | 80 | |
| Federal Tax Credits | 0.10 | |
| NY State ITC | 0.06 | |
| Lead Time (yrs) | 2 | |
| Tax Rate | 0.50 | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation ACRS | | | 912 | 1338 | 1277 | 1277 | 1277 | | | | | | | |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1465 | 1876 | 1797 | 1777 | 1754 | 451 | 420 | 386 | 346 | 300 | 248 | 188 |
| Pre-Tax Income (000s) | | | -710 | -1090 | -980 | -927 | -862 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -710 | -1090 | -980 | -927 | -862 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Income Taxes @50% | | | -355 | -545 | -490 | -464 | -431 | 243 | 282 | 324 | 370 | 419 | 474 | 534 |
| Federal Tax Credits | | | 640 | | | | | | | | | | | |
| State Tax Credits Net | | | 192 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 1187 | 545 | 490 | 464 | 431 | -243 | -282 | -324 | -370 | -419 | -474 | -534 |
| After Tax Net Equity Cash Flow | -563 | -282 | -718 | 638 | 612 | 614 | 620 | -13 | -9 | -6 | -5 | -6 | -9 | -14 |
| IRR on Equity | 0.144 | | | | | | | | | | | | | |
| Project Cash Flow | -563 | -282 | -3923 | 1026 | 1010 | 1025 | 1044 | 426 | 447 | 470 | 493 | 518 | 544 | 571 |
| Project IRR | 0.098 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 4008.788 | | | | | | | | | | | | | |

NO ETC, NO INVESTMENT TAX CREDIT

Small Hydro Project: Limited Partnership (10/7/85)

Assumptions

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (MW) | 2.2 | | | | | | | | | | | | | |
| Capital Cost (Million $) | 6.4 | | | | | | | | | | | | | |
| Capacity Factor | 0.49 | | | | | | | | | | | | | |
| Debt Fraction | 0.56 | | | | | | | | | | | | | |
| Loan Term (yrs) | 12 | | | | | | | | | | | | | |
| Interest Rate | 0.135 | | | | | | | | | | | | | |
| Avoided Cost ($/MWh) | 80 | | | | | | | | | | | | | |
| Federal Tax Credits | 0.00 | | | | | | | | | | | | | |
| NY State ITC | 0.06 | | | | | | | | | | | | | |
| Lead Time (yrs) | 2 | | | | | | | | | | | | | |
| Tax Rate | 0.50 | | | | | | | | | | | | | |
| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation ACRS | | | 960 | 1408 | 1344 | 1344 | 1344 | | | | | | | |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1513 | 1946 | 1865 | 1844 | 1821 | 451 | 420 | 386 | 346 | 300 | 248 | 188 |
| Pre-Tax Income (000s) | | | -758 | -1161 | -1048 | -994 | -929 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -758 | -1161 | -1048 | -994 | -929 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Income Taxes @50% | | | -379 | -580 | -524 | -497 | -464 | 243 | 282 | 324 | 370 | 419 | 474 | 534 |
| Federal Tax Credits | | | 0 | | | | | | | | | | | |
| State Tax Credits Net | | | 192 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 571 | 580 | 524 | 497 | 464 | -243 | -282 | -324 | -370 | -419 | -474 | -534 |
| After Tax Net Equity Cash Flow | -563 | -282 | -1334 | 674 | 645 | 648 | 654 | -13 | -9 | -6 | -5 | -6 | -9 | -14 |
| IRR on Equity | 0.055 | | | | | | | | | | | | | |
| Project Cash Flow | -563 | -282 | -4539 | 1062 | 1044 | 1058 | 1078 | 426 | 447 | 470 | 493 | 518 | 544 | 571 |
| Project IRR | 0.075 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 4219.777 | | | | | | | | | | | | | |

CCRS

Small Hydro Project: Limited Partnership (10/7/85)

| | Assumptions |
|---|---|
| Capacity (MW) | 2.2 |
| Capital Cost (Million $) | 6.4 |
| Capacity Factor | 0.49 |
| Debt Fraction | 0.56 |
| Loan Term (yrs) | 12 |
| Interest Rate | 0.135 |
| Avoided Cost ($/MWh) | 80 |
| Federal Tax Credits | 0 |
| NY State ITC | 0.06 |
| Lead Time (yrs) | 2 |
| Tax Rate | 0.50 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation CCRS C5 | | | 544 | 1043 | 909 | 794 | 691 | 646 | 678 | 710 | 749 | 781 | 410 | 0 |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1097 | 1582 | 1429 | 1294 | 1168 | 1098 | 1099 | 1096 | 1094 | 1081 | 657 | 188 |
| Pre-Tax Income (000s) | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Income Taxes @50% | | | -171 | -398 | -306 | -222 | -138 | -80 | -58 | -32 | -5 | 29 | 269 | 534 |
| Tax Credits: Federal | | | 0 | | | | | | | | | | | |
| State Tax Credits Net | | | 192 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 363 | 398 | 306 | 222 | 138 | 80 | 58 | 32 | 5 | -29 | -269 | -534 |
| After Tax Net Equity Cash Flow | -563 | -282 | -1542 | 491 | 428 | 373 | 327 | 310 | 330 | 349 | 369 | 385 | 196 | -14 |
| IRR on Equity | 0.076 | | | | | | | | | | | | | |
| Project Cash Flows | -563 | -282 | -4747 | 879 | 826 | 783 | 751 | 749 | 786 | 825 | 867 | 908 | 748 | 571 |
| Project IRR | 0.080 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 3917.417 | | | | | | | | | | | | | |

CCRS, LOWER MARGINAL TAX RATE

Small Hydro Project: Limited Partnership (10/7/85)

| | Assumptions |
|---|---|
| Capacity (MW) | 2.2 |
| Capital Cost (Million $) | 6.4 |
| Capacity Factor | 0.49 |
| Debt Fraction | 0.56 |
| Loan Term (yrs) | 12 |
| Interest Rate | 0.135 |
| Avoided Cost ($/MWh) | 80 |
| Federal Tax Credits | 0 |
| NY State ITC | 0.06 |
| Lead Time (yrs) | 2 |
| Tax Rate | 0.35 |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation CCRS C5 | | | 544 | 1043 | 909 | 794 | 691 | 646 | 678 | 710 | 749 | 781 | 410 | 0 |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1097 | 1582 | 1429 | 1294 | 1168 | 1098 | 1099 | 1096 | 1094 | 1081 | 657 | 188 |
| Pre-Tax Income (000s) | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Income Taxes @35% | | | -120 | -279 | -214 | -155 | -97 | -56 | -40 | -22 | -3 | 20 | 188 | 374 |
| Tax Credits: Federal | | | 0 | | | | | | | | | | | |
| State Tax Credits Net | | | 250 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 369 | 279 | 214 | 155 | 97 | 56 | 40 | 22 | 3 | -20 | -188 | -374 |
| After Tax Net Equity Cash Flow | -563 | -282 | -1536 | 372 | 336 | 306 | 286 | 286 | 313 | 339 | 367 | 393 | 277 | 146 |
| IRR on Equity | 0.061 | | | | | | | | | | | | | |
| Project Cash Flows | -563 | -282 | -4668 | 830 | 801 | 780 | 769 | 780 | 819 | 859 | 903 | 946 | 850 | 742 |
| Project IRR | 0.088 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 3917.417 | | | | | | | | | | | | | |

CCRS, TAX RATE = 35%, NON-DEDUCTIBILITY OF STATE TAXES

| Small Hydro Project: | Limited Partnership Assumptions | (10/7/85) |
|---|---|---|
| Capacity (MW) | 2.2 | |
| Capital Cost (Million $) | 6.4 | |
| Capacity Factor | 0.49 | |
| Debt Fraction | 0.56 | |
| Loan Term (yrs) | 12 | |
| Interest Rate | 0.135 | |
| Avoided Cost ($/MWh) | 80 | |
| Federal Tax Credits | 0 | |
| NY State ITC | 0.06 | |
| Lead Time (yrs) | 2 | |
| Tax Rate | 0.35 | |

| Year | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output (MWh) | | | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 | 9443 |
| Avoided Cost ($/MWh) | | | 80 | 83 | 87 | 90 | 94 | 99 | 104 | 109 | 115 | 121 | 127 | 133 |
| Revenues (000s) | | | 755 | 786 | 817 | 850 | 892 | 937 | 984 | 1033 | 1085 | 1139 | 1196 | 1256 |
| Income Statement | | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | | |
| O & M | | | 40 | 42 | 44 | 46 | 49 | 51 | 54 | 56 | 59 | 62 | 65 | 68 |
| Insurance | | | 12 | 13 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Property Tax | | | 15 | 16 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Depreciation CCRS CS | | | 544 | 1043 | 909 | 794 | 691 | 646 | 678 | 710 | 749 | 781 | 410 | 0 |
| Interest | | | 486 | 468 | 447 | 423 | 396 | 366 | 331 | 292 | 247 | 197 | 139 | 74 |
| Total Expenses | | | 1097 | 1582 | 1429 | 1294 | 1168 | 1098 | 1099 | 1096 | 1094 | 1081 | 657 | 188 |
| Pre-Tax Income (000s) | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | | |
| PTI + Depreciation | | | 202 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Debt Funds | | | 3584 | | | | | | | | | | | |
| Equity Funds | 563 | 282 | 1971 | | | | | | | | | | | |
| Total Sources | 563 | 282 | 5758 | 247 | 296 | 350 | 415 | 486 | 563 | 647 | 739 | 838 | 948 | 1067 |
| Uses of Funds | | | | | | | | | | | | | | |
| Capital Equipment | 563 | 282 | 5555 | | | | | | | | | | | |
| Debt Repayment | | | 136 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Total Fixed Uses | 563 | 282 | 5691 | 154 | 175 | 199 | 226 | 256 | 291 | 330 | 375 | 425 | 483 | 548 |
| Funds Available (000s) | 0 | 0 | 66 | 93 | 121 | 151 | 189 | 230 | 272 | 317 | 364 | 413 | 465 | 519 |
| Tax Effect on Equity | | | | | | | | | | | | | | |
| Pre-Tax Income | | | -342 | -796 | -612 | -444 | -276 | -161 | -115 | -63 | -10 | 58 | 539 | 1067 |
| Income Taxes @35% | | | -120 | -279 | -214 | -155 | -97 | -56 | -40 | -22 | -3 | 20 | 188 | 374 |
| Tax Credits: Federal | | | 0 | | | | | | | | | | | |
| State Tax Credits Net | | | 384 | | | | | | | | | | | |
| Tax Savings (Liability) | | | 504 | 279 | 214 | 155 | 97 | 56 | 40 | 22 | 3 | -20 | -188 | -374 |
| After Tax Net Equity Cash Flow | -563 | -282 | -1401 | 372 | 336 | 306 | 286 | 286 | 313 | 339 | 367 | 393 | 277 | 146 |
| IRR on Equity | 0.072 | | | | | | | | | | | | | |
| Project Cash Flows | -563 | -282 | -4533 | 830 | 801 | 780 | 769 | 780 | 819 | 859 | 903 | 946 | 850 | 742 |
| Project IRR | 0.093 | | | | | | | | | | | | | |
| NPV Depreciation @15% | 3917.417 | | | | | | | | | | | | | |

BASECASE

Wood: Electric Only (10/8/85)

| | | | | |
|---|---|---|---|---|
| Plant Capacity (MW) | 10 | Assumptions | | |
| Capital Cost (Million $) | 14.4 | Fuel Price | 2.22 | ($/MBtu) |
| Capacity Factor | 0.70 | Heat Rate | 12150 | (Btu/kWh) |
| Debt Fraction | 0.40 | Infl. Rate | 0.05 | |
| Loan Term (yrs) | 10 | | | |
| Interest Rate | 0.14 | | | |
| Tax Rate | 0.50 | | | |
| Federal Tax Credits | 0.20 | | | |
| Lead Time (yrs) | 1 | | | |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output | | | | | | | | | | | | | |
| Electricity Sales (MWh) | | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 |
| Energy Price ($/kwh) | | 0.070 | 0.075 | 0.079 | 0.083 | 0.087 | 0.091 | 0.096 | 0.100 | 0.105 | 0.111 | 0.116 | 0.122 |
| Capacity ($/kwh) | | 0.016 | 0.017 | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 | 0.025 | 0.027 | 0.028 |
| Total Revenues (000s) | | 5274 | 5643 | 5925 | 6221 | 6532 | 6859 | 7202 | 7562 | 7940 | 8337 | 8754 | 9191 |
| Income Statement | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | |
| Fuelwood Cost | | 1651 | 1733 | 1820 | 1911 | 2006 | 2107 | 2212 | 2323 | 2439 | 2561 | 2689 | 2823 |
| O & M | | 1190 | 1249 | 1312 | 1377 | 1446 | 1519 | 1594 | 1674 | 1758 | 1846 | 1938 | 2035 |
| Insurance | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Property Tax | | 105 | 110 | 116 | 122 | 128 | 134 | 141 | 148 | 155 | 163 | 171 | 180 |
| Management Fee | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Interest | | 806 | 764 | 717 | 663 | 601 | 531 | 450 | 359 | 254 | 135 | 0 | 0 |
| Depreciation ACRS | | 1944 | 2851.2 | 2721.6 | 2721.6 | 2721.6 | | | | | | | |
| Total Expenses (000s) | | 5983 | 7010 | 7003 | 7128 | 7253 | 4658 | 4783 | 4909 | 5031 | 5151 | 5267 | 5530 |
| Pre-Tax Income (000s) | | -710 | -1368 | -1079 | -907 | -721 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | |
| PTI + Depreciation | | 1234 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Debt Funds | | 5760 | | | | | | | | | | | |
| Equity Funds | 2592 | 6048 | | | | | | | | | | | |
| Total Sources | 2592 | 13042 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Uses of Funds | | | | | | | | | | | | | |
| Capital Equipment | 2592 | 11808 | | | | | | | | | | | |
| Debt Repayment | | 298 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Total Uses | 2592 | 12106 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Funds Available (000s) | 0 | 936 | 1144 | 1256 | 1374 | 1498 | 1628 | 1765 | 1908 | 2059 | 2217 | 3487 | 3661 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Pre-Tax Income | | -710 | -1368 | -1079 | -907 | -721 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Income Taxes @ 50% | | -355 | -684 | -539 | -453 | -360 | 1100 | 1209 | 1326 | 1454 | 1593 | 1743 | 1831 |
| Federal Tax Credits | | 2880 | | | | | | | | | | | |
| Tax Savings (Liability) | | 3235 | 684 | 539 | 453 | 360 | -1100 | -1209 | -1326 | -1454 | -1593 | -1743 | -1831 |
| After Tax Net Equity Cash Flow | -2592 | -1877 | 1827 | 1795 | 1827 | 1858 | 527 | 555 | 581 | 604 | 624 | 1743 | 1831 |
| IRR on Equity | 0.260 | | | | | | | | | | | | |
| Project Cash Flow | -2592 | -6936 | 2549 | 2541 | 2600 | 2662 | 1366 | 1434 | 1506 | 1581 | 1660 | 1743 | 1831 |
| Project IRR | 0.179 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 8545.05 | | | | | | | | | | | | |

NO ENERGY TAX CREDIT

Wood: Electric Only (10/2/85)

| | |
|---|---|
| Plant Capacity (MW) | 10 |
| Capital Cost (Million $) | 14.4 |
| Capacity Factor | 0.70 |
| Debt Fraction | 0.40 |
| Loan Term (yrs) | 10 |
| Interest Rate | 0.14 |
| Tax Rate | 0.50 |
| Federal Tax Credits | 0.10 |
| Lead Time (yrs) | 1 |

Assumptions

| | |
|---|---|
| Fuel Price | 2.22 ($/MBtu) |
| Heat Rate | 12150 (Btu/kWh) |
| Infl. Rate | 0.05 |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output | | | | | | | | | | | | | |
| Electricity Sales (MWh) | | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 |
| Energy Price ($/kwh) | | 0.070 | 0.075 | 0.079 | 0.083 | 0.087 | 0.091 | 0.096 | 0.100 | 0.105 | 0.111 | 0.116 | 0.122 |
| Capacity ($/kwh) | | 0.016 | 0.017 | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 | 0.025 | 0.027 | 0.028 |
| Total Revenues (000s) | | 5274 | 5643 | 5925 | 6221 | 6532 | 6859 | 7202 | 7562 | 7940 | 8337 | 8754 | 9191 |
| Income Statement | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | |
| Fuelwood Cost | | 1651 | 1733 | 1820 | 1911 | 2006 | 2107 | 2212 | 2323 | 2439 | 2561 | 2689 | 2823 |
| O & M | | 1190 | 1249 | 1312 | 1377 | 1446 | 1519 | 1594 | 1674 | 1758 | 1846 | 1938 | 2035 |
| Insurance | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Property Tax | | 105 | 110 | 116 | 122 | 128 | 134 | 141 | 148 | 155 | 163 | 171 | 180 |
| Management Fee | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Interest | | 806 | 764 | 717 | 663 | 601 | 531 | 450 | 359 | 254 | 135 | 0 | 0 |
| Depreciation ACRS | | 2052 | 3010 | 2873 | 2873 | 2873 | | | | | | | |
| Total Expenses (000s) | | 6091 | 7169 | 7155 | 7279 | 7404 | 4658 | 4783 | 4909 | 5031 | 5151 | 5267 | 5530 |
| Pre-Tax Income (000s) | | -818 | -1526 | -1230 | -1058 | -872 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | |
| PTI + Depreciation | | 1234 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Debt Funds | | 5760 | | | | | | | | | | | |
| Equity Funds | 2592 | 6048 | | | | | | | | | | | |
| Total Sources | 2592 | 13042 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Uses of Funds | | | | | | | | | | | | | |
| Capital Equipment | 2592 | 11808 | | | | | | | | | | | |
| Debt Repayment | | 298 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Total Uses | 2592 | 12106 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Funds Available (000s) | 0 | 936 | 1144 | 1256 | 1374 | 1498 | 1628 | 1765 | 1908 | 2059 | 2217 | 3487 | 3661 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Pre-Tax Income | | -818 | -1526 | -1230 | -1058 | -872 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Income Taxes @ 50% | | -409 | -763 | -615 | -529 | -436 | 1100 | 1209 | 1326 | 1454 | 1593 | 1743 | 1831 |
| Federal Tax Credits | | 1440 | | | | | | | | | | | |
| Tax Savings (Liability) | | 1849 | 763 | 615 | 529 | 436 | -1100 | -1209 | -1326 | -1454 | -1593 | -1743 | -1831 |
| After Tax Net Equity Cash Flow | -2592 | -3263 | 1907 | 1871 | 1903 | 1934 | 527 | 555 | 581 | 604 | 624 | 1743 | 1831 |
| IRR on Equity | 0.195 | | | | | | | | | | | | |
| Project Cash Flow | -2592 | -8322 | 2629 | 2616 | 2675 | 2737 | 1366 | 1434 | 1506 | 1581 | 1660 | 1743 | 1831 |
| Project IRR | 0.149 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 9019.77 | | | | | | | | | | | | |

NO ETC, NO ITC

Wood: Electric Only (10/2/85)

| | | | | |
|---|---|---|---|---|
| Plant Capacity (MW) | 10 | Assumptions | | |
| Capital Cost (Million $) | 14.4 | Fuel Price | 2.22 | ($/MBtu) |
| Capacity Factor | 0.70 | Heat Rate | 12150 | (Btu/kWh) |
| Debt Fraction | 0.40 | Infl. Rate | 0.05 | |
| Loan Term (yrs) | 10 | | | |
| Interest Rate | 0.14 | | | |
| Tax Rate | 0.50 | | | |
| Federal Tax Credits | 0.00 | | | |
| Lead Time (yrs) | 1 | | | |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output | | | | | | | | | | | | | |
| Electricity Sales (MWh) | | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 |
| Energy Price ($/kwh) | | 0.070 | 0.075 | 0.079 | 0.083 | 0.087 | 0.091 | 0.096 | 0.100 | 0.105 | 0.111 | 0.116 | 0.122 |
| Capacity ($/kwh) | | 0.016 | 0.017 | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 | 0.025 | 0.027 | 0.028 |
| Total Revenues (000s) | | 5274 | 5643 | 5925 | 6221 | 6532 | 6859 | 7202 | 7562 | 7940 | 8337 | 8754 | 9191 |
| Income Statement | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | |
| Fuelwood Cost | | 1651 | 1733 | 1820 | 1911 | 2006 | 2107 | 2212 | 2323 | 2439 | 2561 | 2689 | 2823 |
| O & M | | 1190 | 1249 | 1312 | 1377 | 1446 | 1519 | 1594 | 1674 | 1758 | 1846 | 1938 | 2035 |
| Insurance | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Property Tax | | 105 | 110 | 116 | 122 | 128 | 134 | 141 | 148 | 155 | 163 | 171 | 180 |
| Management Fee | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Interest | | 806 | 764 | 717 | 663 | 601 | 531 | 450 | 359 | 254 | 135 | 0 | 0 |
| Depreciation ACRS | | 2160 | 3168 | 3024 | 3024 | 3024 | | | | | | | |
| Total Expenses (000s) | | 6199 | 7327 | 7306 | 7430 | 7555 | 4658 | 4783 | 4909 | 5031 | 5151 | 5267 | 5530 |
| Pre-Tax Income (000s) | | -926 | -1684 | -1381 | -1209 | -1023 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | |
| PTI + Depreciation | | 1234 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Debt Funds | | 5760 | | | | | | | | | | | |
| Equity Funds | 2592 | 6048 | | | | | | | | | | | |
| Total Sources | 2592 | 13042 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Uses of Funds | | | | | | | | | | | | | |
| Capital Equipment | 2592 | 11808 | | | | | | | | | | | |
| Debt Repayment | | 298 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Total Uses | 2592 | 12106 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | 0 | 0 |
| Funds Available (000s) | 0 | 936 | 1144 | 1256 | 1374 | 1498 | 1628 | 1765 | 1908 | 2059 | 2217 | 3487 | 3661 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Pre-Tax Income | | -926 | -1684 | -1381 | -1209 | -1023 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Income Taxes @ 50% | | -463 | -842 | -691 | -605 | -512 | 1100 | 1209 | 1326 | 1454 | 1593 | 1743 | 1831 |
| Federal Tax Credits | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | | 463 | 842 | 691 | 605 | 512 | -1100 | -1209 | -1326 | -1454 | -1593 | -1743 | -1831 |
| After Tax Net Equity Cash Flow | -2592 | -4649 | 1986 | 1946 | 1978 | 2009 | 527 | 555 | 581 | 604 | 624 | 1743 | 1831 |
| IRR on Equity | 0.148 | | | | | | | | | | | | |
| Project Cash Flow | -2592 | -9708 | 2708 | 2692 | 2751 | 2813 | 1366 | 1434 | 1506 | 1581 | 1660 | 1743 | 1831 |
| Project IRR | 0.124 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 9494.50 | | | | | | | | | | | | |

CCRS

| | | | | |
|---|---|---|---|---|
| Wood: Electric Only | (10/2/85) | | | |
| | | Assumptions | | |
| Plant Capacity (MW) | 10 | | | |
| Capital Cost (Million $) | 14.4 | Fuel Price | 2.22 | ($/MBtu) |
| Capacity Factor | 0.70 | Heat Rate | 12150 | (Btu/kWh) |
| Debt Fraction | 0.40 | Infl. Rate | 0.05 | |
| Loan Term (yrs) | 10 | | | |
| Interest Rate | 0.14 | | | |
| Tax Rate | 0.50 | | | |
| Federal Tax Credits | 0 | | | |
| Lead Time (yrs) | 1 | | | |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output | | | | | | | | | | | | | |
| Electricity Sales (MWh) | | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 |
| Energy Price ($/kwh) | | 0.070 | 0.075 | 0.079 | 0.083 | 0.087 | 0.091 | 0.096 | 0.100 | 0.105 | 0.111 | 0.116 | 0.122 |
| Capacity ($/kwh) | | 0.016 | 0.017 | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 | 0.025 | 0.027 | 0.028 |
| Total Revenues (000s) | | 5274 | 5643 | 5925 | 6221 | 6532 | 6859 | 7202 | 7562 | 7940 | 8337 | 8754 | 9191 |
| Income Statement | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | |
| Fuelwood Cost | | 1651 | 1733 | 1820 | 1911 | 2006 | 2107 | 2212 | 2323 | 2439 | 2561 | 2689 | 2823 |
| O & M | | 1190 | 1249 | 1312 | 1377 | 1446 | 1519 | 1594 | 1674 | 1758 | 1846 | 1938 | 2035 |
| Insurance | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Property Tax | | 105 | 110 | 116 | 122 | 128 | 134 | 141 | 148 | 155 | 163 | 171 | 180 |
| Management Fee | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Interest | | 806 | 764 | 717 | 663 | 601 | 531 | 450 | 359 | 254 | 135 | | |
| Depreciation CCRS CS | | 1224 | 2347 | 2045 | 1786 | 1555 | 1454 | 1526 | 1598 | 1685 | 1757 | 922 | |
| Total Expenses (000s) | | 5263 | 6506 | 6327 | 6192 | 6086 | 6112 | 6310 | 6507 | 6716 | 6908 | 6189 | 5530 |
| Pre-Tax Income (000s) | | 10 | -864 | -402 | 29 | 446 | 747 | 892 | 1055 | 1224 | 1429 | 2565 | 3661 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | |
| PTI + Depreciation | | 1234 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Debt Funds | | 5760 | | | | | | | | | | | |
| Equity Funds | 2592 | 6048 | | | | | | | | | | | |
| Total Sources | 2592 | 13042 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Uses of Funds | | | | | | | | | | | | | |
| Capital Equipment | 2592 | 11808 | | | | | | | | | | | |
| Debt Repayment | | 298 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | | |
| Total Uses | 2592 | 12106 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | | |
| Funds Available (000s) | 0 | 936 | 1144 | 1256 | 1374 | 1498 | 1628 | 1765 | 1908 | 2059 | 2217 | 3487 | 3661 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Pre-Tax Income | | 10 | -864 | -402 | 29 | 446 | 747 | 892 | 1055 | 1224 | 1429 | 2565 | 3661 |
| Income Taxes @ 50% | | 5 | -432 | -201 | 15 | 223 | 373 | 446 | 527 | 612 | 714 | 1283 | 1831 |
| Federal Tax Credits | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | | -5 | 432 | 201 | -15 | -223 | -373 | -446 | -527 | -612 | -714 | -1283 | -1831 |
| After Tax Net Equity Cash Flow | -2592 | -5117 | 1575 | 1457 | 1359 | 1275 | 1255 | 1318 | 1381 | 1447 | 1502 | 2204 | 1831 |
| IRR on Equity | 0.137 | | | | | | | | | | | | |
| Project Cash Flow | -2592 | -10176 | 2297 | 2202 | 2132 | 2079 | 2093 | 2197 | 2305 | 2424 | 2539 | 2204 | 1831 |
| Project IRR | 0.121 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 8814.19 | | | | | | | | | | | | |

CCRS, LOWER MARGINAL TAX RATE

| | | | | |
|---|---|---|---|---|
| Wood: Electric Only | (10/2/85) | | | |
| | | Assumptions | | |
| Plant Capacity (MW) | 10 | | | |
| Capital Cost (Million $) | 14.4 | Fuel Price | 2.22 | ($/MBtu) |
| Capacity Factor | 0.70 | Heat Rate | 12150 | (Btu/kWh) |
| Debt Fraction | 0.40 | Infl. Rate | 0.05 | |
| Loan Term (yrs) | 10 | | | |
| Interest Rate | 0.14 | | | |
| Tax Rate | 0.35 | | | |
| Federal Tax Credits | 0 | | | |
| Lead Time (yrs) | 1 | | | |

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Output | | | | | | | | | | | | | |
| Electricity Sales (MWh) | | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 | 61320 |
| Energy Price ($/kwh) | | 0.070 | 0.075 | 0.079 | 0.083 | 0.087 | 0.091 | 0.096 | 0.100 | 0.105 | 0.111 | 0.116 | 0.122 |
| Capacity ($/kwh) | | 0.016 | 0.017 | 0.018 | 0.019 | 0.020 | 0.021 | 0.022 | 0.023 | 0.024 | 0.025 | 0.027 | 0.028 |
| Total Revenues (000s) | | 5274 | 5643 | 5925 | 6221 | 6532 | 6859 | 7202 | 7562 | 7940 | 8337 | 8754 | 9191 |
| Income Statement | | | | | | | | | | | | | |
| Expenses (000s) | | | | | | | | | | | | | |
| Fuelwood Cost | | 1651 | 1733 | 1820 | 1911 | 2006 | 2107 | 2212 | 2323 | 2439 | 2561 | 2689 | 2823 |
| O & M | | 1190 | 1249 | 1312 | 1377 | 1446 | 1519 | 1594 | 1674 | 1758 | 1846 | 1938 | 2035 |
| Insurance | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Property Tax | | 105 | 110 | 116 | 122 | 128 | 134 | 141 | 148 | 155 | 163 | 171 | 180 |
| Management Fee | | 144 | 151 | 159 | 167 | 175 | 184 | 193 | 203 | 213 | 223 | 235 | 246 |
| Interest | | 806 | 764 | 717 | 663 | 601 | 531 | 450 | 359 | 254 | 135 | | |
| Depreciation CCRS CS | | 1224 | 2347 | 2045 | 1786 | 1555 | 1454 | 1526 | 1598 | 1685 | 1757 | 922 | |
| Total Expenses (000s) | | 5263 | 6506 | 6327 | 6192 | 6086 | 6112 | 6310 | 6507 | 6716 | 6908 | 6189 | 5530 |
| Pre-Tax Income (000s) | | 10 | -864 | -402 | 29 | 446 | 747 | 892 | 1055 | 1224 | 1429 | 2565 | 3661 |
| Pre-Tax Cash Flow | | | | | | | | | | | | | |
| Sources of Funds | | | | | | | | | | | | | |
| PTI + Depreciation | | 1234 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Debt Funds | | 5760 | | | | | | | | | | | |
| Equity Funds | 2592 | 6048 | | | | | | | | | | | |
| Total Sources | 2592 | 13042 | 1484 | 1643 | 1815 | 2001 | 2201 | 2419 | 2653 | 2909 | 3186 | 3487 | 3661 |
| Uses of Funds | | | | | | | | | | | | | |
| Capital Equipment | 2592 | 11808 | | | | | | | | | | | |
| Debt Repayment | | 298 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | | |
| Total Uses | 2592 | 12106 | 340 | 387 | 441 | 503 | 573 | 654 | 745 | 850 | 969 | | |
| Funds Available (000s) | 0 | 936 | 1144 | 1256 | 1374 | 1498 | 1628 | 1765 | 1908 | 2059 | 2217 | 3487 | 3661 |
| Tax Effect on Equity | | | | | | | | | | | | | |
| Pre-Tax Income | | 10 | -864 | -402 | 29 | 446 | 747 | 892 | 1055 | 1224 | 1429 | 2565 | 3661 |
| Income Taxes @ 35% | | 4 | -302 | -141 | 10 | 156 | 261 | 312 | 369 | 428 | 500 | 898 | 1281 |
| Federal Tax Credits | | 0 | | | | | | | | | | | |
| Tax Savings (Liability) | | -4 | 302 | 141 | -10 | -156 | -261 | -312 | -369 | -428 | -500 | -898 | -1281 |
| After Tax Net Equity Cash Flow | -2592 | -5115 | 1446 | 1397 | 1364 | 1342 | 1367 | 1452 | 1539 | 1630 | 1717 | 2589 | 2380 |
| IRR on Equity | 0.148 | | | | | | | | | | | | |
| Project Cash Flow | -2592 | -10174 | 2168 | 2142 | 2136 | 2145 | 2205 | 2331 | 2463 | 2607 | 2753 | 2589 | 2380 |
| Project IRR | 0.129 | | | | | | | | | | | | |
| NPV Depreciation @ 15% | 8814.19 | | | | | | | | | | | | |

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