ENETI
SAMOA'S ENERGY NEWS

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Photovoltaic Generation – A Future Technology for American Samoa .....

What is Photovoltaic? It is a term combining the Greek root "photos," meaning light, and "Volta", an Italian physicist in the late 1800s. Today, this term applies to the process of generating electricity from light, especially sunlight.

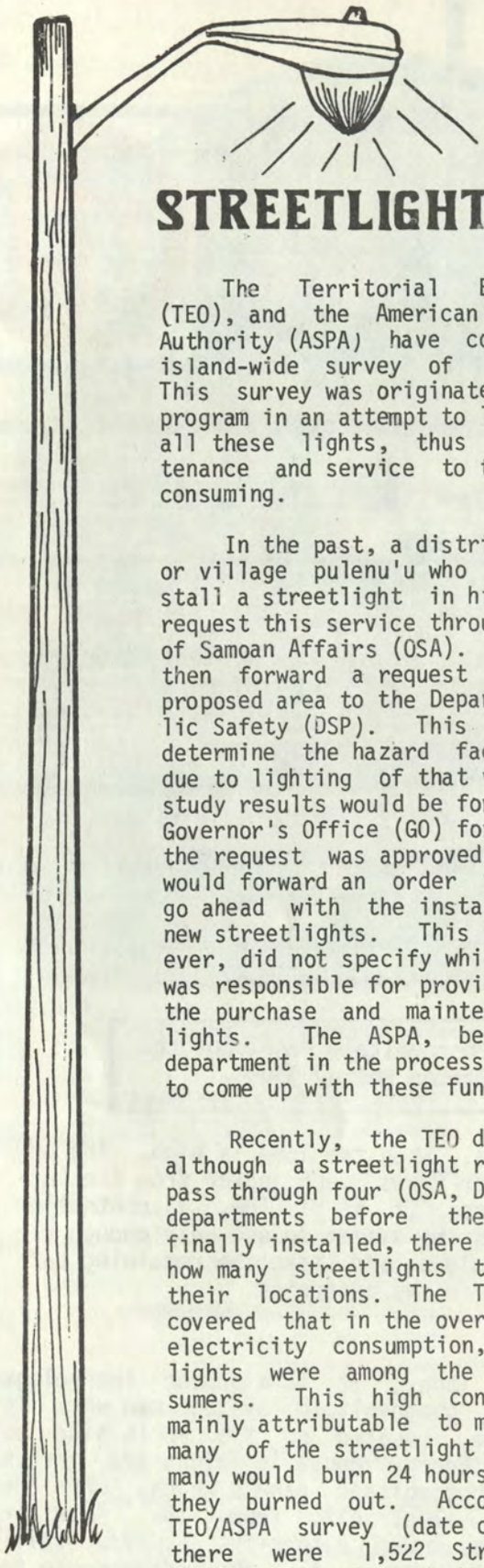
Because Samoa's geographical location provides many sunlight days throughout the year, this new process of photovoltaic energy is among the prime alternative and renewable energy resources in the territory.

The photovoltaic process, or system, as it is technically called, consists of three separate yet unified components. The first component is called the photovoltaic panel. The photovoltaic panel is a collection of many special cells. These are the heart of the system. When light hits these cells, electrons are moved in such a way that a direct electric current is produced. This current is then transferred to the second component of the system: the batteries. The batteries' purpose is to store the current from the photovoltaic panel, and distribute it as needed by the third component.

The third component is called the inverter. Since the main electricity used by most, if not all homes, is called alternating current, the job of the inverter is to convert the direct current from the batteries into alternating current needed by a load in the house. When the load is high, the inverter draws much power from the batteries. If it is low, a controller tells the system to use only enough for that load, and store the remaining current in the batteries.

Photovoltaic Panels at the Samoan Energy House.

Today, it is a proven technology that photovoltaic systems can work in Samoa. Located on the North side of the Energy House in Tafuna are arrays of photovoltaic panels which, when the main electricity from the American Samoa Power Authority is off, still supply energy to the Energy House to power its lights and equipment. For more information on photovoltaics, stop by the Energy House in Tafuna or call 639-1101, 1102 or 1103 during business hours.



STREETLIGHTING

The Territorial Energy Office (TEO), and the American Samoa Power Authority (ASPA) have completed an island-wide survey of streetlights. This survey was originated under a TEO program in an attempt to locate and map all these lights, thus making maintenance and service to them less time consuming.

In the past, a district legislator or village pulenu'u who wished to install a streetlight in his area would request this service through the Office of Samoan Affairs (OSA). The OSA would then forward a request to study the proposed area to the Department of Public Safety (DSP). This study would determine the hazard factor decrease due to lighting of that vicinity. The study results would be forwarded to the Governor's Office (GO) for approval. If the request was approved, then the GO would forward an order to the ASPA to go ahead with the installation of the new streetlights. This practice, however, did not specify which department was responsible for providing funds for the purchase and maintenance of the lights. The ASPA, being the last department in the process, was expected to come up with these funds.

Recently, the TEO discovered that although a streetlight request had to pass through four (OSA, DPS, GO & ASPA) departments before the units were finally installed, there was no data on how many streetlights there were and their locations. The TEO also discovered that in the overall government electricity consumption, the streetlights were among the highest consumers. This high consumption was mainly attributable to malfunctions of many of the streetlight controls, and many would burn 24 hours a day until they burned out. According to the TEO/ASPA survey (date completed 9/82) there were 1,522 Streetlights on Tutuila island, including Aunu'u. Of this number, 1,251 were 175-watt mercury vapor units (mv), 104 were 400 watt m.v. units, 64 were 200 watt units, and 5 were 60 watt units of the standard lights. The survey also showed that 16 out of every one hundred units were damaged.

Because of the survey, new efforts are being made to repair or replace the damaged lights with more efficient lights available on the market today. As of this publication, the TEO has continued to monitor this effort and recommend efficient, properly sized outdoor lighting units as replacements when needed.

Energy Tips

Match the size of the pan to the heating element. More heat will get to the pan; less will be lost to surrounding air.

On very warm days, use your draperies and curtains to help keep the heat out of the house. Draw draperies and curtains across windows during the hottest part of the day. Open them later when the temperature drops.

Did you know that pilot lights for gas stove burners and ovens burn about 1/3 of all the gas used for residential cooking? Make sure that your pilot light is properly adjusted – it could be burning more fuel than is necessary.

THE SAMOA ENERGY HOUSE COMBINED TECHNOLOGIES IN ENERGY USE

Located at the corner of the FAA Station turn-in from the main Airport road stands a recently completed two-story building which houses the Territorial Energy Office of American Samoa. From a distance, it looks like any other office building.

On the contrary, when the Energy House was first planned, the idea of a "home" was incorporated in all its phases. But that is only part of this unusual house.

At close range, a visiting home owner will see many ideas on how to manage energy use, from cooking to comfort, from production to conservation.

Let us take some of these ideas in detail.

Lighting. In any home, a prime use of energy is to provide lighting. During the day, there is enough sunlight to light indoors as well as outdoors. But a sad practice in many homes is closing out the natural light outdoors and use energy to light the indoors. Sometimes, because of the building orientation, the occupants are forced to this practice. Upstairs at the Energy house, roof skylights demonstrate the effectiveness of natural lighting. Downstairs, the building is oriented in such a fashion that natural lighting flows in from morning to sunset.

Ventilation. Ventilation in any home is a hygienic need. This is the process of displacing indoor air with fresh outdoor air. Since people living in a home pollute the indoor air with smoke, oven fumes, etc., it is not healthy to keep breathing the same air. The Energy House is built and oriented so that outdoor air will flow in freely and displace the rising warm and used indoor air. This natural ventilation also helps keep the indoor temperature cool and comfortable.

Insulation. When this term is mentioned, the first thing that most people think of is air conditioning. Partly correct. The Energy House features insulation of the walls and ceilings of both stories. Only two rooms of the whole building, however, are air conditioned, and both are also insulated. The main point demonstrated in non-air conditioned space is that, at night, the cool air moves in and, in the morning when it warms up, the cool air remaining from the night before will keep the occupants comfortable until the breezes begin to flow .

The Samoa Energy House located at Tafuna

These are but a few of the special features of Samoa's Energy House. More of them will be discussed in the next issue of ENETI Newsletter.

NO MORE HOT AIR ABOUT AIR CONDITIONING

Room Air Conditioners

Choosing the best room air conditioner involves many considerations besides finding one that will fit into your window. In order to cool a room most cost-effectively, the air conditioner you buy should be both efficient and correctly sized. It's easy to be sold on a big powerful unit that will cool a room quickly, or one that appears cheaper because it's on sale, but energy costs are rising so rapidly that it's also important to select a unit that will operate most economically while serving your needs.

How They Work

A room air conditioner cools, dehumidifies, cleans, and circulates air. It works by drawing in warm, humid room air through a filter which removes any dirt particles. The filtered air then passes over refrigerated coils which cool and dry it. Excess humidity is removed from the air as it cools.

Operating Efficiency

The amount of heat an air conditioner removes from the air is measured in British Thermal Units per hour (BTUh). If an air conditioner has a cooling capacity of 20,000 BTUh, that means it will remove 20,000 BTU's of heat from the air per hour of operation; the higher the BTU rating, the greater the cooling capacity.

Along with a BTUh rating, each air conditioner will have a rating in watts, corresponding to the amount of electricity it uses to operate. While it is generally true that machines with greater cooling capacities use more electricity, there can be a great difference in efficiency between similar-sized units. Some may cool more while using a smaller amount of electricity than others; the wattage does not necessarily increase with the BTUh. The more cooling produced per watt of electricity consumed, the more efficient the air conditioner.

One BTU is the amount of heat required to raise the temperature one pound of water one degree Fahrenheit--or approximately the same heat produced by burning one match.

Energy Efficiency Ratio: EER

Some appliances are labeled with an Energy Efficiency Ratio (EER) which gives the customer an estimate of operating costs. For air conditioners the EER represents the ratio of cooling effect to electricity used. Many units will have an EER label you can check, but if you can't find the label, it's simple enough to calculate. Just look for the nameplate on the unit which will list both the BTUh and the wattage, and divide as shown in the example to find the EER.

$$EER = \frac{BTUh}{Watts} = \frac{20,000}{4,000} = 5$$

An EER of 10 is quite good; more efficient machines have higher EER ratings. The higher the EER, the more heat and humidity the unit will remove per unit of electricity, and thus, the less it will cost to operate.

The Right Size, Please

With air conditioners, bigger is not necessarily better. An air conditioner that is too big for a room will not operate efficiently, while one that's too small will not cool properly. The table below will help you select a properly sized unit for a particular room by estimating the heat load for the room in BTUh. The table shows how many BTUh will have to be removed from each cubic foot of room space in order to achieve a 10°F reduction in temperature. This table is not an absolute measure of the heat load of any room; it can only be used as an estimate. Find the appropriate figure for the room you intend to cool and multiply it by the number of cubic feet in the room. The answer will represent the approximate BTUh rating to look for

Air Conditioning (cont'd.)

on an air conditioner that would cool that room properly.

Rooms in Residence Exposed on Two or Three Sides	Heat Load per Cubic Foot of Cooled Space in BTU per hour
Second-floor room	4.0
First-floor room	3.5
First-floor room with surrounding rooms also cooled	2.75

Table is taken from Handbook of Air Conditioning, Heating, and Ventilating, Clifford Strock and Richard Koral, Industrial Press, Inc., New York, NY. 1965.

There are many other factors that impact on the heat load of any room. Consider the following:

- O room orientation--the north side of the home is hotter than the south.
- O position of the room in the house--a first-floor room is cooler than one on the second floor.
- O the number of windows and whether they are shaded--windows allow heat to enter.
- O color of furnishings--dark furniture will absorb heat.
- O the number of people usually occupying the room, at 650 BTU per.
- O the types of activities that usually take place in the room--playing or cooking produces more heat and humidity than sleeping.

Depending on these factors, you may want to increase or reduce the figure you get from the table. But it will help you estimate the cooling capacity needed for your room. As an example, suppose you want to cool a second-floor room that is 11'x22'x8'.

Begin by calculating the volume in cubic feet:

$$11 \times 22 \times 8 = 1936 \text{ ft}^3$$

Next, consult the heat load table to determine the BTUh per cubic foot. In this example, the room is on the second floor so 4 BTUh per cubic foot must be removed from the room. Multiply the area of the room by 4:

$$1936 \times 4 \times 8 = 7{,}744$$

The answer, (7,744) is the approximate size air conditioner required to cool the room. For instance, suppose you do the calculations above, but upon visiting an appliance store you discover that the only available sizes are 5,000 BTUh and 8,000 BTUh units. You should then consider the other factors. If the room is used only for sleeping, you may want to select the 5,000 BTU size. If there's a lot of daytime activity and sunlight in the room, you might purchase the larger size. The calculations simply give you a 'ballpark' figure from which to work.

Other Considerations

In your search for a room air-conditioner, you'll find various styles. Most have two controls, one which electrically operates the unit, and another to control the temperature. It is important to find a setting that will keep the room at 78°, or some other desired temperature level so when the unit is turned on the compressor will cycle on and off as it is needed to maintain the temperature. The higher you set the thermostat, the fewer dollars you'll spend to cool the room.

To increase the life of your air conditioner and its effectiveness, remember to do the following:

- Tightly seal the opening in the window around the air conditioner to help keep cool air in and heat out.

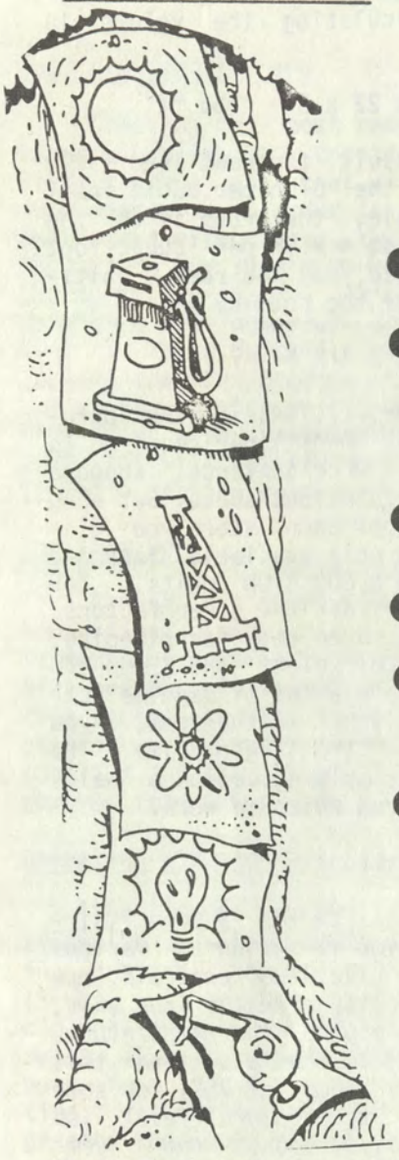
(cont'd. on page 7)....

ERATA:

Page 5, Column 2, second paragraph, last sentence should read: Multiply the VOLUME (instead of AREA) of the room by 4:

Also, calculations should read: 1936 x 4 (instead of 1936 x 4 x 8) = 7,744.

MATCH THE PICTURES and WORDS



- Oil
- Energy
- Ant
- Gasoline
- Electricity
- Solar Power
- Nuclean Power

UNSCRAMBLE THE WORDS

1. Instead of going fast in a car.
   DREVI SOLWER

2. When you leave the room be sure to.
   URNT FFO LITGHS

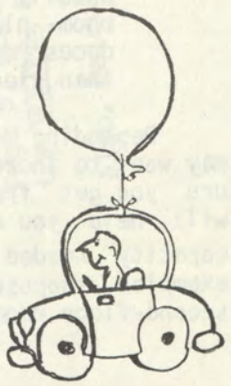
3. Instead of asking someone to drive you there every day, why not.....
   ALKW OT SHOCOL

Light Cars Mean light fuel bills

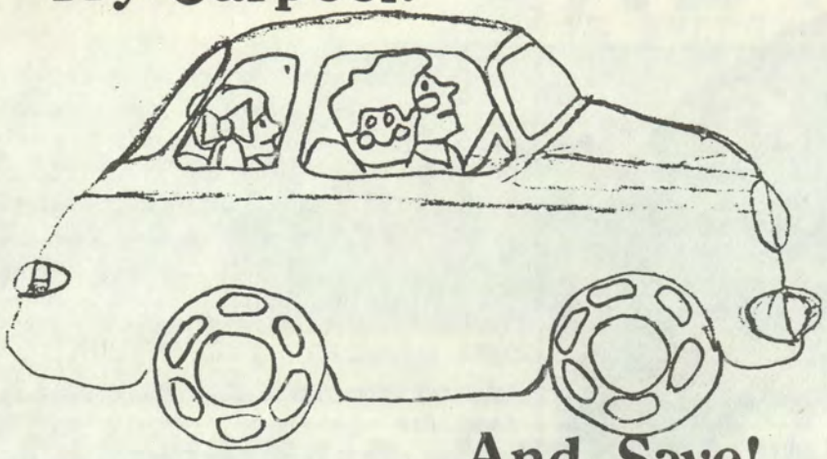
When you have worked out your car needs, think carefully about a vehicle with good fuel economy. Remember car weight will be a very important factor in your gasoline bills for the next few years.

Consider large luxury sedans and station wagons weighing in at over one-a-half tons. That can add up to a lot of gasoline to power a lot of vehicle not always required for your needs.

A misfiring plug can waste fuel and reduce mileage at the rate of 2 miles per gallon, depending on the type of car and its condition.



Try Carpool!



And Save!

Consider the advantage of carpooling. Convince a friend or a relative to share a ride to work. If you work in an office or department that requires a lot of driving, consult and combine several pick-ups and deliveries into one trip. Meet with your department heads to arrange daily schedules to eliminate unnecessary trips. You will save a lot of gasoline and money.

TEO Staff Members Attend the All States Energy Meeting

Our Director and two members of the Energy Office attended the All States Energy Leaders Conference that was held in San Francisco, California, September 14-16, 1982.

The conference is an annual gathering of all State Energy Leaders to exchange ideas and discuss energy programs.

A great deal of information was shared by the guest speakers and participants, explaining the variety of energy programs as implemented by different states. Energy programs like the Energy Extension Service Program, (EES), State Energy Conservation Program (SECP) and the Institutional Conservation Program (ICP) were among those discussed at the conference. It was quite gratifying to see the enthusiasm displayed by all the leaders.

Special recognition must go to Dennis Syke and the California Energy Office Staff for the outstanding conference arrangements. Keep up the Good Work!

AIR-CONDITIONING (cont'd)

Passive Cooling

One obvious tactic is to shade windows receiving direct sunlight with curtains, shades, or awnings.

Finally, prevailing breezes will cool your house considerably if used properly. Open those windows that are exposed to direct winds and provide outlets on the opposite side of the house. Outlets should be slightly larger than the inlets to increase the velocity of air flow.

Air conditioning can be an expensive luxury, but with some careful thought and calculation you can make a purchase that will provide you with comfort for the least cost and with the greatest energy efficiency.

Are you planning to remodel your kitchen? Remember not to build cabinets or counters too close to the regrigerator. If you want the "built in" look, be sure to leave enough space for air to circulate around the refrigerator. If air flow is restricted, heat can build up and the refrigerant compressor must then work harder and longer - and waste energy.

Conserve Energy

ABOUT THE NEWSLETTER

The Samoa Energy News is published quarterly by the Territorial Energy Office (TEO). The objective of the newsletter is to serve as an update on energy information as it relates specifically to the unique situation of American Samoa, and to the Pacific Islands in general.

The masthead carries an illustration of the famous Rainmaker mountain, a familiar landmark which majestically stands over Pago Pago harbor. The banner word "Eneti", was created by the TEO as a Samoan language equivalent to the word energy. The masthead concept was conceived by the TEO and originally designed by Fijian artist Kolinio Moce. The masthead has been revised to include the new TEO logo and seal of American Samoa by Program Manager I, Kay Napoleon, of the TEO.

Publication dates are planned for January, April, July and October. Any person or office wishing to contribute articles related to energy or energy conservation may write the Territorial Energy Office at the Governor's Office in Utulei. Comments and suggestions are welcome.

Circulation for "Eneti" is limited; however, if you would like to receive more copies, or if you know of anyone who would like to receive one, please use the coupon on the back page or call the TEO at 639-1101, 1102 or 1103.

The standard distribution list now includes: The Federal Department of Energy and Department of the Interior, the countries of the South Pacific Commission (SPC), energy offices of 56 states and Territories, the Fono (legislature), all ASG offices, and each school in American Samoa.

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Samoa's Energy News

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