

# ENVS 482

Internship: Energy Wise

Energy  Wise

**Tyler Barns**

Spring 2006

## **January 19<sup>th</sup>**

Today I met with Dana Boudreau of Energy Wise. Energy Wise is a small one man company right now. It is focused on bringing energy efficiency to Humboldt County. Dana and I discussed a number of projects that he has been working on and where I could help him out. We discussed a project that I had done previously for another class which involved Energy Wise and a survey about energy use in the Arcata area. I will be presenting this data to him at a latter date. Along with the survey we discussed interpretive displays for RCEA, halogen lamp to T5 retrogrades, as well as figuring a way to summarize an HVAC manual into an easy to read informative handout. It looks as if I have a lot of work to do this semester, and I am looking forward to getting some hands on experience out in the field. Our next scheduled meeting is for Thursday 01/26/06.

## **January 24<sup>th</sup>**

Today was really the start of my internship process. I put together some documents from a previous class that I will be presenting to Dana on Thursday. I also started the newsletter on PV vs. PV and energy efficiency. I am having a little trouble trying to figure out exactly what fits into a newsletter like that, but I am making due.

## **January 25<sup>th</sup>**

Continuing to work on the newsletter and getting ready for the meeting. Also, going to start working on research about LED's and whether they are better than CFLs, etc.

## **January 26<sup>th</sup>**

Met with Dana today for our second meeting; I turned in the Energy Efficiency PV handout and went over the energy and the community work. He gave me a few more things to do: Talk with Mike Gough about a GIS Solar Homes tour of Arcata, summarizing the CHEER Binder (mainly the tight ducting section) and following up on the energy and the community survey. It's going to be a lot of work this semester, and I hope that I gain some good experience and possibly some job options.

## **January 27<sup>th</sup>**

I starting work on the stuff that we covered in the meeting yesterday. I have a few e-mails to get out and have to build a brief handout that summarizes and best explains the results of the energy and the community survey results. Dana is working on flagging some key sections of the CHEER binder so it's not so overwhelming. I plan on reading as much as I can...hopefully it will help with some future opportunities.

## **February 1-4<sup>th</sup>**

Continued working on the handout for the community energy survey. Updated a view of the old slides from the original presentation; made them more readable in black and white by removing the background colors. Still waiting for Dana to finish flagging the CHEERS notebook, not sure how much time it will take to actually summarize the documents.

## **February 7<sup>th</sup>**

Dana sent me an e-mail last night and cancelled our meeting for today. That gives me a little longer to work on some of the handout information seeing as I lost my flash drive with all of my completed work on it.

### **February 10<sup>th</sup>**

Finished the handout, again, and this time it's ready to be presented to Dana on our meeting on the 14<sup>th</sup>. I met up with a student from another one of your classes about a solar project they are working on. It sounds great and actually it could be very useful to Dana and RCEA. I will be speaking more with her as time goes on.

### **February 14<sup>th</sup>**

Had a meeting with Dana today that covered a lot of material. We edited the handout and got that ready for another review session for the 28<sup>th</sup>. (He'll be gone for the 21<sup>st</sup>.) We talked a lot about the CHEERS notebook and what needs to be done. I have a lot of work ahead of me- he would like a flow chart multi-page handout that in theory could be given to the State for general use in climate zone 1. It's going to be a little tough for me to get much done in the coming weeks – I have a lot of tests and assignments for my classes.

### **February 23<sup>rd</sup>**

Finished editing the handout and it's ready for final review and printing/e-mailing. I haven't started working on the CHEERS notebook yet – too scary. But, actually I have looked into flowchart software. We don't have any to my knowledge on campus and I think that I can download a few trial versions from the internet for free. I will speak to you and/or the computer specialist on campus about this issue.

### **February 28<sup>th</sup>**

Made a lot of progress over the past week; got Microsoft Visio from Microsoft.com and installed a trial version on my computer that will enable me to finish this assignment. I started looking at the book and it's a big one but I don't think that it will be all that hard to dissect and put into an easier format. I met with Dana today about his thoughts of how to get the flow charts started and also for him to tell me a little about his recent field work. His field work isn't as exciting as I thought that it would be – still looking for clients.

### **March 7<sup>th</sup>**

Well, I've been working hard on the California HVAC manual and it's coming along a little slower than I anticipated. I am also studying for some of my upcoming tests and projects for other classes. He hasn't given me a deadline for this so I can put it on the back-burner for a little while. I am going to start researching the next item on the list...the LED and what it can do for energy efficiency in the home and business.

### **March 21<sup>st</sup>**

I am back in town now after a short trip home for spring break. Nothing much going on down there, however I was able to finish up a lot of the CHEERS handbook. It is coming along pretty quick now that I've got the hang of Visio. I was supposed to have a meeting with Dana this

afternoon to "report in" on what I've got done. But, he's going to be out of town doing some research for a product that he is interested in promoting. Oh, well.

### **March 28<sup>th</sup>**

Met with Dana this afternoon and showed him my designs for the CHEERS handbook. He liked the idea of what I was doing but then we discussed how we were going to get it out to the rest of the people. Microsoft Visio is not an easy printer-friendly program and there is no way to convert it to a format that would work. He told me to download a program called Concept Draw and convert the Visio to it's format.

### **March 30<sup>th</sup>**

I was able to download the program for a 30 day trial and get the converter. It was an easy switch, but there were complications. A lot of my text was in an incorrect format or completely out of place. This will set me back a little while.

### **April 4<sup>th</sup>**

Over the past few days I have been able to get the hang of Concept Draw – it's much harder than Visio. I have finished the draft and I am turning it in to Dana today.

### **April 5<sup>th</sup>**

I sent Dana a digital copy of the document and I think that he is going to do some editing and print a few copies out for demo. Now that the work for the CHEERS book is done, I am going to focus on finding some data on the elusive energy efficient LED.

### **April 11<sup>th</sup>**

The semester is closing in fast and I am finishing up with my other classes and working on a few projects here and there. I sent him more data on the LED and I am still researching what ever I can find. There isn't much out there in terms of peer reviewed journals or articles that say whether or not we can expect an LED with high lumens/watt. I will keep looking and in the meanwhile, I hope that Dana will start taking me out on some field work. Dana and I met today and we discussed what is going to happen for the remainder of the semester. I have finished my research portion of the intern and I am now looking forward to the nitty-gritty.

### **April 18<sup>th</sup>**

Dana missed another meeting today so I am a little disappointed about that. We were supposed to talk about his business and how it's managing. I want to know more about advertising business and social marketing. I want to know about installing PV panels and getting clients, etc. I am not sure I we are going to get any field work in, but I hope there will be something in the near future. I believe that I was going to get final copies of the edited work that I have done so I can put them in a portfolio of sorts just to give you an idea of what I have done this semester. We'll see.

### **April 24<sup>th</sup>**

I met with you today and kind of vented about the lack of field work, and professionalism for that matter. I realize that things come up and that I am just an intern, but this is something that I

hope to take seriously in the future and right now I can use all the help I can get. I will call him tonight to verify for tomorrow. You and I talked about the final paper and I'll have that done with the journal and hopefully a copy of some of my work for you on Monday of finals week.

### **April 25<sup>th</sup>**

Dana missed our meeting again today and I called him on it. He was doing some financials for his business. No news on when I am going to get the final drafts of the work I have done so I will be turning in my drafts to you. Dana is competing in the Economic Fuels Business Plan competition put on by the Eureka Reporter. He invited me to watch his presentation this Wednesday.

### **April 26<sup>th</sup>**

The Economic Fuels Competition was pretty interesting to watch. I found out where Dana has been spending all of his time. He's working on Integral Energy, a business focusing on utilizing energy efficiency measures and solar photo voltaic systems in tandem with each other for the best economic effectiveness. I feel that a few of the projects that he presented as test runs would have been great field experience for me...seeing as I didn't really get any. The Renner gas station was slated in January to be on my list of things to do. Oh well, I'm the intern. I verified our meeting for the following Tuesday, May 2<sup>nd</sup>.

### **May 2<sup>nd</sup>**

Sat in Sacred Grounds for about an hour this afternoon, and again Dana didn't show up. When I got home I had a message waiting for me. "Not sure if we had a meeting scheduled for today, I think that we have covered everything we needed to get done." Ya, except for my final papers and my letter of recommendation...I will talk to him tomorrow.

### **May 3<sup>rd</sup>**

I am writing up the last entry in the journal and getting ready to write the paper. Not quite sure what I am going to write about, but I will focus on my experiences with research and management. Then I will try and focus on my future goals and what I have learned about being an intern.

## **ENVS 482 – Internship Paper**

Energy Wise – Dana Boudreau  
Tyler Barns

My ideal internship would include research, design, communication, and field work. I feel my internship with Energy Wise fell a little short of that goal. Granted I did receive education about business practices, new products that are out on the market, and how difficult a profession can be when there really is no market for that particular need. In this paper I plan to talk about my experiences, my research, and my frustrations. Not all is as bad as it seems, I was an intern and I gained the knowledge that I needed to better understand my goals and what I would like to do with my degree in Environmental Science.

First, my experiences up to this point have been fairly limited to the classroom and/or the labs required with certain classes. I have completed a few projects that I feel best exemplify what I could do: "Zero Waste Graduation," and a research project that focused on the businesses of Arcata for ENGR 308 with David Narum. However, working with Dana at Energy Wise, well actually working more or less by myself and meeting with him at Sacred Grounds weekly has given me another experience- that of being an intern. I am glad that I had the opportunity to work under Dana and yourself for this last semester. I had hoped to utilize my communication skills a little more (i.e. actually dealing with a client) but, the experience was what it was and I am glad that I had it.

Second, my research was a great deal of my internship. I had initially done first Energy Wise research project back in 2004 in ENGR 308. I finally had the chance to get the results back out to the public. Many people actually had the opportunity to see them before but now Dana finally got around to editing them. I am not quite sure if the "final draft" has been sent out yet, or if it is still sitting on his desk. I will give him the mailing list this week (the last week of school) if he cannot produce the copies I need to get them out myself. Along

with re-vamping the results of that study [copy included] I also contributed a great deal of time in researching energy efficiency and photovoltaic's. Actually, now that I think about it, my research might have been used in Dana's business proposition Integral Energy. Again, I have included a copy of that draft for you to review. I was able to identify ways in which to get people motivated to use energy efficient technologies such as CFL's and other behavioral changes to maximize that amount of energy saved. Following the research on PV panels I started up a project on the California Heating and Ventilation Standards; the CHEERS<sup>®</sup> Handbook. This was a daunting task at first because I knew nothing about the regulations required by the State of California, or any state for that matter. I was instructed to synthesize the un-needed information and make a clean and clear presentation that could be utilized by local contractors, regulators, and other state officials. I used Visio to create models and flow charts, then I had to convert them over to Concept Draw in order for Dana to get them in the correct format for e-mailing and printing. It wasn't as hard as I thought it would be once I got a hang of the programs. There was still plenty of information that Dana flagged for me to look at and everything takes a certain amount of time. I was really looking forward to a final copy of the document, but I feel that will never come until Dana finishes up with his other projects. My last round of research focused on LED's and how in the near future we may be seeing them replacing a lot of our residential lighting needs. I found that they will become more energy efficient with goals of 150L/watt in the future. I completed this research and Dana was going to write an article in the Times Standard about the benefits coming soon. I got his rough draft around the mid April, and I haven't had a meeting with him yet [in person] were I have been able to give it back to him. I am not sure when or if he is still planning on getting that article out.

Lastly, as you can tell, I have had a little frustration in dealing with the lack of contact and the lack of field work, etc. I wish that the internship could have given me a little more experience in the work that I plan on doing. I feel that it would have better prepared me for the work force and it could have given

me a leg up on the competition. I asked for more field work and I volunteered my time when ever he needed it, but nothing ever came to fruition. I am not sure if he just isn't getting the amount of business that he needs or if things are just getting done before they reach my level. We were planning on using the last two meetings for discussion about his business practices, what he feels will be the market trends in the near future, and what areas he thinks would be good places to start looking for perspective jobs. These meetings never happened; I still have questions that I want to get answered. I plan on calling him soon to see if I can get any of the final drafts and also to get some of those questions answered. After reading my journal entries you'll find that there were multiple times that we had to skip meetings for various reasons. I feel that I was somewhat under utilized for my time and experience.

In conclusion, the experience was a good one. I needed to get an internship under my belt and this one proved to have all the ingredients to exemplify work in the real world. It can be sketchy at times, but there will always be times when you have big projects to work on that create some level of stress. I appreciate the effort that Dana put in and I am now aware that he might not have been the best "company" to intern for. I also thank you for allowing me this internship and for requiring those "check-ins" about my progress. I hope that I was able to inform you about what was happening on my end. I may not have gotten all the components required for my ideal internship, but none the less, I am happy to have this as a resume builder and a learning experience.



# Energy Usage and Social Change



## Summary Report Tyler Barns

First and foremost, thanks to all those involved in the survey process. Your time and effort creates a better understanding of the relationship between energy and business management in Arcata.

This document presents and briefly discusses certain pertinent. The full report can be attained via Energy Wise at a later date.

**It is important to note that due to the recent hurricane activity in the Gulf Coast some correlations may now be incorrect. For example, gas prices are higher than expected based on historical trends.**

Many business owners are aware of the opportunities to save, but some are not. We recognize this barrier and feel that educating business owners regarding energy efficiency measures (i.e. rebates, credits, etc.) could make a considerable difference.

We are also aware of the most prominent barrier to utilizing energy efficient practices; money. Again, we feel that with education from Redwood Coast Energy Authority (RCEA) and others, more of these measures will become available to the business owner.

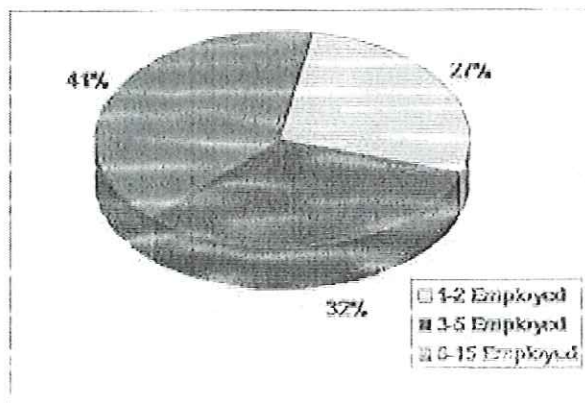
Some possible solutions:

- Rebates – as discussed previously, rebates or credits have been offered for investing in energy efficient products.
- Workshops and informational days can be and have been available in the pasts. (Depends of RCEA.)
- Awards or special recognition could be given to those businesses who implement energy saving methods (i.e. Newspaper article)
- Business owner could sign a contract to conserve.

These are just a few possible solutions to some of the problems facing today's business owner. We hope that this summary report has helped portray the energy concerns of Arcata's businesses.

Here are the results of the spring 2005 survey:

### Employment Percentage



### Business Size

Businesses in Arcata, California were surveyed during the months of March and April 2005. The first question on the survey was how many persons were employed by the business, including the owner.

- For 1-2 Employed, it was roughly 41%
- For 3-5 Employed, it was roughly 32%
- For 6-15 Employed, it was roughly 27%
- For 16+ Employed, there were zero

We can, from this data, state that the majority of the businesses in Arcata are small in size.

We found that in a lot of the businesses surveyed, there was a correlation between business size and the money spent on energy utility fees. Larger businesses

were able to spend more on energy efficient products and therefore capitalizing on the savings generated by said products.

Another key issue the survey defined was the correlation between gas vs. electric use. The survey covered a majority of the businesses in Arcata, and with the survey an idea of the overall gas and electricity bill for the average business was possible.

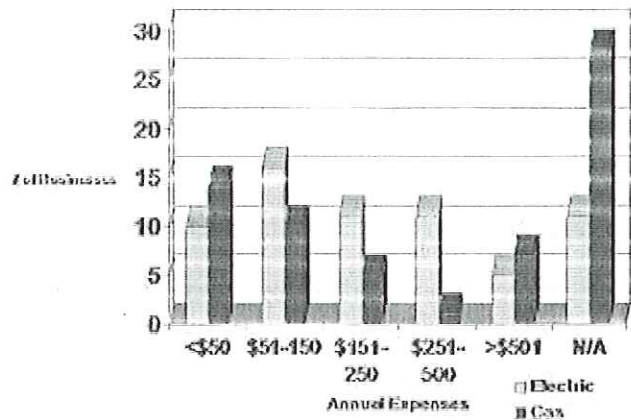
### Fuel Mix

The table below illustrates how many businesses were spending what amount on the annual energy utility fees. (Results based on monthly billing estimates)

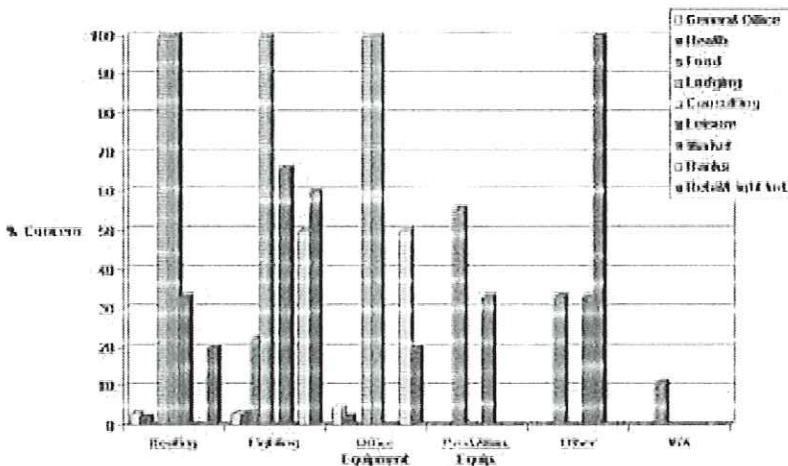
	<\$50	\$51-150	\$151-250	\$251-500	>\$501	N/A
Electric	10	16	11	11	5	11
Gas	14	10	5	1	7	28

With this data, we gather that there is an inconsistency in what people are spending for gas v. electricity. This could be caused by energy conservation methods already in place.

### Gas v. Electric Usage in Arcata



### Primary Energy Concerns



### Primary Energy Concerns

The survey then asked business owners what their primary energy concerns were. The graph on the right displays all the business types except for retail. The top energy concerns are:

1. Lighting concerns were the primary concern for the majority of business owners.
2. Office equipment, and
3. Heating

Here again, we can assume that due to hurricane activity gas prices for heating might overtake lighting as a primary concern for business owners.

*This is a mild climate.*

### Retail Primary Energy Concerns

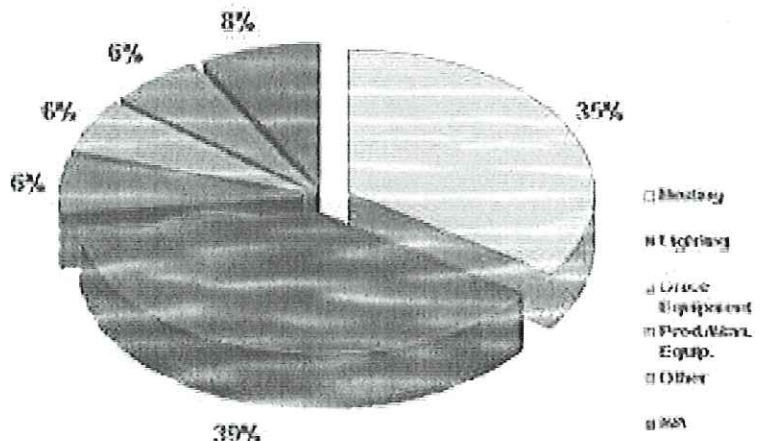
Retail was separated from the remainder of the business types because it was the majority of the businesses we were able to survey and therefore it construed the data.

We found:

- Lighting again was the primary concern of retail business owners
- Followed closely by heating.

With Retail having such a large chunk of the overall business type pie, we feel that making a difference with this social and technical barrier could have a dramatic effect on energy conservation. Social barriers refer to the resistance of energy conservation and investments in energy efficient products. Technical barriers in this case refer to the

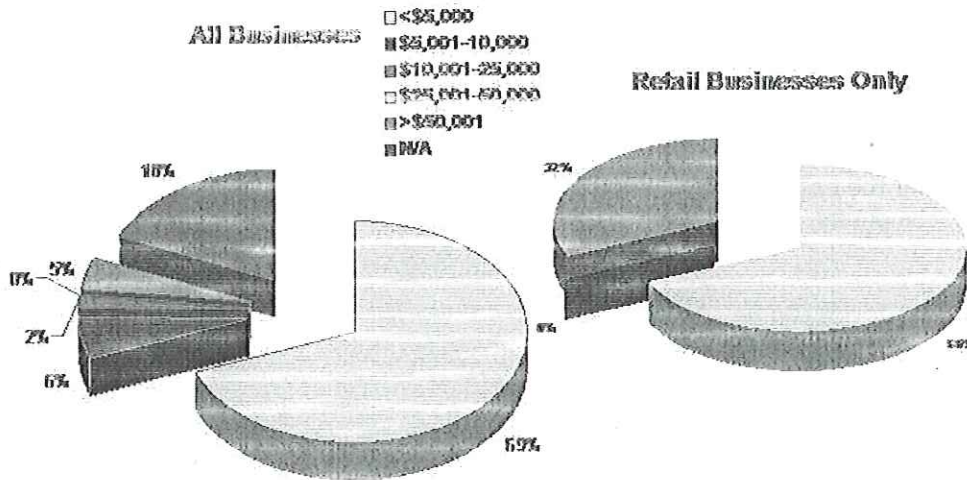
### Retail's primary energy concerns?



complexity or extra work to install and use of said products.

Here again, we can assume that due to hurricane activity gas prices for heating might be a primary concern for business owners over lighting.

## Willingness to spend on EE products



Willingness to Spend  
Roughly 69% of the businesses, except retail, surveyed were willing to spend less than \$5,000 on energy efficient products. And, 18% did not answer the question or were not willing to state that information.

Retail businesses were roughly the same; however, 32% were willing to spend at least \$50,001 for energy efficient products.

We believe that some of this percentage could be attributed to faulty answers. However, as to not bias the results, all answers were included in the analysis.

The last set of questions on the survey asked business owners to rank the order in which they felt best represented their views about using energy efficient products.

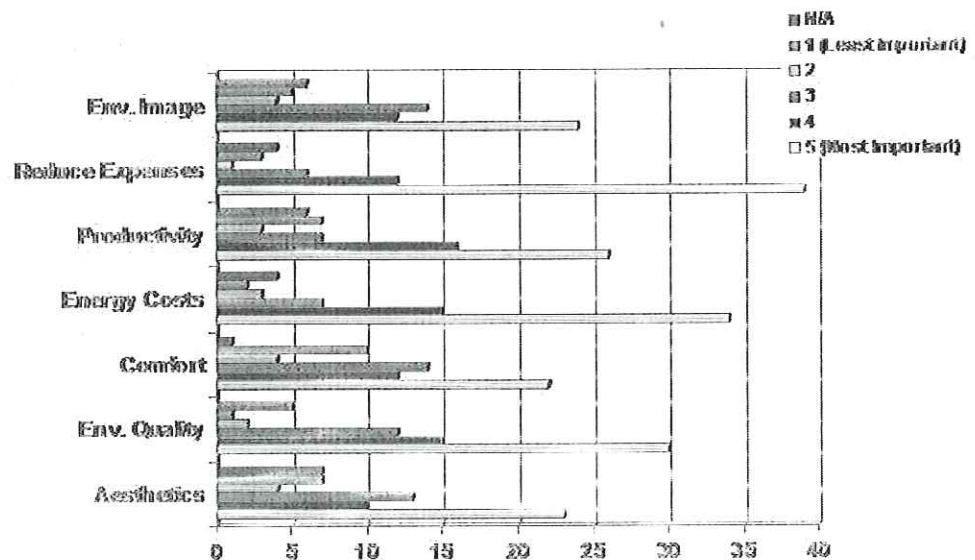
This display and the previous diagram show that money is a major factor in all business related decisions.

## What's important to the business owner?

In priority order:

1. Reduce Expenses
2. Shield themselves from rising energy costs
3. Improve the quality of the environment
4. Improve their positive environmental image
5. Improve their productivity
6. Improve aesthetics of the store/sales impact
7. Improve levels of comfort

## Motivation to use Energy Efficient Products



During the survey, we recognized that there are some businesses that utilize energy efficient measures to combat the high prices associated with the utility fees of a business.

## Take the next step

There are numerous pathways to reducing your energy consumption. For example, purchasing new energy efficient machines such as refrigerators, freezers, and office equipment could significantly decrease the monthly utilities expenditure. Another investment that could pay dividends would be the installation of solar energy systems, either passive or photovoltaic.

Some of the easiest ways to include energy efficiency in your practice could be to switch out incandescent bulbs for compact fluorescents lamps (CFLs), or incorporating solar hot water, or even as easy as recycling materials used. By far the easiest way to save energy is to turn off the lights, computers, and office equipment when they are not in use.

A multitude of *How To...* answers and technical advice can be obtained via Redwood Coast Energy Authority (RCEA). ([www.redwoodenergy.org](http://www.redwoodenergy.org))

For further questions and assistance please direct inquiries to Energy Wise or RCEA.

**Energy Wise**

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Arcata, CA  
95521  
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# HERE'S TO THE CALIFORNIANS WHO RECOGNIZE THAT PROTECTING THE ENVIRONMENT DOESN'T COME AT A COST, BUT A SAVINGS.



**Energy Wise** is a free, confidential service that provides energy efficiency information to businesses. We help you identify energy-saving opportunities and provide you with the information you need to make informed decisions about energy efficiency investments. Our experts provide you with a free energy audit and a list of energy-saving opportunities. We also provide you with a list of energy-saving products and services. We are committed to helping you reduce your energy costs and protect the environment.

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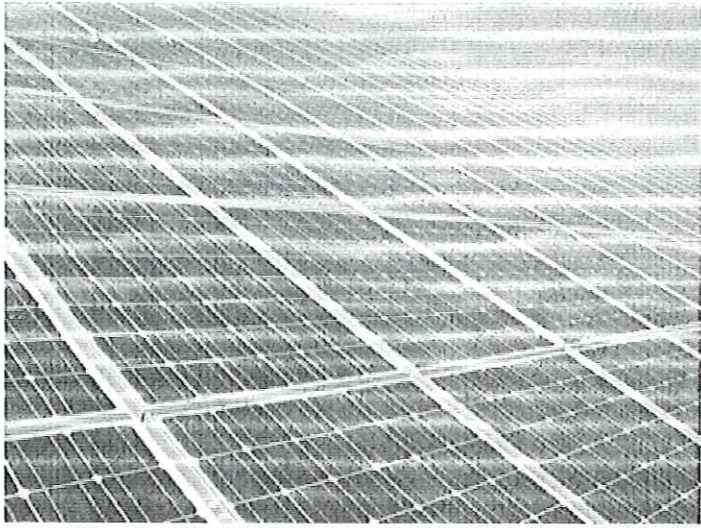
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# Energy

## Efficiency

ADDRESSING THE NEEDS OF BUSINESS AND SPREADING KNOWLEDGE FOR A MORE SUSTAINABLE FUTURE.

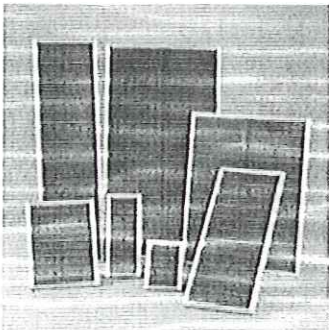
## How much are you saving with solar?

What are some of the benefits of utilizing a PV system for your business?

- Protect Against Rising Utility Rates -California has seen rising utility prices over the past years; Businesses that require high energy usage are at stake – Solar is one way to combat against these expenditures.
- Reduce Operating Costs – Solar Systems can cut your electricity bill in half.
- Take Advantage of Government Rebates and Tax Credits - Save up to 70% on the cost of a system with rebates and credits.
- Good Return on Investment (ROI) – Along with the rebates businesses can get quick pay backs, long-term savings, and increased property value
- Long Term Reliability & Low Maintenance Costs – Systems require very little maintenance, especially if batteries are not used.
- Become a "Green" Business- help reduce the consumption of fossil fuels, reduce the amount of pollution and green house gases.  
- Borrego Solar; <http://www.borregosolar.com/business/solar-energy-benefits.php>

Energy efficiency means using your building's individual components to do the same job as less efficient components for less money over the long-term. Energy-efficiency applies to everything from the building envelope, which includes energy efficient windows, lighting, insulation, foundation, and the roof, to office equipment that doesn't waste energy sitting idle and equipment with built-in power management features. It also applies to space heating and cooling systems, which are aided through the use of automated controls, ventilation, improved duct systems, and other advanced technologies. Energy efficiency can also apply to water heating when combined with water-efficient appliances and fixtures that will save water, energy, and money. – NREL

[http://www.nrel.gov/buildings/pv/c\\_energy\\_solar.html](http://www.nrel.gov/buildings/pv/c_energy_solar.html)

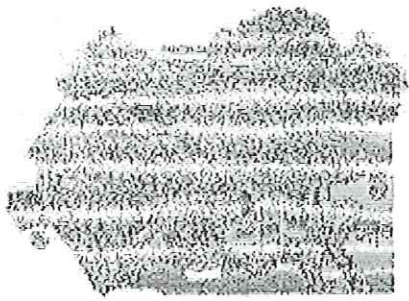


## PV Panel Variety

- There are a multitude of available products on the market. Finding companies via the internet is one way to discover these products.
- Once a particular system has been selected, there are multiple ways to assemble and mount the system.
- It is best to have a system installed by a certified provider; Companies listed on the web or otherwise can customize systems to fit your needs.

<sup>1</sup> Solar Panel Picture: Pianeta; <http://www.pianetah2.it/en/ps.htm>

<sup>2</sup> Solar Panel Picture: DivPower; [http://www.divpower.com/store\\_pv\\_panels.htm](http://www.divpower.com/store_pv_panels.htm)



## Getting the most from your solar system?

*Combining energy efficiency measures with your PV system will enhance your investment.*

**SMARTER INVESTING:**

**PV and Energy Efficiency Measures vs. PV stand alone**

**Our money's on the efficiency measures**

An important first step when considering the purchase of a photovoltaic system for a commercial building is whole-building design because it can save building owners time and money. Whole-building design takes into consideration the building structure and systems as a whole and examines how these systems work best together to save energy and reduce environmental impact. Besides allowing building owners to get more value from their solar electric system, whole-building design can also benefit building owners by improving comfort for building occupants, which can lead to such things as improved employee productivity or less tenant turnover.

A good place to start reducing energy consumption for an existing building is through energy efficiency measures. For new construction, passive solar features incorporated into the building design can have a significant impact on a building's energy consumption. For example, a building that uses lots of natural light will not only reduce electrical consumption for lighting, but will also reduce the amount of heat given off by lighting fixtures, thus, allowing for a smaller air conditioning system. A smaller air-conditioning system needs less electrical power to operate, and therefore, less solar panels will be required for cooling the building, allowing building owners to get more value from their solar-electric panels. Other technologies that can reduce electrical demand are solar thermal technologies for space and water heating.

On a broader scale, whole-building design can help reduce the enormous amount of energy consumed in the United States by commercial buildings. By creating buildings that use less energy and have lower power demands, greater robustness of the buildings as well as the power grid is achieved. This reduces the need for fossil fuels and consequential environmental impact. Other benefits of whole-building design include:

- Reduce energy use by 50% or more
- Reduce maintenance and capital costs
- Reduce environmental impact

If done correctly, whole-building design need not cost more. In some cases, it can even eliminate or reduce unnecessary building space and reduce construction costs. However, because all the pieces must fit together, it is essential that the design team be fully integrated from the beginning of the design process. The building design team can include architects, engineers, building occupants and owners, and specialists in areas such as indoor air quality, materials, and energy use. For commercial buildings, it is essential to bring energy consultants into the design process from the beginning and keep them involved throughout the process so they can advise owners of how changes to design will affect a building's energy performance. -NREL

[http://www.nrel.gov/buildings/pv/c\\_design.html](http://www.nrel.gov/buildings/pv/c_design.html)

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<sup>3</sup> Energy Efficiency Diagram: GoodCents; <http://www.goodcents.com/Programs/energy.htm>