Sotereas Pantazes

Johns Hopkins University

Carey School of Business

Practicum in Real Estate Development

767.810

Advisor: David Sislen

Commercial Building Energy Consumption And the Evolution of the Solar Power Purchase Agreement

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1. Introduction

Since the beginning of time man has valued shelter. The size of his shelter, the efforts put behind its construction and maintenance add to the value and a sense of pride. This train of thought has started with where man sleeps, and transferred to where he works, commercial buildings are no exception to this. For centuries churches were constructed ornately to show man's dedication to a higher being. In the early 20th century builders in the United States began adding decorative window sills and even carving their names in stone above the building's entrance to show their mark. For years, the way a building had been constructed has been a showing of society during the time of construction.

Today, society has begun to realize that less can be more. "Less" does not mean using simpler methods or materials in the construction process, but "less" has begun to be defined as a building's ability to sustain itself and to minimize the amount of resources needed to keep the building operating. Today the goal of many buildings is to have a long lasting life, with a versatile array of uses, and to most importantly rely less on the need for outside sources for the building's own sustainability. One outside source is energy.

Energy consumption is a major factor on the operations of a commercial building. In the United States commercial buildings account for over 65% of energy consumption, 30% of all raw materials used, greenhouse gas emissions, and waste output. Plainly, commercial buildings have a significant impact on the environment.

In recent times, building managers and developers have realized this. Slowly, as the need to conserve environmental resources has evolved from a once radical thought to

an overall way of life, a group of building operators have found small and efficient ways to begin reducing the impact of buildings on the environment, and increasing their efficiency. The process began with recycling of common materials or ordinary trash, and then moved onto energy efficiency and using those recycled products back in the buildings as materials. Eventually benchmarks were set and tenants began to recognize the standards of a "Green Building", and turned their attention to how those buildings were developed. Ultimately, governments stepped in and provided incentives for efficient buildings, incentives which included tax breaks and even the threat of non-occupation by government agencies and authorities.

Today is an age of innovation, where the inventions of the 20th century have finally reached a stage where they can be tested and pushed beyond what their inventors ever thought possible. The goal of a "solar panel on every building" by New York's Mayor Bloomberg in late 2007 was not viewed by the public as outlandish, but as a real goal, a tangible and logical idea in today's energy aware society.

This movement has grown large and impacted the building industry which historically has remained reluctant to change over history with the exception of architectural design. Individual industries have grown to help facilitate this movement and the changes made may never be undone.

One key aspect to the "Greening of America", which was a term first utilized by Charles Reich in 1970 about peaceful revolution, is the need for society to change the way we develop, distribute, and use energy. Currently energy prices are on the rise because of a number of variables which have recently changed. Americans are realizing the prices for energy, which they have become to expect, were undervalued, and all

budgets (whether for an office building or a regular homeowner) have to change dramatically.

It is arguable that the most realistic, and inevitable resource that can be used for energy efficiency is the sun. Unlike other sources that are on the horizon, solar is the only energy source that beyond normal maintenence (which is very limited in solar panels which have no moving parts), requires external fuel. Solar only needs sunlight sunlight which occurs daily and is reliable in some geographic regions. Other sources need constant fuel to produce energy such as wind, which can relinquish for extended periods, coal and oil power plants pollute and they are traded commodities which can cause extreme price fluctuations, and wave technology, as well as others, has not yet developed enough to be sustainable or reliable.

Through a series of financing structures and the reduction in costs of production of solar energy which will become less expensive as more businesses enter this market. For this reason solar energy appears to be the emerging alternative energy leader.

History of Electricity in the Building Environment.

Over the course of modern civilization buildings have remained generally consistent as far as their construction, methods of construction, and basic fundamentals that make a building a building. At the very basis of any structure there is a (1) foundation, which is made of either rock, concrete, or some other solid substance, there is a (2) curtain wall and roof which protects the occupants from the outdoor elements, and there are the (3) interior components which define the building's use such as the differences between a warehouse and an office building.

A church constructed in Upper Marlboro, Maryland 300 years ago is virtually the same as a mega church constructed in that same area today (excluding size**).**

Saint Barnabas Church, *built 1704*

Evangel Church, Largo MD, *Built 2001*

Although the historic structure was constructed using different methods, the materials and purpose of each component of these two buildings are strikingly similar and serve the same goal in this example. Both buildings utilize arches to support the structure, both use post beams, have a rock/ solid foundation, and both have an interior that consists of a build out to serves a specific purpose. The only difference between these structures on a grand scheme is the historic church did not have the luxury of power tools and other modern marvels to help the construction process. The modern facility is, fundamentally, a large scale or exaggerated version of St. Barnabas Church. The modern tools however, are only used to aid a process of construction which remained generally similar between the two properties.

The one major and rare difference in this example is the vast contrast of the building's electrical system when both respective properties during the time of the initial completion. In 1704 when Saint Barnabas Church was constructed, civilization had not yet begun to utilize electricity. This historic church had to have electricity added to the

building at a later time and during the first three hundred years of its existence; the thought of electrical equipment was not even a concept known to its congregation. It is therefore arguable, that over the course of modern construction, the only significant change in building has been the utilization, and management of energy use and consumption.

Energy consumption in the United States was not a major issue during the mid to later part of the 20th Century. This was because electrical research was in its infancy and harnessing electricity for commercial use was not a viable option. Although electricity was first discovered around 500 B.C. when Greek experimenters first began studying this force, the first power plant was constructed in 1881 and was a steam system developed by Thomas Edison however even this was not accepted or widespread until years after.

2. The Energy Environment and Players Involved.

Electrical power is delivered to commercial buildings through a complex process that even the most savvy real estate investor may not completely understand. The "Power Grid" which was first developed in the early 20th century is still in wide use today and has generally remained unchanged. Our reliance on "The Grid" has increased drastically while the business models which supply this power have become equally complex. At every stage there are multiple contracts and agreements that effect the price of energy, and the reliability that a building will have uninterrupted power. For the most part, the United States has had no major problems with the power grid's reliability however; in the case of the "Northeast Blackout of 2003", and the rolling brownouts in California during the first years of the 21st century it is evident that even a modern system is subject to problems when tested under extreme stresses.

These variables have all added to the recent peak awareness of energy consumption and the attention to the costs associated with them. Because of this a market has grown and awareness among the players has been fostered.

In the energy market there are a number of players and circumstances that are involved with delivering every watt of power that a commercial building uses through the power grid. The power is first generated at a power plant by a plant management company, distributed by a utility company, and used by the consumer who sometimes can bill a tenant as part of the "CAM" fee, operating expense, or recoverable expense (depending on the lease structure).

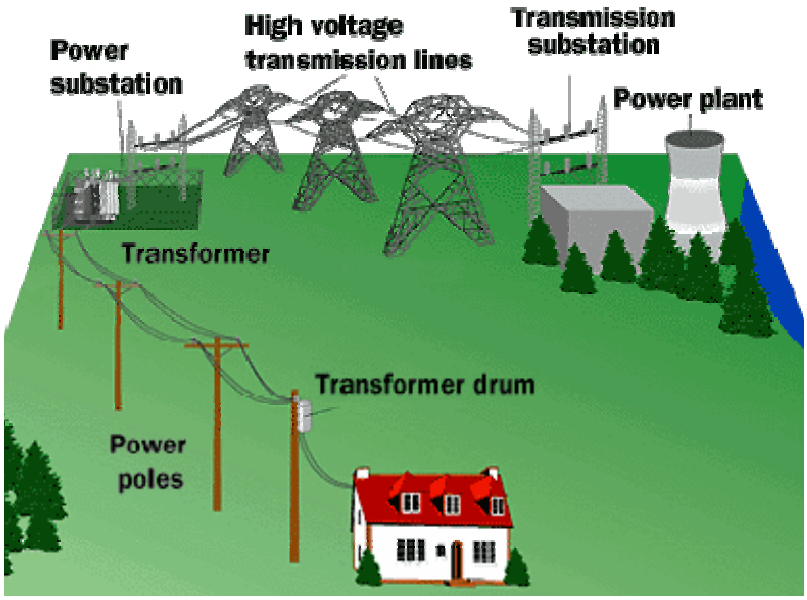


Image from www.howstuffworks.com

There are several players that may be involved in each of these steps, and every group will most certainly have a complex contract in order to perform or to supply their service. These agreements can be as simple as a regular consumer agreement on a residential home, or as complicated as a commercial power purchase agreement. Additionally, overseeing this entire process is most certainly a series government entities which will weigh in on consumer protection, distribution right of ways, power plant location and size, environmental regulations, as well as other areas that the government may see fit.

At the beginning of the process, electricity is generated by a power energy company (for example Constellation Energy http://www.constellation.com). In this model Constellation Energy is the provider. In the Northeast section of the United States the predominate power plants are powered by coal burning turbines. A coal plant is the second least expensive process to generate electricity only behind Nuclear. However, coal produces the highest amount of harmful pollution compared to other generation options. Because of this a series of benchmarks have been set and must be met before a

power plant location can be chosen. In fact, most jurisdictions do not even allow for a power plant in any zoning classification without a detailed and intricate hearing process. Even after this process the applicant is asking for a special exception therefore the likelihood of obtaining the permit to operate is timely, costly, and for practical purposes impossible.

A coal plant operates by burning coal to heat from which transforms water into steam. The steam is directed through a turbine that has a series of magnets embedded in it that, when in motion creates an electrical current. The current is then transferred onto the Distribution Grid and a distribution company will take over.

Once on the distribution grid another provider begins their involvement. This next group is in charge of distributing the electricity and delivering it to the consumer. The second provider has an agreement with the power plant operator to be the distributor of that power, and they will then agree to sell the power to the retail market* (retail market can be to either the consumer, or another electric distribution group who is in a jurisdiction where the electric rates may be higher). In Maryland the two largest distribution groups which perform this task are BGE (www.bge.com) and Pepco (www.pepco.com). Through a series of transmission lines, and switches, the electricity then finds it's way the consumer.

At this point the consumer can either be the end user or the landlord of a building as in most cases in commercial real estate. In an end user occupied situation, an end user has a contract with the power provider, the power provider bills the user for actual wattage used at an agreed upon price, and that is the end of the energy channel. In certain situations, which are common in office investment properties, the billed consumer is the

landlord, who will bill the tenant or asked to be reimbursed for the actual electrical usage (**see Exhibit I**.). Many times landlords will either ask a tenant to reimburse the landlord for the actual energy fees, or will ask that they pay this amount over a base year. **Exhibit I** shows these two examples and how a landlord will bill the tenant. Depending on how the lease is written, the landlord may ask for different amount of money to be reimbursed. Many times, larger energy consumers will hedge the risk of rising energy prices and seek a long term power purchase agreement with their utility provider.

A Power Purchase Agreement is a contract between the consumer and a provider who will provide energy to a user under a set of terms including a fixed price. The agreement will address minimums of energy provided, pricing, length of guaranteed price, and other terms which will all dictate how the risk of price fluctuation will be minimized. An example of a Power Purchase Agreement can be found in **Exhibit** II. Here an actual Power Purchase Agreement can be viewed which shows that the owner of this particular asset has entered into an agreement that he will be supplied electricity at a rate that is greater than current market rate, however because of the length of term, he will be guaranteed a rate throughout the life of this contract provided he meets certain criteria. The providers generally enter into such agreements because it will allow them to finance expansion or maintenance of their infrastructure. Consumers favor these agreements when they believe energy prices may rise and this can be utilized as a way to hedge against rising prices and help the consumer construct a budget where utility prices can be accurately forecasted.

Since Power Purchase Agreements allow for a user to guarantee the purchase of energy from the provider, businesses began to look beyond the historical providers and

"PPA's" which opened the door for a new type of provider. During this time, alternative energy providers began to emerge as new players. This new group, in certain circumstances, can construct a power plant within the confines of the property that uses the energy, and provides a percentage of the energy needed as well as satisfy the "Green Goals" of many groups.

The Introduction of Solar Energy

As time progressed and energy costs increased, so did the willingness of consumers to investigate new ways to cut expenses. Finding alternative energy sources quickly rose to the forefront and capital began to accumulate for tackling this cause. Wind, Geothermal, Ethanol, and other sources have been experimented with however, Solar has arguably become the focus of many researchers as it is seen to be the near term solution with the highest probability of use by the average consumer. This is because as of today's alternative energy a source, solar is the only financially viable source and is mostly unaddressed or prohibited by zoning codes.

In recent times consumers have become more environmentally, and fiscally aware of the often extreme expenses that can be associated with energy costs. In the mid 20th century, with the advent of luxuries such as the air conditioning system and other powerful electrical equipment, building users have come to expect a certain level of technology to be located within building before they can be deemed "habitable". This expanded further as the business community began to utilize equipment such as copy machines, facsimile, computers, and other electrical equipment that all combined have dramatically increased the amount of energy a building requires.

In the mid 1970's a small group of aware consumers began to notice this increase and a small environmental movement began. As the 20th century drew to a close the broader group of consumers, who pay for the energy they use, began to notice an increase in costs associated with energy usage. Many started making attempts to cut usage by purchasing energy efficient equipment. An example of which are electronics with an "Energy Star" rating.

Energy Star rated equipment is a federal government organized program that began in 1992 which alerts consumers to the efficiency of a particular piece of electronics. By setting a series of benchmarks a manufacturer can claim their products are Energy Star rated in their marketing efforts. Energy star ratings can be placed on equipment, appliances, and even homes or commercials buildings. In order to obtain the energy star rating a manufacturer must prove "superior" energy performance according to standards set by the US Environmental Protections Agency (EPA), and the U.S. Department of Energy. The goal is to reduce energy consumption and help consumers make decisions on new appliances that illustrate a level of conservation.

About this same time the initial members of the United States Green Building Council (USGBC) began meeting (1995). The "USGBC" was formed as a non-profit that defined itself simply as a "Community of leaders working to make green buildings accessible to everyone within a generation". Today the USGBC standard is the benchmark by which Green Buildings are defined. Their LEED (Leadership in Energy and Environmental Design) program, which sets a series of standards for a level of environmental sensitivity obtained, has been written in government policies and adopted by developers as the way to illustrate how efficient a building is.

USGBC announced their first LEED program in 2000. Under this program participants are graded on a point system depending on various steps they choose to take in the construction, design, and operations of their buildings. Each point they receive is tallied and depending on their final count, they obtain either a certified, silver, gold, or platinum rating. Points are awarded for systems such as HVAC efficiency, alternative energy, low VOC products on build- out, and many others. LEED was designed to be an

overall rating system which if viewed on a general basis, would give an individual an idea of environmental sensitivity.

Solar Energy can be purchased in small quantities; the technology was initially developed in the 1970's and has since gone under countless tests and review. Investors also are aware of operational advances in recent years which have increased the efficiency and lowered the costs of solar panels. Because of this, more capital has been drawn into this industry and the snowballing of advancements in technology has occurred drastically since the turn of the century. As of today, with tax incentives, or a reduced tax basis.

3. Solar History and the current Building Requirements.

Solar energy, or at least the idea and knowledge of the capabilities of utilizing the sun's power to generate electricity, was first discovered in 1883 by Charles Fritts who discovered that by coating a semiconductor with gold, his device would have a reaction when exposed to sunlight that would cause a temporary change in the particle makeup of the chemicals used. This laid the groundwork for a series of tests and experiments to study this effect however, it was not until 1946 that the first solar cell was patented and used to produce solar energy.

The "light sensitive device", as it was called (and patented), was first built by Russell Ohl, who created a semiconductor that when exposed to sunlight would react in a way that would produce energy. Mr. Ohl's device was the first that was able to utilize the sun as a power source that could be used in modern applications. It was, in fact a derivative of his device that was first used in the late 1950's to help power Russian, and United States satellites that were first to orbit Earth. Today's solar cells are much different than those of Russell Ohl's however the theory and basic principal behind the technology remains the same.

The Solar energy topic can be confusing, especially to the building owner or manager who is not familiar with the intricate technologies needed in order to convert sunlight into real, and usable energy. The subject building has only minor requirements and often the largest hurdles of installing a solar system on a building are the financial and utility environments surrounding the project. In recent times however the federal government and many state legislatures have passed laws that aid in the efficiency of

working through the process when installing a system. Furthermore, building owners have found ways to use the new systems to market their projects as holding a premium, thus able to recuperate the capital costs in order to install a full scale solar system.

A solar sell today can either be made with silicon or a newly tested “thin film technology” coating which consists of chemical grade glass in lieu of costly silicone. Currently a solar sell is as high as 42.8% efficient. .(http://www.renewableenergyworld.net/rea/news/story?id=49483) as apposed to the mid 1990’s where the panel with different technology would only be classified as 19%. The efficiency of a cell measures the amount of energy that is actually produced by the solar cell in relation to the amount of energy and expose specific to the location of the solar system.

Because solar technology has improved drastically over the past 20 years, its application has become much more useful for building owners, and readily available. Today’s panels work through a series of arranged solar cells that are arranged on an enclosed grid. The cells which absorb energy and transfer the energy to an AC/DC converter can be connected to a power grid and provide the same type of electricity that a particular building would draw off the public utility grid. This power produces 0% greenhouse emissions, and after an initial capital outlay, energy is virtually free with the exception of maintenance and repairs to the panels.

Once a particular system and technology has been chosen, most buildings do not need much mechanical work in order to have the system installed. In certain cases the actual building structure would have go through minor engineering in order to withstand the weight of the new panels however most modern buildings are capable of holding

much more than the average solar panel system and the only work needed to be performed would be to the electrical system in order to connect the building. This work usually entails upgrades to, or addition of monitoring systems, power converters, and improved conduits to the public system.

Utility and Regulation Environment: The Challenge with getting the most out of the Solar Installation.

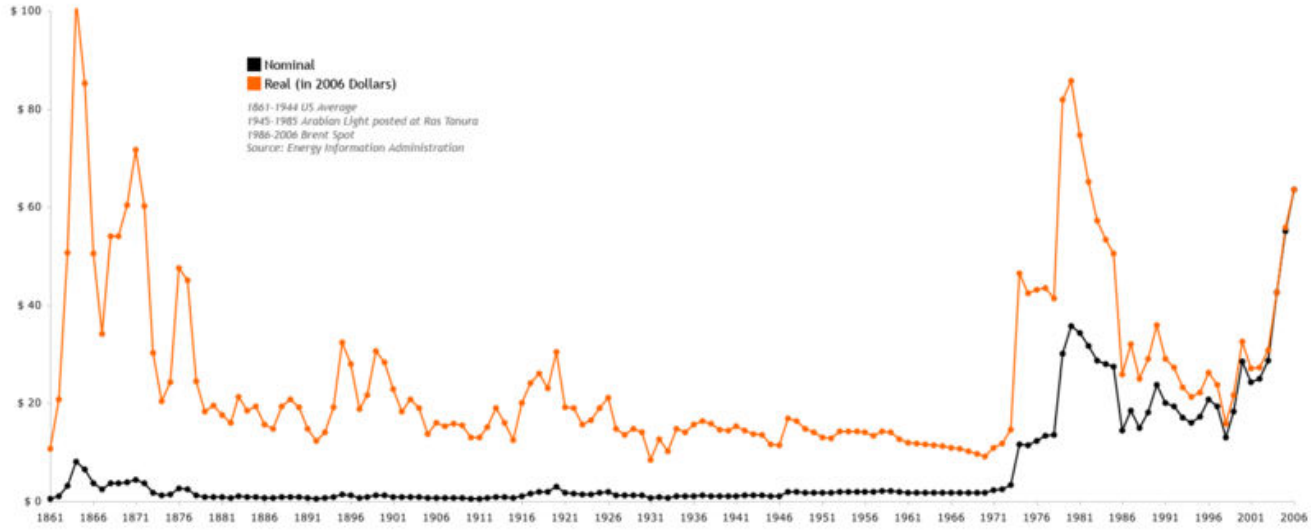
Legislative effect:

Currently, solar energy which is not subsidized can cost anywhere between $0.14 to $0.60 per kilowatt hour compared to market electricity which is approximately $0.11 per kilowatt hour in Maryland. This is a wide window of cost due to the various types of solar energy available. In best circumstances a subsidy is needed in order to bring the price down to current market rate.

There are a number of variables that should be included when deciding whether or not to install a solar panel system on a commercial building. Physical geography is only the start of a positive outcome in a given scenario and the user needs to also understand government backed incentives, as well as utility procedures and policy should be noted.

The Federal Government first began to legislate energy issues as a result of the energy crisis in the 1970's. At that time domestic oil production was at a peak and relatively close to the levels of oil that American's consumed and needed to support society. Suddenly however, the OPEC nations which did supply a larger percentage of world oil had placed a world embargo of exporting oil to countries that supported Israel. Because of this constraint oil prices rose while and the global demand for oil continued to grow and surpassed the supply that any of the non-OPEC producing nations could produce. This is an interesting change in ideology because many view it as the start of where American's began to see how fragile their energy supply could be and how quickly

the price of that energy could change (see table below of world oil prices in US$, note the price "jump" during the crisis and how levels never returned to pre-crises levels).



Source: Wilkepedia

After the Oil Crisis, a series of regulations were enacted however arguably, the next significant change in environmental law was the Energy Policy Act of 1992. This act was passed specifically to address America's dependence of foreign oil and to protect the energy supply chain within the U.S. borders. The Energy Policy Act of 1992 examined how American's use energy and how to reduce it. This was the first time that Congress would actually dedicate themselves to regulating the types of products that used the most energy, and place restrictions that would construct specific goals for manufacturers to reach. An example of this is the "outlawing" of the 5 gallon flush toilet; one of the policies set forth in the Energy Policy Act of 1992 was to restrict all toilets to be sold in the United States to operate under a minimum of 1.6 gallons for each flush.

Today there are several new pieces of legislation that have helped the solar movement gain momentum. Tax incentives and regulations for large utility companies to meet certain green standards have all played a role in the growth of this industry.

Beyond the Federal Government, State Legislators have decided to really take the charge on aiding the expansion and growth of a more energy efficient real estate culture. California is viewed as the leader and a system that many states look to when rewriting their regulation. Colorado, New Jersey, Nevada, Pennsylvania, Arizona, and Hawaii are also viewed as leaders in the solar movement. Following behind these are several other states that are looking to implement regulations.

In Maryland the environmental movement is not as progressive as in other states such as California, however Maryland Lawmakers are in agreement that changes must be made. Recently Marylander's began contemplating increasing tax credit programs to homeowners, and they recently took up issue with the Global Warming Solution Act which passed the State Senate but failed in the house. It is predicted that this bill, which would require a reduction of global gas emissions by 20% by 2020 will be reexamined and is destined to be passed in a similar form. These regulations are similar to those already in place in progressive states such as California (such as the California Solar Initiative, 2006). Furthermore, Maryland Legislators are also looking into regulations that would state minimum amount of energy that utility companies would have to meet and would force them to purchase alternative energy as an overall supplier to their portfolios. All of these add strength to the argument that regulations will get tougher, incentives will increase and as Maryland, when other states follow the arena for solar energy will open.

Utilities Input

Because solar panels can only produce electricity during sunlight hours, it is necessary for any building to still connect to the utility grid to serve as a reliable source of electricity during night hours, or during times of inclement weather. In order for a Solar Power Purchase Agreement to generally make sense, the utility company for the area in which the building in located must subscribe to a practice called “net metering”. Net Metering is a system that allows a building’s solar panels to “push” energy in excess of the buildings needs onto the power grid during the day when the building is operating at peak. During the day, this excess energy is sent to the grid and the electric meter simply spins backwards. At night, when the solar panels are not producing electricity, the building’s energy needs are serviced once again by the public utility off “the Grid”. However the building relies partially on the credits that were accumulated during the day. Utility Companies must allow for this practice in order to solar to achieve efficiency, and approve of the equipment and electrical voltage that is compatible with their system. This practice also allows for the consumer to forego the purchase of expensive batteries, equipment that has hindered the growth of solar energy in many different aspects.

Below is a graph taken from Sunedison that shows the monitoring software of a building with a solar panel system installed. As you can see there is an excess of energy being produced, which will be "banked" on the public utility grid.

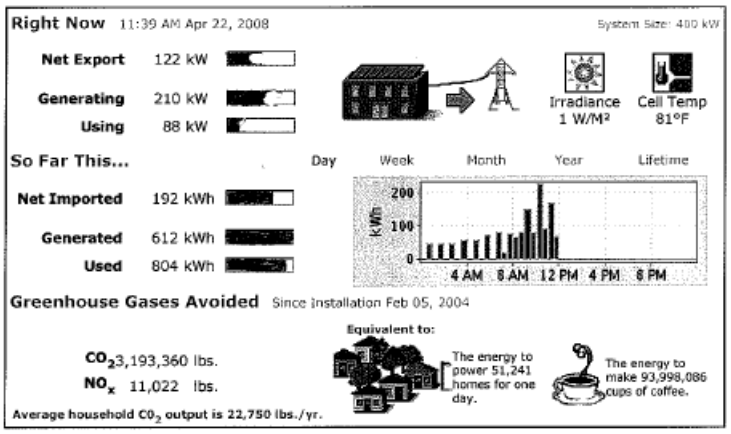


Image to be taken from http://www.sunedison.com/commercial-overview.php

4. Solar Power PPA's

A power purchase agreement is a contract between an energy provider, and the user. Initially drafted as a means for building owners to lock in electric rates and help protect themselves against a sharp energy rise, these agreements are historically used solely in the commercial environment. As of recently however, and with the advances in solar technology, there have been countless solar providers who have begun this arrangement with building owners, and acted as provider of electricity for the building owner and effectively replace the utility company.

A solar power project can be placed on a specific property and supply energy for their use and their needs. Each individual project is a separate power plant built for a specific user. The general solar power purchase agreement can be described as both an energy purchase agreement, and a lease (which utility PPA's do not need to entail). The solar power purchase agreement has a number of detailed sections which are necessary for the implementation and success of this agreement, an outline of a "boiler plate" agreement can be found in the attached exhibit **II.**

A solar PPA can provide landlord with a number of advantages. When asked, area building owners knowledgeable of the agreement set up are aware that that with larger portfolios a PPA in general can help stabilize energy prices and help better predict CAM fees when negotiating new lease rates. A PPA can help take a variable out of a building's operating costs that may fluctuate, and in the case of energy which can be one of the highest risk costs. A Solar PPA can help achieve this same goal as well as provide a price discount, LEED credits, additional rent, and marketability.

Many PPA signed today can actually provide energy to the consumer at a price lower than market. This is however, only possible when the user works with a reputable provider that has the ability to finance the solar panel system, and how that financing is in place is what enables them to provide such a deal. The larger, and established providers are able to finance the solar arrays at more favorable terms, therefore are able to share the savings with the consumer. This can be compared to an individual's personal credit rating and their ability to lower overhead when financing a new business or their home.

A building is not eligible unless it meets the following requirements.

First and foremost the building has a number of physical and geographical qualifications. The first of which are common sense that would dictate the building must have direct sunlight and not be obstructed by trees, or other buildings. Imagine a small 3 story building in downtown Manhattan, the similarities between that and a struggling sapling in the woods should provide an adequate picture why a building of this nature would not be the best suited for solar. This is a major issue however because the less exposure to direct sunlight the panels have, the less efficient they will serve, therefore their output would be drastically reduced and with any decrease in efficiency a solar project of this type would most likely not be viable both financially and by reaching the goal of obtaining alternative energy.

As for the building structure itself, solar panels have relatively little weight compared to the heavy HVAC systems that are normally designed to be placed on rooftops. However they do add a significant weight and most new projects must have a new roof installed, or in place before the project can commence.

Geographically, a solar array could operate within certain standards anywhere in the United States. It is favorable in the southwest or sunnier parts of the country however projects in New Jersey and Massachusetts have been completed and have done so with success. More importantly the state in which the buildings reside and the local legislations and treatment of solar subsidies and tax credits are much more important than their latitudes in most cases.

One of the main and largest hurdles to installing a solar array through a Solar PPA is not actually geography or physical attributes, but the ownership. In today's solar environment financing of these projects can be tough and the money in the industry is more focused on technological advances and not project development. Jigar Shah of Sunedison states that he cannot even evaluate a project unless the building ownership has a recognized bond rating. Because his financing is based on an income flow from electricity produced, a top rated purchaser must be the signatory of the Solar PPA. This is the largest hurdle that holds back real estate managers from signing onto a Solar PPA. Without this, solar would be readily accessible and able to locate on a majority of all other buildings.

5. Case Study

Staples, Inc.

Staples Inc. is an office supply superstore with over 2,000 stores located throughout the world. Since the first store opened in 1986 the company has steadily grown into one of the world's largest retailers and use a combination of attractive pricing, and marketing to fuel their expansion. "That was easy" has become a coined phrase in office communication, a phrase which was made popular by Staples inc. in 2004 and led to the sale of more than 1.5 million "easy" buttons.

Recently, Staples Inc. has made tremendous efforts to "go green", an effort which many retailers have found is almost a necessity, yet a hard goal to reach. One of the questions that most face when going green is whether their efforts will be received as green, and how will they benefit the company while still providing an acceptable IRR. In a world of skeptics, and where a recent study showed that 51% of self proclaimed environmentally conscious Americans could not name a single "green brand", staples knew they had a challenge.

Solar is an interesting aspect to going green, historically it did not provide a measurable IRR. The costs of the panels were high, and the payback of systems costs and money saved would almost take the entire lifespan of the actual panels. They are usually located on the roof of a building and are not seen by the average consumer. Therefore, no visual advertising is evident to the consumer and the "wow" factor that

may persuade customers to patronize their business is not as evident. For these reasons, until recently solar was a non-factor for groups in a similar situation as Staples Inc.

However, as time has progressed, governments have become more progressive and the price of solar produced electricity has decreased dramatically. With shorter payback periods and the birth of Solar PPA providers, Staples found a friend in Sunedison of Beltsville, MD.

Sunedison is regularly viewed as the benchmark in Solar PPA's among industry insiders. The founder Jigar Shaw is an individual who speaks of solar power with passion, and is able to portray that passion to his consumer. More importantly he is able to provide that same consumer with the favorable IRR that had been missing from the solar environment until recently.

When Staples and Sunedison began their relationship, Staples admitted that solar had been perceived as not viable because the there was no financial strength. However under Jigar's plan "The bottom line is that we're [Staples Inc.] able to purchase solar energy off our rooftops for less than electricity off the grid, it's a win-win", and Staples signed on to enlist Sunedison's services.

How Sunedison Works:

Would the average real estate manager consider this situation?

A group approaches a manager and asks him if he would consider contracting out a portion of their energy consumption to a green power company such as Sunedison. Immediately the manager would ask what it would cost him and what benefits would accrue. Most likely the manager would be skeptical and in recent interviews, they would only entertain this notion for academic purposes.

However, what if green energy were obtainable with no capital outlays? The manager would respond “great, but how much extra do I have to budget per month?”. The answer to that question is what shocks any building owner or manager because the truth is electricity is actually sold at below market rates, sometimes up to 10 or 20 percent below. Additionally groups such as Sunedison often offer to pay a lease rate for the panels, although the rate is usually less than $.40 per s.f. of actual space used, on a larger scale this is income that can be realized for leasing a space on an area where generally building owners do not receive any income, the rooftops.

Case Study and Financial Models:

Below is an example case study of a potential Solar Power Purchase Agreement. Certain assumptions were made in this example and although there is not an actual building cited, does represent real numbers and market rates.

For this case study a comparison of four separate scenarios will show different outcomes. All cases are set up with similar circumstances from the building owner's point of view in the first section of this study. Then an illustration will show what will need to change in order for the Power Purchase Agreement to reach a "break even" point from the provider's point of view.

In all scenarios the building is assumed to be the same with the exception of their location. An approximate 30,000 s.f. single story building is used so there will be no restrictions on roof area for the solar system. The system will be designed to provide 50% of the buildings 270,000 Kwh annual usage and all panels will be assumed to have the same clear view of the sunlight available for the respective geographic region. Furthermore, all buildings will charge the PPA Provider rent for the actual space that the panes require, and no owner capital outlay will be needed on the owner's behalf.

Scenario 1 is a suburban Washington D.C. setting. This building is located in Prince George's County Maryland where there is very little state incentives to support such systems. Because of this all rebates are provided by the federal government, the same rebates which are in place anywhere in the country.

Here the panels will take up approximately 11,500 s.f. of roof space. Maryland is rated as a "good" solar environment providing 4.721 Kwh/ sq meter per day. In this scenario, the landlord will receive more incentives in rental income, however because the

panel array system is so large, there are no local incentives, and electric rates are relatively low, the system does not provide a positive cash flow for the provider and a Solar PPA is not feasible in this state.

Building Information

Location:		Suburban Maryland
Type:		Office
Size:		29,730.0
Monthly Kwh:		22,500.0
Annual Kwh:		270,000.0
Solar Rating		4,721
Electric Rate:	$	0.110
Monthly Bill.	$	2,475.00
Annual Bill:	$	29,700.00
Solar Instillation:		
Panel Output		135,000.0
Utility Draw		135,000.0
Solar Rate:	$	0.10
Solar Bill:	$	13,500.00
Utility Bill:	$	14,850.00
Total Utility Bill:	$	28,350.00
Pre- Rent Savings:	$	1,350.00
Percentage Savings		5%
Rent		
Rental Rate:	$	0.35
Size Leased:		11,050.00
Total Annual Rent	$	3,867.50
Total Utility Bill minus Rent:	$	24,482.50
Total Owner Savings:	$	5,217.50
Percentage Saved:		18%

Cash Flow for PPA Provider

State and County:	MD- Prince George's County	
Utility:	Pepco	
Annual Output:	135,000.00	
Panel Area:	11,050	
System Cost:	$994,500.00	
MD Rebate:	$ 5,000.00	
Fed Tax Credit	$298,350.00	
Net Cost	$691,150.00	
Annual Gross Income:	$ 13,500.00	
minus rent	$ 9,632.50	
Amount Financed	$691,150.00	
Cash	$ -	
Interest Rate		8%
Term		20
Payment		($70,395.15)
Net Income:	$ (45,912.65)	

Scenario 2 is the same building however the assumption is made that the building is in Washington D.C. As in Maryland, the local government does not provide incentives however the electric rate is much lower. Because of this, the potential Solar PPA Provider will have to charge less per Khw hour than in Maryland, therefore under these circumstances the building in Washington D.C. would be harder to place under a solar PPA.

Building Information					
Location:	Washington D.C.				
Type:	Office				
Size:		29,730.0		s.f.	
Monthly Kwh:		22,500.0			11250
Annual Kwh:		270,000.0			
Solar Rating			4,743	kwh per day (average)	
Electric Rate:	$	0.100		*including taxes	
Monthly Bill.	$	2,250.00			
Annual Bill:	$	27,000.00			
Solar Installation:					
Panel Output		135,000.0			
Utility Draw		135,000.0			
Solar Rate:	$	0.09			
Solar Bill:	$	12,150.00			
Utility Bill:	$	13,500.00			
Total Utility Bill:	$	25,650.00			
Pre- Rent Savings:	$	1,350.00			
Percentage Savings			5%		
Rent					
Rental Rate:	$	0.35		can vary between $.30 and $.50	
Size Leased:		11,050.00			
Total Annual Rent	$	3,867.50			
Total Utility Bill minus Rent:	$	21,782.50			
Total Owner Savings:	$	5,217.50			
Percentage Saved:			19%		

Cash Flow for PPA Provider		
State and County:	Washington D.C.	
Utility:	Pepco	
Annual Output:	135,000.00	Kwh
Panel Area:	11,050	
System Cost:	$990,000.00	
MD Rebate:	$ -	
Fed Tax Credit	$297,000.00	
Net Cost	$693,000.00	
Annual Gross Income:	$ 12,150.00	
minus rent	$ 8,282.50	
Amount Financed	$693,000.00	
Cash	$ -	
Interest Rate	8%	
Term	20	
Payment	($70,583.58)	
Net Income:	$ (48,801.08)	

Scenario 3 is the similar building however the building is located in suburban Philadelphia, more specifically in New Jersey which offers a number of incentives and tax credits. Because New Jersey has a lesser Solar Rating a larger system must be installed. This will provide the tenant with more rental income and because the electric rate is higher in New Jersey than other Mid-Atlantic States, the Solar PPA provider may charge more for electricity. In this scenario the PPA Provider still runs a negative cash flow however the losses are not nearly as high as in Maryland and the District of Columbia. Some large scale systems are possible in New Jersey because electricity can be sold to local jurisdictions, as well as the trading of carbon credits, all of which allow for a reduction in this loss and the possibility of a positive cash flow.

Building Information				
Location:	Camden, NJ			
Type:	Office			
Size:	29,730.0		s.f.	
Monthly Kwh:	22,500.0			11250
Annual Kwh:	270,000.0			
Solar Rating		4.641	kwh per day (average)	
Electric Rate:	$ 0.130		*including taxes	
Monthly Bill.	$ 2,925.00			
Annual Bill:	$ 35,100.00			
Solar Installation:				
Panel Output	135,000.0			
Utility Draw	135,000.0			
Solar Rate:	$ 0.12			
Solar Bill:	$ 15,795.00			
Utility Bill:	$ 17,550.00			
Total Utility Bill:	$ 33,345.00			
Pre- Rent Savings:	$ 1,755.00			
Percentage Savings		5%		
Rent				
Rental Rate:	$ 0.35		can vary between	

			$.30 and $.50
Size Leased:		11,500.00	
Total Annual Rent	$	4,025.00	
Total Utility Bill minus Rent:	$	29,320.00	
Total Owner Savings:	$	5,780.00	
Percentage Saved:			16%

Cash Flow for PPA Provider			
State and County:	Camden, NJ		
Utility:	Atlantic City Electric Company		
Annual Output:		135,000.00	Kwh
Panel Area:		11,500	
System Cost:	$	1,008,000.00	
NJ Rebate:	$	286,980.00	
Fed Tax Credit	$	302,400.00	
Net Cost	$	418,620.00	
Annual Gross Income:	$	15,795.00	
minus rent	$	11,770.00	
Amount Financed	$	418,620.00	
Cash	$	-	
Interest Rate		8%	
Term		20	
Payment		($42,637.37)	
Net Income:	$	(13,317.37)	

Scenario 4 is the ideal situation for a Solar Power Purchase Provider. If the same building which is being examined is located in suburban Los Angeles all sides may realize a positive return, or in the case of the land owner, a savings. Here electricity is close to $.18 per Kwh, and a number of state incentives, as well as several competing solar power installation firms have all brought down the cost for the instillation of this system. This is the sole scenario where from day 1, the solar PPA provider can obtain a positive cash flow.

From the land owner's point of view, the return (or savings) are not as high because the electric discount is the same as in the other scenarios, however the panel system is lower because of Los Angeles' "Best" solar rating of 5.966 Kwh per sq meter/ day.

Building Information			
Location:	Suburban Los Angeles		
Type:	Office		
Size:	29,730.0		s.f.
Monthly Kwh:	22,500.0		
Annual Kwh:	270,000.0		
Solar Rating	6		kwh per day (average)
Electric Rate:	$ 0.176		*including taxes
Monthly Bill.	$ 3,960.00		
Annual Bill:	$ 47,520.00		
Solar Installation:			
Panel Output	135,000.0		
Utility Draw	135,000.0		
Solar Rate:	$ 0.16		
Solar Bill:	$ 21,384.00		
Utility Bill:	$ 23,760.00		
Total Utility Bill:	$ 45,144.00		
Pre- Rent Savings:	$ 2,376.00		
Percentage Savings	5%		
Rent			
Rental Rate:	$ 0.35		can vary between $.30 and

			$.50
Size Leased:		8,700.00	
Total Annual Rent	$	3,045.00	
Total Utility Bill minus Rent:	$	42,099.00	
Total Owner Savings:	$	5,421.00	
Percentage Saved:		11%	

Cash Flow for PPA Provider		
State and County:	Los Angeles, CA	
Utility:	Pacific Gas and Electric	
Annual Output:	135,000.00	
Panel Area:	11,050	
System Cost:	$783,000.00	
CA Rebate:	$175,500.00	
Fed Tax Credit	$234,900.00	
Net Cost	$372,600.00	
Annual Gross Income:	$ 21,384.00	
minus rent	$ 18,339.00	
Amount Financed	$372,600.00	
Cash	$ -	
Interest Rate		8%
Term		20
Payment		($37,950.13)
Net Income:	$ 4,148.87	

The final portion of the scenario shows two examples of what electric rates would have to be charged in order for the Suburban Maryland property to break even, with the incentives, and with no incentives (both state and federal).

In order for the Solar PPA Provider to break even on monthly cash flow, they would have to charge the Maryland consumer nearly $.45 per Kwh. Because this number is nearly four times the market rate for energy, Solar PPAs are not common in this state.

With no incentives, the Solar PPA Provider would have to charge the energy consumer $.66 per Kwh, nearly 600% of the current market rate.

Below is what the solar electric rate would have to be priced at in order for the Solar PPA to break even under current Maryland, and Federal Laws.

Building Information

Location:	Suburban Maryland		
Type:	Office		
Size:	29,730.0	s.f.	
Monthly Kwh:	22,500.0		11250
Annual Kwh:	270,000.0		
Solar Rating	4,721	kwh per day (average)	
Electric Rate:	$ 0.110	*including taxes	
Monthly Bill.	$ 2,475.00		
Annual Bill:	$ 29,700.00		
Solar Installation:			
Panel Output	135,000.0		
Utility Draw	135,000.0		
Solar Rate:	$ 0.45		
Solar Bill:	$ 60,750.00		
Utility Bill:	$ 14,850.00		
Total Utility Bill:	$ 75,600.00		
Pre- Rent Savings:	$ (45,900.00)		
Percentage Savings	-155%		
Rent			
		can vary between $.30	
Rental Rate:	$ 0.35	and $.50	
Size Leased:	11,050.00		
Total Annual Rent	$ 3,867.50		
Total Utility Bill minus Rent:	$ 71,732.50		
Total Owner Savings:	$ (42,032.50)		
Percentage Saved:	-142%		

Cash Flow for PPA Provider		
State and County:	MD- Prince George's County	
Utility:	Pepco	
Annual Output:	135,000.00	Kwh
Panel Area:	11,050	
System Cost:	$994,500.00	
MD Rebate:	$ -	
Fed Tax Credit	$298,350.00	
Net Cost	$696,150.00	
Annual Gross Income:	$ 60,750.00	
minus rent	$ 56,882.50	
Amount Financed	$696,150.00	
Cash	$ -	
Interest Rate	8%	
Term	20	
Payment	($70,904.42)	
Net Income:	$ 828.08	

Below is an example of what rates would have to be priced at if there were no State of Federal Laws.

Building Information

Location:	Suburban Maryland			
Type:	Office			
Size:	29,730.0		s.f.	
Monthly Kwh:	22,500.0			11250
Annual Kwh:	270,000.0			
Solar Rating		4,721	kwh per day (average)	
Electric Rate:	$ 0.110		*including taxes	
Monthly Bill.	$ 2,475.00			
Annual Bill:	$ 29,700.00			
Solar Installation:				
Panel Output	135,000.0			
Utility Draw	135,000.0			
Solar Rate:	$ 0.66			
Solar Bill:	$ 89,100.00			
Utility Bill:	$ 14,850.00			
Total Utility Bill:	$ 103,950.00			
Pre- Rent Savings:	$ (74,250.00)			
Percentage Savings		-250%		
Rent				
Rental Rate:	$ 0.35		can vary between $.30 and $.50	
Size Leased:	11,050.00			
Total Annual Rent	$ 3,867.50			
Total Utility Bill minus Rent:	$ 100,082.50			
Total Owner Savings:	$ (70,382.50)			
Percentage Saved:		-237%		

Cash Flow for PPA Provider	
State and County:	MD- Prince George's County
Utility:	Pepco
Annual Output:	135,000.00
Panel Area:	11,050
System Cost:	$994,500.00
MD Rebate:	$ 5,000.00
Fed Tax Credit	
Net Cost	$989,500.00
Annual Gross Income:	$ 89,100.00
minus rent	$ 85,232.50
Amount Financed	$989,500.00
Cash	$ -
Interest Rate	8%
Term	20
Payment	($100,782.76)
Net Income:	$ (700.26)

6. Conclusion

Conclusion:

There are many reasons why Solar Energy can be a beneficial aspect to all property types. In recent interviews with real estate managers, solar is interesting and provides a number of unique attributes to a project, however the hurdle of financing and providing a favorable IRR, as well as reliability all seem to be the major concerns that are shared.

In due time, solar energy should be able to benefit all building owners and users. New York City Mayor Michael Bloomberg stated in late 2007 that he sees a future New York where every building has at least a small array of panels to help offset rising energy needs and greenhouse gas emissions that buildings cause.

Currently solar is on the brink of major changes where the mainstream owner will soon be able to access what this alternative energy type has to offer. The present successes are hindered by the hurdles of access which is the only evident reason why solar has not yet blossomed. Companies like Sunedison exist to make solar an obtainable goal however even an established group like this must rely on outside funding for projects, therefore only top tier real estate management groups can apply for their services. In today's climate, the average building owner cannot contract a Solar PPA because the average building owner does not have the credit strong enough to do so or is in an area which does not offer the incentives to help with the cost of the system. Most Solar PPA's must be backed by an owner with a recognized bond rating.

Unless a real estate owner is willing to finance the panels himself, there are no means for funding a small project. Although solar generated electricity has a respectable

pay back period in certain scenarios, , lending institutions still view solar as an emerging technology and are not yet willing to aggressively finance these projects.

What will it take for this to change? It has been forecasted that Solar PPA groups will soon seek public financing or trade stock. Once this occurs a number of investors who are tolerant for more risk will enter the arena and expectations of the Solar PPA projects will be adjusted accordingly. This influx of money will most certainly change the environment and allow users to install solar and make this technology more readily available.

As this happens, simultaneously, the solar technologies that are commercially viable will drastically be changing. First Solar, a company based in California has developed a technology that eliminates the use of silicone in solar cells, thus reducing the cost and adding efficiency. Companies like First Solar, as well as others that are in their infancy are pushing the solar technologies forward and will soon begin to drive down the cost of production, thus the cost of producing energy by this generation type.

It is arguable that the only hurdle Solar faces today is the idea that the technology is still foreign to investors and real estate managers alike. In due time alternative energy PPAs will become accepted much like the LEED rating system has evolved over the past four years. As interest levels rise, so will the demand, which will all certainly be followed by an influx of investment capitol and a change in this arena. Solar Energy can work.

Works Cited:

1.)
Author Unknown. (2008) *Power Purchase Agreement*
Retrieved April 10, 2008 from Wikipedia
Web Site: **http://en.wikipedia.org/wiki/Power_Purchase_Agreement**

2.)
Author Unknown (2005) *Sample Power Purchase Agreement*
Retrieved April 11, 2008 from Onecle
Web Site: http://contracts.onecle.com/ripe-touch/tri-state.svc.1995.03.15.shtml

3.)
Bradford, T. (2006) Solar Revolution: The Economic Transformation of the Global Energy Industry, the MIT Press

4.)
Brian, M (2000), *How Power Grids Work*. Retrieved
March 11, 2008 from How Stuff Works
Web Site: http://www.howstuffworks.com/power.htm

5.)
Coupe, P. (July 16, 2007) *Informational video Renewable Energy- Solar Electric*
Retrieved: April 11, 2008 from Youtube.com
Web Site: http://www.youtube.com/watch?v=IUM8L6XOO20

6.)
Hayden, H. (2005) The Solar Fraud: Why Solar Energy Won't Run the World, Second Edition, Vales Lake Publishing, LLC

7.)
Hermann, S. (2004), The Solar Economy: Renewable Energy for a Sustainable Global Future Earthscan Publication, LTD.

8.)
Karden, R (2005), *History of Electricity*. Retrieved
March 7, 2008 from Code Check
Web Site: http://www.codecheck.com/HistoryOfElectricity3.html

9.)
California Public Utility Commissions
California Solar Initiative
http://www.gosolarcalifornia.ca.gov/documents/CSI_HANDBOOK.PDF
10.)
Department of Energy, (2007), Annual *Energy Review*
Retrieved April 1, 2008

http://www.eia.doe.gov/emeu/aer/overview.html

Information also obtained from various interviews with:

Abramson, Marnie- with The Tower Companies
Barbieri, Lyssandra- with Gould Property Company
Chaney, Hall- *Real Estate Manager* with Chaney Enterprises
Frank, Andrew- *Business Manager* with Constellation Energy
Gimelson, Brian- *Partner* with Gimelson Capital
Holt, Joseph- *Vice President of* Washington College
Michael, Gary- *President* of NAI The Michael Companies
Ng, Edward- *Partner* of Grace's Fortune Restaurant
Perriera, Rui- *Retail Broker* with Marcus and Millichap
Ross, Justin- *Maryland State Delegate*
Shah, Jigar- *Founder, President* of Sunedison
Sislen, Dave- *President* of Bristol Capital
Vallario, Joseph- *Maryland State Delegate*
Wallace, Richard- *Partner* of Advanced Thermal Solutions
Zang, Dean- *Retail Broker* with Marcus and Millichap

Conference attended:
Author also attended the Solar Power Expo (October 2007), Long Beach CA in preparation for this Practicum.

Exhibit I

2.5 Common Area Maintenance Expenses. Tenant shall pay to Landlord, as additional rent, _____% of all common area maintenance expenses for the building of which the Premises are a part. Landlord shall estimate the total cost of the Common Area Maintenance ("CAM") expenses for each calendar year or portion thereof during the Lease term and any renewals/extensions thereof. Commencing on the Commencement Date, Tenant shall pay 1/12 of Tenant's pro rata share of said estimated CAM expenses for the then current calendar year in advance of the first of each month with the monthly rent, as additional rent hereunder. Following the end of each calendar year, Landlord will calculate the actual CAM expenses for the preceding calendar year and, if Tenant's pro rata share of the actual CAM expenses for the year exceeds the total of all estimated CAM expense payments which Tenant has made during that calendar year, then Tenant shall, within Ten (10) days after demand by Landlord, reimburse Landlord for the difference between Tenant's pro rata share of the actual CAM expenses and the estimated CAM expenses which Tenant has paid to Landlord. If Tenant has paid more than Tenant's pro rata share of the actual CAM expenses for any calendar year, then at the end of each calendar year, Tenant shall receive a credit toward the next due monthly CAM expense payment equal to the amount of any such overpayment.

The Full Service lease does not have a CAM section – all charges are covered, but it is not in a CAM Section.

2.2 Utilities. Landlord shall pay all bills for electricity, gas, fuel oil, water and sewer service used in the Premises. Tenant shall be responsible for the cost of its telephone service.

Exhibit II

POWER PURCHASE AGREEMENT

BETWEEN
TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
AND
RIPE TOUCH GREENHOUSE, LLC.

THIS AGREEMENT, made and entered into this 15th day of March, 1995, by and between TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC., a cooperative corporation duly organized and existing under and by virtue of the laws of the State of Colorado, hereinafter called "Tri-State", its successors and assigns, and Ripe Touch Greenhouse, LLC., a limited liability company duly organized, created, and existing under and by virtue of the laws of the State of Colorado, hereinafter called "Producer", its successors and assigns. Tri-State and Producer are hereinafter known collectively as the Parties and individually as the Party.

This Agreement is made pursuant to the Tri-State Interconnection Standards For Qualifying Facilities (hereinafter referred to as "Interconnection Standards") dated September, 1992, attached hereto as Exhibit "A" and by this reference incorporated herein.

RECITALS

WHEREAS, Tri-State owns and operates an electric power system within the States of Colorado, Nebraska and Wyoming, and is engaged in generating, purchasing, and transmitting power and energy for sale at wholesale to its member distribution cooperatives, including Mountain View Electric Association, Inc., (hereinafter called "Mountain View") on an "all requirements" basis; and

WHEREAS, Mountain View is engaged in transmitting and distributing power and energy to, among others, consumers in El Paso County in the State of Colorado; and

WHEREAS, the Producer intends to install and operate a waste fuel fired generation facility (hereinafter referred to as "Project") in northwest El Paso County, two miles west of the town of Calhan; and
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WHEREAS, the Producer has requested electrical interconnection with Mountain View directly and with Tri-State indirectly, to facilitate delivery and sale of approximately 5,000 kilowatts of power and associated energy from the Project to Tri-State.

NOW, THEREFORE, in consideration of the mutual promises, covenants, and conditions set forth herein, the Parties agree as follows:

ARTICLE 1 - DEFINITIONS

For purposes of this Agreement, all terms with initial capital letters textually defined and used herein, and not otherwise defined, shall have the definitions ascribed to them by the text. The following terms shall have the following meanings:

A. "Authorization for Interconnection" means the Agreement between Tri-State, Mountain View, and Producer that details certain conditions that must be met in order for Producer to continue interconnected operation beyond the initial testing period of the Project.

B. "Billing Period" means the period of time between the consecutive monthly cutoff meter reading dates used to determine billing quantities. The Billing Period will normally coincide with a calendar month.

C. "Billing Year" means January 1 through December 31, or such other dates which coincide with Tri-State's Billing Year for its Class A members.

D. "Capacity Rate" means the amount expressed in dollars per kilowatt per month that Tri-State will pay Producer for metered capacity per Article 5.

E. "Commercial Date" means the first day of which capacity and energy deliveries to Tri-State begin, subsequent to the initial testing period as described in Article 8.

F. "Effective Date" is the date stated on page one (1) of this Agreement.

G. "Energy Rate" means the amount expressed in dollars per megawatthour that

Tri-State will pay Producer for metered energy per Article 5.
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H. "Interconnection Facilities" means all of the electrical connection facilities which must be installed or modified for the purpose of interconnecting and delivering power from the Project to the Tri-State system, including, but not limited to, all metering equipment, transmission and distribution lines and equipment, communications and telemetering equipment, protective devices and safety equipment.

I. "Member System Peak" means the half-hour interval during which Tri-State's Class A Membership was billed for demand during a Billing Period.

J. "Operating Representative(s)" means a person designated by each Party to act on its behalf as set forth in Article 23.

K. "Point(s) of Delivery" means the point(s) of interconnection between the Project and Tri-State's electrical system.

L. "Rated Output" means the design capability of the Project which is projected to be 5,000 kW.

M. "REA [RUS] Form 12d" means that certain document prescribed by the Rural Utilities service entitled, "Operating Report-Steam Plant" REA [RUS] Form 12d, REV. 12/93, which Tri-State submits to the Rural Utilities Service, or in lieu thereof such other records of Tri-State providing essentially the same information in essentially the same reporting format as said REA [RUS] Form 12d.

N. "Rolling Three-Year Average Monthly Load Factor", means Tri-State's system-wide three-year weighted average monthly load factor as calculated per Exhibit B. Tri-State's monthly load factor to be used in this calculation is calculated by taking the total Class A member energy sales for the month in kWh divided by the product of the total Class A member capacity sales for the month in kW, and the number of hours in the month.

0. "Test Period" means the period of time between the Effective Date and the Commercial Date when Project testing is performed per Article S.

P. "Twelve Month Weighted Average Monthly Load Factor" means Producer's twelve month weighted average monthly load factor of capacity and energy deliveries to

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Tri-State as calculated per Exhibit B attached here-to and by this reference incorporated herein. Producer's monthly load factor to be used in this calculation is calculated by taking the total metered energy delivered by Producer to Tri-State for the month in kWh divided by the product of the total metered capacity produced by the Project at the time of the Member System Peak in kW, and the number of hours in the month. If this calculation yields a monthly load factor in excess of 100%, the load factor shall be deemed to be 100% for that particular month.

ARTICLE 2 - AGREEMENT FOR SALE

Tri-State agrees to purchase the entire net output of capacity and energy from the Project (delivered to the Point(s) of Delivery), and Producer agrees to sell and deliver said capacity and energy solely to Tri-State for the term of this Agreement. Producer agrees the production and delivery of capacity and energy will be pursuant to the restrictions contained in Exhibit "A" and that any variance from such restrictions shall enable Tri-State to terminate its obligations under this Agreement, without notice, without penalty or cost, upon Tri-State's sole discretion, by notice of termination delivered in writing to Producer.

Notwithstanding the provisions of Article 19, there may be times when these purchases may have to be curtailed to ensure safe and reliable service to electric customers of Tri-State, Mountain view, or other interconnected power suppliers. These curtailments would be performed only under adverse electrical conditions including, but not limited to, power system interruptions, overload of facilities, loss of system generation, or other adverse conditions. Tri-State shall have the sole responsibility to determine the capability of the Tri-State and Mountain View electrical systems to accept capacity and energy purchases from the Project. In the event purchases are curtailed, Tri-state shall make reasonable efforts to minimize the duration of the curtailment. It is further understood and agreed that Tri-State shall not be liable for loss of revenue or other costs to the Producer as a result of such curtailment(s).
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ARTICLE 3 - TERM AND TERMINATION

This Agreement shall have an initial term of thirty (30) years beginning with the Effective Date. The Agreement shall thereafter be deemed to be extended by the Parties hereto for up to two (2) successive terms of fifteen (15) consecutive years in the absence of any Party giving written notice to the other Party of its election not to so extend, said notice to be given at least 30 days prior to the expiration of the initial or any additional term.

Tri-State may also terminate this Agreement if certain minimum load factor deliveries are not maintained by Producer, as outlined in Article 5. In addition, if the Commercial Date does not occur prior to February 28, 1997, the terms of this Agreement become null and void.

ARTICLE - 4 DETERMINATION OF CAPACITY AND ENERGY DELIVERED BY PRODUCER TO TRI-STATE

This Agreement shall make monthly payments for capacity and energy based on actual metered quantities per Article 5. The monthly payments shall consist of a Capacity Rate applied to the metered capacity delivered by the Project at the time of the Member System Peak during the Billing Period, and a Energy Rate applied to the total metered energy delivered by the Project during the Billing Period.

If the Project is off-line, or not producing power for any reason during the time of the Member System Peak, the metered capacity for the Billing Period will be determined by taking an average of the daily metered peak capacity produced for all days during the Billing Period in which the Project is on-line for the entire twenty-four hours of each day during the Billing Period.

In the event of partial-month service, the capacity component of the rate shall be prorated on the basis of the number of whole (24 hour) days served.

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ARTICLE 5 - PURCHASE PRICE FOR CAPACITY AND ENERGY

Energy Rate - Energy purchased for a Billing Year of this Agreement shall be priced at the average operation cost as shown on line 12 of the REA [RUS) Form 12d for Tri-State's Craig Station Unit No. 3 for the preceding twelve month period ended October 31. Any lease expense contained in line 10 of said form shall be removed prior to calculating the Energy Rate. The energy billing charge for any period shall be the product the number of megawatthours metered and received by Tri-State in the period times the Energy Rate. An example of the calculation of the Energy Rate is contained in Exhibit B attached hereto. Tri-State will provide an initial Energy Rate calculation to Producer no later than the Commercial Date of this Agreement. This initial Energy Rate will be in effect for the first Billing Year of the Agreement, or portion thereof, if less than a full year. Subsequent Energy Rate calculations will be provided by letter prior to the start of each succeeding Billing Year. If subsequent Energy Rate calculations for any Billing Year result in an Energy Rate less than the initial Energy Rate, the initial Energy Rate will be assessed for such Billing Year(s).

Capacity Rate - The Capacity Rate during the entire term of this Agreement shall be $10.07 per kW per Billing Period.

If total capacity and energy deliveries from Producer to Tri-State for any Billing Period yield a Twelve Month Weighted Average Monthly Load Factor for the most recent twelve month period, ended with the current Billing Period, of less than the Rolling Three Year Average Monthly Load Factor for the most recent thirty-six month period, ended with the current Billing Period, a billing adjustment will be performed to prorate the total capacity revenue paid to Producer for the Billing Period. A proration factor will be determined by multiplying the total capacity revenue paid by Tri-State by a fraction, the numerator of which is the actual Twelve Month Weighted Average Monthly Load Factor and the denominator of which is the Rolling Three Year Average Monthly Load Factor. Tri-State will receive from Producer a discount for said Billing Period based on the difference between the total capacity revenue calculations per this Article 5 and the proration factor so determined. An example of the calculation of the Twelve Month Weighted Average Monthly Load Factor and the Rolling Three Year Average Monthly Load Factor is contained in Exhibit B.
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The purpose of 'the preceding billing adjustment is to reduce the capacity revenue received by Producer in the event deliveries to Tri-State do not meet the Rolling Three Year Average Monthly Load Factor. Monthly deliveries to Tri-State resulting in a Twelve Month Weighted Average Monthly Load Factor exceeding the Rolling Three Year Average Monthly Load Factor will not result in calculations to increase the capacity revenue received by Producer.

If the Twelve Month Weighted Average Monthly Load Factor drops below fifty (50) percent for three consecutive months, Tri-State may terminate this Agreement upon 30 days writ-ten notice to Producer, unless Producer can demonstrate to Tri-State's sole satisfaction that it is exercising its best efforts to correct the problem with all dispatch.

ARTICLE 6 - METERING

Tri-State shall provide, own, and maintain, all at Producer's sole expense, all necessary meters, dedicated potential and current transformers, and associated equipment to be utilized for the measurement of capacity and energy for determining Tri-State's payments to Producer pursuant to this Agreement. Producer shall provide, at no expense to Tri-State, a suitable location for all meters and associated equipment, and a dedicated telephone circuit for telemetering purposes. Producer, under the term and conditions set forth herein, hereby grants to Tri-State, its agents, employees, and subcontractors, a license to enter the premises to operate, maintain, or replace the equipment installed hereunder. All reasonable costs associated with any remote recorder readings, translations, billing costs, and any applicable administrative and general expenses including labor and travel, shall be borne solely by Producer.

Tri-State's meters shall be sealed by Tri-State and the seals shall be broken only when the meters are to be inspected, tested or adjusted by Tri-State or its agent. Producer shall be given reasonable notice of testing and have the right to have its representative present on such occasions.
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Tri-State's meters installed pursuant to this Agreement shall be tested by Tri-State, at Producer's sole expense, at least once each year and at any reasonable time upon request by either Party, at the requesting Party's sole expense. metering equipment found to be inaccurate shall be repaired, adjusted, or replaced by Tri-State, at Producer's sole expense, such that the metering accuracy of said equipment shall be within two percent (2%). If metering inaccuracy exceeds two percent (2%), the correct amount of capacity and energy output during such Billing Period shall be measured by check meters installed by Tri-State. If Tri-State's check meters have not been installed, or if such check meters have failed to fully register during such Billing Period, the amount of metered capacity and energy shall be determined based on a mutually agreed upon estimate between the authorized Operating Representatives of the Parties. Any correction in the billing resulting from such a correction in meter records shall be made in the next monthly bill rendered, and such correction, when made, shall constitute full resolution of any claim between the Parties hereto arising out of such inaccuracy of metering equipment.

ARTICLE 7 - FIRST RIGHT OF REFUSAL

In the event Producer proposes to sell the Project or its associated rights to any third party, Tri-State shall have the first right of refusal to purchase the Project for a purchase price equal to any bona fide offer offered and conditionally accepted by Producer (such condition being only the Tri-State first right of refusal). The provisions of this Article shall not apply to transactions associated with the financing or refinancing of the Project.

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ARTICLE 8 - TEST ENERGY

Prior to the Commercial Date of operation of the Project, the Parties anticipate a period of testing during which a limited amount of test energy will be produced. Tri-State agrees to purchase all metered test energy from Producer, subject to the following terms and conditions:

1. Metering will be installed by Tri-State, at the Project's expense, before any interconnected operation for testing is permitted.

2. Producer will obtain liability insurance which conforms to the Interconnection Standards prior to any testing. Approval of liability insurance by Tri-State and Mountain View, in Tri-State's and Mountain View's sole opinion, is required prior to any interconnection for testing.

3. The Project will be required to receive authorization from the Tri-State dispatchers in Westminster, Colorado, at least thirty (30) minutes before commencing each testing period. Unauthorized testing will not be permitted.

4. The Project will have personnel on-site during each testing period who can be contacted immediately by Mountain View or Tri-State. Prior to testing, the Project will provide telephone numbers or radio frequencies through which they

can be contacted.

5. The Project will immediately disconnect upon request from Mountain View or Tri-State.

6. Tri-State will pay $5.00/MWh ($0.005/kWh) for the metered energy during authorized testing periods. There will be no associated capacity rate assessed or paid for test energy.

7. Upon satisfactory completion of the test period, as solely determined by Tri-State, the Authorization for Interconnection will be executed before the Project may be placed into commercial operation.

ARTICLE 9 - OPERATIONS AND MAINTENANCE

Producer shall maintain an operating log at the Project with records of:

1. Real power generation;

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2. Changes in operating status;

3. Outages;

4. Operations of protective devices;

5. Any unusual conditions found during inspections; and

6. Routine maintenance.

Such information shall be made available to Tri-State upon request and copies of said operating log and records shall be provided, if requested, within thirty (30) days of Tri-State's request. Producer shall coordinate all scheduled out-ages and major overhauls with Tri-State.

ARTICLE 10 - INTERCONNECTIONS FACILITIES

The Producer shall design, construct, own, operate., and maintain, at its own expense, all equipment on the Project side of the Point of Delivery, except for equipment set forth in Article 6.

Producer is required to meet the interconnection requirements of Mountain View as well as those of Tri-State, as set forth in Tri-State's Interconnection Standards (Exhibit "A") . The Interconnection Standards set forth the details of Tri-State's requirements concerning protective equipment, inspection and maintenance, insurance, metering, liability, and the procedure to be followed during application for interconnection.

Any costs incurred by Tri-State in connection with an interconnection request pursuant to this Agreement shall be the sole responsibility of Producer, including, but not limited to, contracting, engineering, and testing activities (inclusive of all payroll burdens and overheads), and any required construction or modification of distribution or transmission system facilities or of any metering or telecommunication facilities.

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ARTICLE 11 - CONDITIONS PRECEDENT TO COMMERCIAL DATE

Sales of power and energy, except as defined in Article 8, shall not commence until:

1. The Project is tested per Article 8, and such test is accepted in writing by Tri-State and Mountain View.

2. The Producer's liability insurance per Article 14 is in force and such insurance has been approved in writing by Tri-State and Mountain View.

3. Tri-State, Mountain View, and Producer have signed an "Authorization for Interconnection" Agreement which is satisfactory to Tri-State and Mountain View

4. Producer has provided an electrical power system single line drawing of the Project to Tri-State and Mountain View.

ARTICLE 12 - BILLING AND PAYMENT

Tri-State shall mail to Producer not later than twenty-five (25) days after the end of each monthly billing period, a statement showing metered capacity and energy, a computation of 'the payment due Producer, and a check for that amount. Payments are deemed paid on the date they are postmarked. Absent proof of postmark, payments shall be deemed paid as of the date of the check. Payments postmarked subsequent to the 25th day of the month shall be subject to a prorated annual interest charge at the Norwest Bank, or its successors, prime rate plus two percent applied to late payments on a daily basis, on a 365 day year. Contested billings shall bear a similar amount of interest due to the prevailing Party upon payment or refund of the contested amount. In the event the due date of an invoice falls on a weekend or Tri-State holiday, the due date shall be the next business day.

ARTICLE 13 - LIABILITY

Each Party shall save, defend, and hold harmless the other Party, its officers, employees, and agents from any and all claims for injury to person or
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persons or damage to property occurring on its respective side of the Point of Delivery; provided, however, that nothing herein contained shall be construed as relieving or releasing either Party from liability far injury or damage, wherever occurring, resulting from its own negligence or the negligence of any of its officers, servants, employees, or agents; and in the event of concurrent negligence by the Parties, there shall be contribution; and provided further, that each of the Parties hereto shall be solely responsible far injury or damage, wherever occurring, due solely to any defect in equipment installed, furnished, or maintained by such Party. Each Party is solely responsible for the risk of loss, or damage to, its equipment, unless the loss or damage results from the negligence or fault of the other Party.

ARTICLE 14 - INSURANCE

Prior to any testing of the Project, Producer shall obtain liability insurance as outlined in Tri-State's Interconnection Standards, and present to Tri-State a current and valid certificate of insurance. Such certificate of insurance shall state that Tri-State shall receive notice of lapse, cancellation and renewal from the insurance carrier. Producer shall give Tri-State thirty (30) days notice of cancellation or material change in the policy. Producer shall maintain such liability insurance for the term of this Agreement. If for any reason such liability insurance is cancelled or not renewed, Tri-State shall disconnect or cause to disconnect Producer's Project from the Mountain View electrical system and shall discontinue purchases of metered capacity and energy output until such time as Producer obtains liability insurance pursuant to the Interconnection Standards and presents the certificate of insurance to Tri-State and Mountain View.

ARTICLE 15 - TITLE

Delivery of energy and capacity shall be deemed completed at the Point of Delivery, and title to energy and capacity shall pass to Tri-State upon delivery.
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ARTICLE 16 - WAIVER

Any waiver at any time by either Party of its rights with respect to this Agreement, or with respect to any other matter arising in connection with this Agreement, shall be deemed a waiver of that specific instance only and shall not be deemed a waiver with respect to any other matter arising thereafter in connection with this Agreement.

ARTICLE 17 - CHOICE OF LAW

This Agreement shall be construed and interpreted in accordance with the laws of the State of Colorado. Jurisdiction and venue shall be in the Adams County, Colorado, District Court.

ARTICLE 18 - REACTIVE POWER

Each Party shall provide the reactive power requirements for its own system unless otherwise mutually agreed upon from time to time by the Operating Representatives of the Parties.

ARTICLE 19 - UNCONTROLLABLE FORCES

No Party hereto shall be considered to be in default in respect to any obligation hereunder if performance of such obligation is prevented by uncontrollable forces. The term uncontrollable forces is deemed for the purpose of this Agreement to mean any cause beyond the control of the Party affected, including, but not limited to, flood, earthquake, storm, drought, lightning, fire epidemic, war, riot, civil disturbance, labor disturbance, sabotage, and restraint by a court order, regulatory agency, or public authority, which by exercise of due diligence and foresight such Party could not reasonably have been expected to avoid. Any Party rendered unable to fulfill any obligation by reason of uncontrollable forces shall exercise due diligence to remove such inability with all reasonable dispatch. Nothing contained herein shall be construed to obligate a Party to forestall or settle a strike against its will.
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ARTICLE 20 - EXHIBITS MADE PART OF THIS AGREEMENT

Inasmuch as Exhibits A and B attached hereto and made a part hereof, set forth conditions which may change during the term of this Agreement, the conditions set forth in the Exhibits shall be as from time to time formulated by the Parties by mutual revision of said Exhibits. The initial Exhibits A and B, attached hereto, shall be in force and effect in accordance with its provisions until superseded by subsequent Exhibit(s). Other exhibits may be added to this Agreement by mutual agreement of 'the Parties.

ARTICLE 21 - SUCCESSORS AND ASSIGNS

A. Permitted Assignments - This Agreement shall be binding upon and inure to the benefit of the permitted successors and assigns of the Parties hereto. Producer, without the approval of Tri-State, may assign, transfer, mortgage or pledge this Agreement to create a security interest for the benefit of the United States of America, acting through the Administrator of the Rural Utilities Service (the Administrator). Thereafter, the Administrator, without the approval of Tri-State, may (1) cause this Agreement to be sold, assigned, transferred, or otherwise disposed of to a third party pursuant to the terms governing such security interest, or (2) if the Administrator first acquires this Agreement pursuant to 7 U.S.C., Section 907, sell, assign, transfer, or otherwise dispose of this Agreement to a third party; provided, however, that in either case (a) Producer is in default of its obligations to the Administrator that are secured by such security interest and the Administrator has given Tri-State notice of such default,; and (b) the Administrator has given Tri-State thirty days' prior notice of its intention to sell, assign, transfer or otherwise dispose of this Agreement indicating the identity of the intended third party assignee or purchaser. No permitted, sale, assignment, transfer, or other disposition shall release or discharge Producer from its obligations under this Agreement.

B. Assignments to Affiliates - Each Party shall have the right to assign all or part of its rights and interests herein, without prior consent of the

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other Party, to (i) any entity acquiring all ox- substantially all of the assets of such Party; (ii) any entity merged or consolidated with such Party; or (iii) any entity which is wholly owned by such Party.

C. Other Assignment - Except as provided in paragraph A, and B., above, neither Party shall assign its interest in the Agreement in whole or in part without the prior written consent of the other Party. Such consent shall not be unreasonably withheld.

ARTICLE 22 - APPROVALS

This Agreement is subject to the regulatory powers of any state or federal agency having jurisdiction, and subject to approval of the Rural Utilities Service. Each Party hereto shall use it best efforts and shall cooperate with the other to obtain from all such state and federal authorities as may have jurisdiction, all authorizations, approvals, and orders to the extent required by law in order to enable them to validly enter into this Agreement and to perform all their obligations hereunder.

ARTICLE 23 - OPERATING REPRESENTATIVES

The Parties hereby establish Operating Representatives to secure effective coordination and to deal on a prompt and orderly basis with the various operating and technical problems which arise in conjunction with the delivery of

power, reciprocal services, and coordination. Each Party, by written notice to the other Party, shall designate an Operating Representative who is authorized to act on its behalf.

The establishment of any procedure or practice or any other action or determination by the operating Representative shall be effective when signed by the Operating Representative of each of the Parties. The Operating Representatives of the Parties shall have no authority to modify any provision of this Agreement, except as provided hereunder.

The Operating Representatives agree to work together to develop procedures for operations, metering, etc., not less -than six (6) months prior to the commercial Date of this Agreement.
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ARTICLE 24 - SEVERABILITY

In the event that any of the terms, covenants or conditions of this Agreement, its Exhibits, or the application of any such term, covenant, or condition shall be held invalid by any court or administrative body having jurisdiction, it is the intention of the Parties that in lieu of each such -term, covenant or condition that is invalid, there be added as part of this Agreement, a term, covenant, or condition as similar in terms as possible to such invalid term, covenant or condition. The Agreement shall not be effected thereby and shall remain in full force and effect.

ARTICLE 25 - INTEGRATION

The terms and provisions contained in this Agreement between Tri-State and Producer constitute the entire agreement between Tri-State and Producer, and supersede all previous communications and representations, either oral or written, between Tri-State and Producer with respect to the subject matter of this Agreement.

ARTICLE 26 - NOTICES

All notices under this Agreement shall be deemed sufficient if deposited in the U. S. Mail, first-class postage prepaid thereon, addressed as follows:

To Tri-State Generation and Transmission Association, Inc.
General Manager
12076 Grant Street Post Office Box 33695
Denver, Colorado 80233

To Ripe Touch Greenhouse, LLC.
14590 East Fremont Avenue
Englewood, Colorado 80112

The designation of the person to be notified or -the address of said person may be changed at any time by similar notice.
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ARTICLE 27 - AUDIT

The Parties shall maintain accurate records and books of account in accordance with generally accepted accounting principles and consistent with this Agreement. Said books and records shall present fairly all costs and expenses utilized, either directly or indirectly, in computing any charges or payments to the other Party under 'this Agreement.

Upon thirty (30) days' written notice, each Party shall afford the other Party or its independent auditors reasonable access to the relevant records and books of account for a period of twenty four (24) months during the term of this Agreement, and fox, a period of twenty-four months thereafter. The Parties shall make every reasonable effort to obtain information from major subcontractors and suppliers requested in connection with such access to the records and books of account, at the requesting Party's expense.

ARTICLE 28 - ARBITRATION

If a dispute between the Parties should arise under this Agreement, either Party may call for submission of the dispute to arbitration, which call shall be binding upon the other Party. The arbitration shall be governed by the rules and practice of the American Arbitration Association (or the rules and practice of a similar organization if the American Arbitration Association should not then exist). If such rules and practices conflict with the then existing provisions

of Colorado law applicable to arbitration proceedings, such law shall govern.

ARTICLE 29 - AMENDMENT

This Agreement may be amended, changed, modified or altered, provided that such amendment, change, modification or alteration shall be in writing and signed by both Parties hereto.
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ARTICLE 30 - ATTEST

IN WITNESS WHEREOF, The Parties hereto have caused this Agreement to be executed in their respective names as of the date and year first above written.

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC	RIPE TOUCH GREENHOUSE, LLC.
By /s/_____ Frank R. Knutson, General Manager	By /s/_____ Stan Abrams, Manager
Attest: /s/_____	Attest: /s/_____

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EXHIBIT B
PURCHASE PRICE FOR ENERGY
(Article 5)

This Exhibit B, made this 15th day of March, 1995, to be effective under and as a part of the Power Purchase Agreement between Tri-State Generation and Transmission, Association, Inc., and Ripe Touch Greenhouse, LLC., dated_____ _____,shall become effective on the Effective Date of said Agreement and shall remain in effect until superseded by another Exhibit B. This Exhibit B or any superseding Exhibit- B shall terminate upon the termination of said Agreement.

ENERGY RATE - Information necessary to complete the calculation of the Billing Year Energy Rate illustrated below shall be taken from Tri-State's REA [RUS] Form 12d entitled, "Operating Report - Steam Plant" for Craig Station Unit No. 3.

ENERGY RATE FOR 1995 BILLING YEAR
(Example)

	October 1994 12 Months YEAR-TO-DATE OPERATION EXPENSE (Sec. E, Col. G, Line 12)	October 1994 12 Months YEAR-TO-DATE NET GENERATION (Sec. B, Col. C, Line 8)
Craig Station (Unit 3)	*$43,502,495	2,897,505 MWh
*Total Operation Expense	$79,565,667	
Minus lease expense	$36,063,172 (line 10)	
=	$43,502,495	

Energy Rate - 1995 = ($43,502,495 o2,897,505 MWh) = $15.01/mwh

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CALCULATION OF TWELVE MONTH WEIGHTED AVERAGE MONTHLY LOAD FACTOR AND

ROLLING THREE YEAR AVERAGE MONTHLY LOAD FACTOR

$$\text{Weighted Average} = \frac{LF(1) \times KW(1) + LF(2) \times KW(2) + \ldots + LF(n) \times KW(n)}{KW(1) + KW(2) + \ldots + KW(n)}$$

Where: LF (m) is the load factor for the month m

KW (m) is the Tri-State Class A member peak kW demand for month m

n = 36 months for Tri-State, or number of whole months elapsed since April 15, 1992, is less than thirty-six.

n = 12 months for Producer, or number of months elapsed since the Commercial Date, if less than twelve.

IN WITNESS WHEREOF, The Parties hereto have caused this Exhibit B to be executed in their respective names as of the date and year first above written.

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.	RIPE TOUCH GREENHOUSE, LLC.
By /s/_____	By /s/_____
Frank R. Knutson, General Manager	Stan Abrams, Manager
Attest: /s/_____	Attest: /s/_____

APPENDIX A

The additional monthly compensation referred to in Section 4(a)(ii) of the Agreement shall be calculated as according to the following formula:

$$R = (E - 14.6727) \times \$833.33$$

where:

R = Additional monthly compensation ($ / month) E = Energy rate from power sales contract ($ / MWh)

The energy rate (E) shall be updated annually on January 1st to reflect annual rate adjustments in the power sales contract. In any event the additional monthly compensation (R) shall not be less than zero.

Example

Where:

E = 15.01 ($ / MWh)

Then:

R = (15.01 - 14.6727) x $833.33 ($ / month)
= $281 per month

APPROVED:

ClTIZENS LEHMAN POWER L.P.	RIPE TOUCH GREENHOUSE, LLC	KENNETH M. MCBRYDE
By:/s/_____	By: /s/_____	By: /s/_____
Date: 9/13/95	Date: 9/8/95	Date: 9/8/85

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AMENDMENT NO. 1

TO THE

POWER PURCHASE AGREEMENT

BETWEEN

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.

AND

RIPE TOUCH GREENHOUSE, LLC

I PREAMBLE. This Contract Amendment is made this 28th day of February 1997, between TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION INC., hereinafter called Tri-State-, and RIPE TOUCH GREENHOUSE, INC., formerly known as Ripe Touch Greenhouse, LLC., hereinafter called Ripe Touch, as part of the Power Purchase Agreement, dated March 15, 1995, (Original Contract) pursuant to the same authorities as the Original Contract, and subject to all of the provisions of the Original Contract except as herein amended.

2. EXPLANATORY RECITALS:

2.1 Ripe Touch has begun the processes necessary to install and operate a waste fuel fired generation facility, hereinafter referred to as the Project, in northwest El Paso County, two miles west of Calhan, Colorado.

2.2 The Original Contract provides, among other things, for electrical interconnection by Ripe Touch with Tri-State's Member, Mountain View Electric Association, Inc., directly and with Tri-State indirectly to facilitate delivery and sale of approximately 5,000 kilowatts of power and associated energy from the Project to Tri-State-

2.3 The terms of the Original Contract stipulate that the Original Contract shall become null and void in the event the Commercial Date has not occurred by February 28, 1997.

2.4 Ripe Touch has requested extension of such termination date until April 30, 1998, has demonstrated to Tri-State that significant progress has been made toward construction of the Project, and has provided to Tri-State a deposit in the amount of $25,000 which shall be refundable only in the event the Commercial Date occurs prior to the requested extension date.

2.5 Ripe Touch Greenhouse, LLC, a party to the Original Contract, along with Tri-State, is now known as Ripe Touch Greenhouses, Inc.,

2.6 The parties desire to change the terms of the Original Contract to change the date of termination and to change the name by which Ripe Touch is known under the Original Contract.

3. AGREEMENT: The parties hereto agree to the terms and conditions set forth herein.

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4. TERM OF CONTRACT AMENDMENT: This Contract Amendment shall become effective on the date first above written, subject, however, to written approval by the Rural Electrification Administration and any regulatory agency having jurisdiction, and shall remain in effect concurrently with the Original Contract and shall terminate concurrently therewith.

5. REVISION OF ARTICLE 3. "TERM AND TERMINATION": The second paragraph of Article 3, "Term and Termination", of the Original Contract is hereby deleted in its entirety and the following substituted therefor:

"Tri-State may also terminate this Agreement if certain minimum load factor deliveries are not maintained by Producer, as outlined in Article 5. In addition, if the Commercial Date does not occur prior to May 1, 1998, the terms of this Agreement become null and void."

6. REVISION OF VARIOUS CONTRACT ARTICLES: All references in the Original Contract to "RIPE TOUCH GREENHOUSE, LLC." shall be understood to refer to "RIPE TOUCH GREENHOUSES, INC."

7. ORIGINAL CONTRACT TO REMAIN IN FULL FORCE AND EFFECT: Except as expressly modified by this Contract Amendment, the Original Contract shall remain in full force and effect, and this Contract Amendment shall be subject to all the provisions, except as herein modified, of the Original Contract.

IN WITNESS WHEREOF, the Parties have caused this Contract Amendment to be executed the date first written above.

RIPE TOUCH GREENHOUSES INC

By: /s/_____ Witness: /s/_____
Stan Abrams, President

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION INC,

By: /s/_____ Witness: /s/_____
Frank R. Knutson, General Manager