Find, Fix, Save

Energy and Operating Cost Reduction

The Episcopal Diocese of San Diego

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Summary / Introduction

Church Finance Committees and Vestries/Bishop Committes are constantly faced with a number of challenges associated with energy usage.

1. Energy costs continue to rise as SDG&E attempts to cope with increasing costs associated with maintaining its grid and purchasing power from third party providers.
2. Technology continues to improve with regards to efficiency measures that will reduce the amount of electrical and water usage.
3. The cost of solar has declined to the point where it now, in many cases, produces positive cash flow savings from day one of installation. The use of solar will enable the Parish to fix its energy costs further creating savings over the long term.
4. Battery storage is now a commercial reality and can further reduce energy costs while also isolating each Parish from the grid.
5. How do we pay for this?
6. We as Christians have an obligation to do our best to save and preserve God's creation.

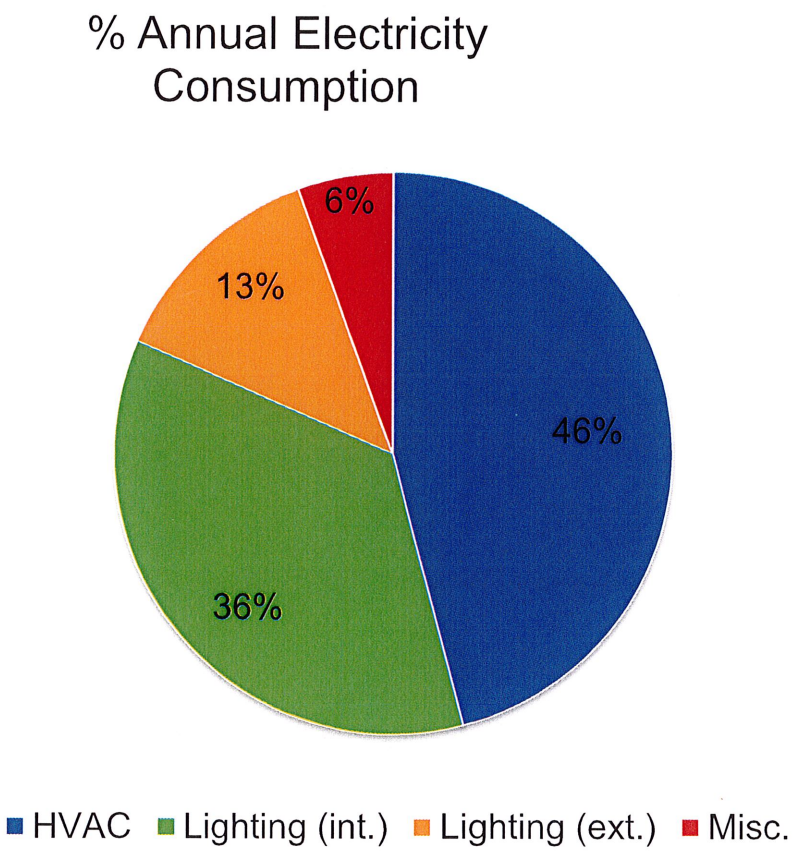
The problems outlined above are complex, can involve multiple contractors and to the novice are daunting. The purpose of this manual is to explain the alternatives open to parishes and provide them with contacts in order for them to begin to achieve their goals and objectives of reducing their energy costs, reducing their operating expenses, improving operating cash flow and doing their Christian duty.

How do we use energy?

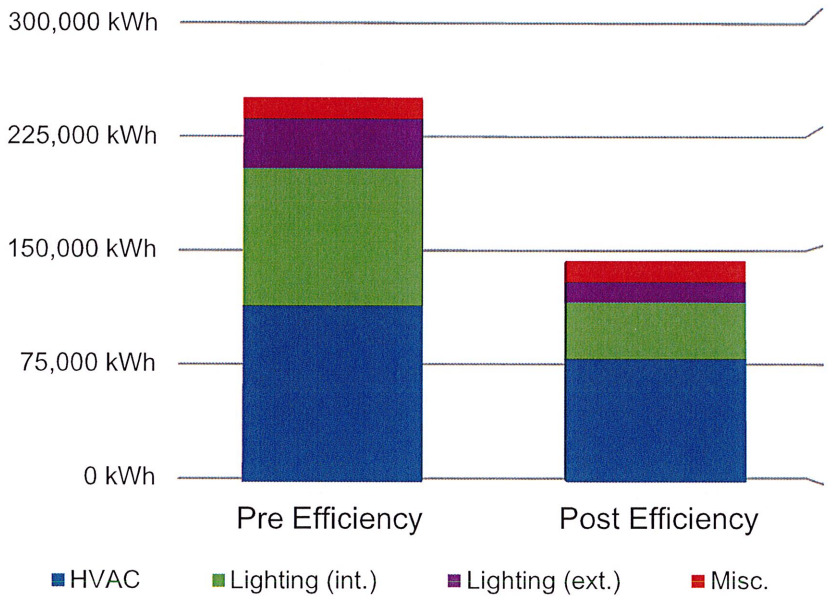
"The most efficient electric light is the one that is turned off."

Our buildings and grounds use energy in three separate areas:

- Lighting – Interior and exterior
- Heating, Ventilation, Air Conditioning (HVAC)
- Miscellaneous (Pumps, refrigerators, freezers, computers, copiers, etc.)



The energy costs that we incur can best be visualized as a pile of children's blocks. The more electrical usage the higher the tower and the greater the bill. By implementing energy efficiency we can remove some of the blocks by automatically turning lights off if rooms are not in use, or implementing computer controlled thermostats so we are not cooling or heating a facility that has no one in it. We can also reduce the size or thickness of the blocks by implementing Light Emitting Diodes (LED) lighting, exchanging old refrigerators and freezers for new energy efficient appliances, purchasing modern HVAC equipment, installing a cool roof and installing new windows where appropriate. The result will be a smaller pile of blocks and a reduced electric bill.



Typical reductions in electrical usage are:

HVAC – (Heating, ventilation and air conditioning)

25% to 35% reduction in energy costs

Lighting – Interior

25% to 50% reduction in energy costs

Lighting – Exterior

25% to 50% reduction in energy costs

Miscellaneous

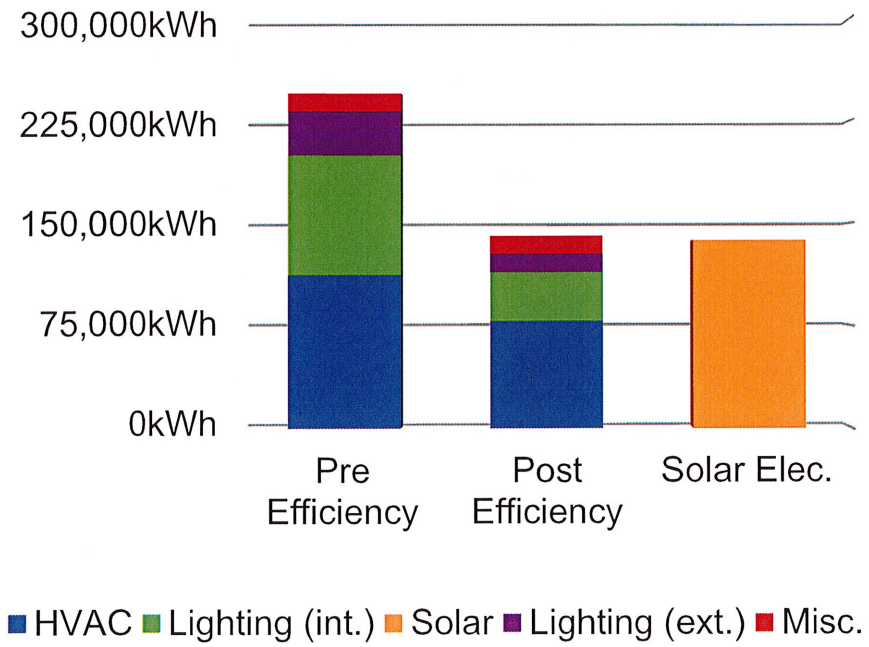
Site specific

Process

In order to achieve our goal of reducing our energy costs we need to determine what measures we can take that will reduce our energy bills. We need to answer the question what are the things that we can do to reduce our energy costs? Equally important is to quantify the amount of the savings for a projection period of 10 + years and to determine the economics of the savings measures. The Church can then look at the costs, the returns and pick the measures that fit best with its facility, location and congregation. Every location is different and we all utilize our facilities in a different manner given the various communities that we serve. This implies that each Church may choose different energy efficiency measures in order to reduce their electrical costs.

Once the efficiency measures are chosen the Church may want to engage contractors in order to receive hard bids as to the cost to implement the energy efficiency measures chosen. We have taken the liberty of suggesting experienced contractors who are interested in working with the Churches within our Diocese. Each Church is certainly free to contact other contractors at their discretion.

Finally, once the electric bill of the church is minimized and the energy efficiency measures have been installed then the Church may want to consider the installation of solar. The installation of solar photovoltaic (PV), on the roof and/or on parking lot canopies puts an electrical power plant on the Church grounds. Since the cost of the solar is fixed, by installing solar the Church in essence fixes the cost of its electrical usage for the life of the solar installation (Normally 25+ years.). This allows the Church to lock in the savings generated by its energy efficiency measures. By fixing the Church's energy cost, solar also allows the Church to plan its operating costs for years to come.



The cost of batteries has now begun to drop to levels where in certain instances they can also reduce the total energy cost of the Church. Admittedly, battery technology is in its infancy as compared to solar and experts believe that like solar the costs of batteries will fall by 75% within the next five to ten years. Batteries accomplish two objectives. First, the California Public Utility Commission is looking to implement demand charges on both residential and commercial properties in the coming years. A demand charge is a separate charge than your normal usage charge. When you turn on your television there is a surge in electrical usage. This surge moderates after a few minutes of operations yet San Diego Gas & Electric Company (SDG&E) must have enough electrical capacity to handle the surge. Thus, it charges the demand charge to compensate it for the fact that it must have sufficient capacity. These demand charges are significant and can add on to the total cost of the electric bill. The battery eliminates the demand charge by the Parish drawing power initially from the battery prior to accessing the grid.

It is expected that we will be facing possible brownouts and blackouts in the near future. If a Church implements a battery system, it will become an "oasis" of power. Everyone's power will be out in a brownout or blackout but the Church will be a place where the community will be able to charge their devices and stay in contact with the world. People have traditionally gone to churches in times of

natural disaster. By implementing a battery system, the Church will be able to further serve the community by being able to provide electric power during times of need.

The last hurdle is many times the most difficult, which is the financing of the suggested improvements. The various types of financing are discussed in detail in this document but they are: a) Power purchase agreements; and, b) Property Assessed Clean Energy (PACE). The good news is that there is financing available that will finance the energy efficiency improvements, solar and batteries. Each Church will need to evaluate the cost of the financing versus the cost and the savings associated with the improvements.

Summary:

1. Church (Parish/Mission) makes the decision to reduce its power consumption and reduce its operating costs.

2. In consultation with the Diocese Property Committee the Parish/Mission initiates a program plan to achieve this goal.

3. The Parish/Mission contacts an energy efficiency contractor/energy audit to put together a list of suggested energy efficiency measures, together with projected costs.

4. The parish selects from a list of options and chooses which ones to select. In the case of the Mission this is done in consultation with the Diocese Property Committee.

5. Both Parish and Mission contact contractors and obtain a minimum of three (3) bids to perform the work.

6. Parish/Mission perform an initial evaluation of the bids and prioritize them in order of best meeting their overall objectives of efficiency, cost and schedule. In the case of Missions this will be done in collaboration with the Diocese Property and Finance committees. It is encouraged that Parishes do likewise.

7. Type and source of financing will be an integral part of the above review and analysis.

8. Based on these evaluations, including settlement of type and source of funding the final selected bid will be forwarded to the Standing committee for approval.

9. On award of contract the implementation of the project will commence.

10. It is recommended that once the system is up and running the Church involved will conduct an assessment of the efficiencies gained from the installed system.

Energy Audit / Review

An energy audit is a review of your facilities to determine:

1) No cost or minor adjustments to your operations that can save energy.
2) Short term energy retrofit improvements that can save energy
3) Action plans for long term capital improvements that can save energy
4) Comfort and code issues that can be addressed to improve the livability of your facility

The purpose of an energy audit is to determine where, when, why and how energy is used in a facility, and to identify opportunities to improve efficiency. Energy audit services are typically provided by energy consultants and engineering firms as well as large contractors. The auditor works closely with the Parish staff to discuss how the property is used and the appropriateness of any energy efficiency recommendations.

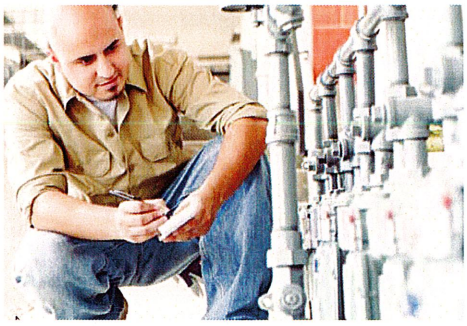
An audit typically begins with a review of historical and current utility data and benchmarking the Parish versus other similar buildings. This sets the stage for an onsite inspection of the physical buildings. The main outcome of an energy audit is a list of recommended energy efficiency measures, their associated energy savings potential and an assessment of whether the energy efficiency measures' installation costs are a good financial investment. Normally audits take a whole building approach by examining the building envelope, (Walls, insulation, windows and roof), building systems and operations and maintenance procedures.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers, (ASHRAE) defines three levels of audits. Each audit level builds on the previous level and audit complexity and thoroughness increases as the level increases. In most cases a Level I audit should be sufficient

Level I: Site Assessment or Preliminary Audits identify no-cost and low-cost energy savings opportunities and a general view of potential capital improvements. Activities include an assessment of energy bills and a brief site inspection.

Level II: Energy Survey and Engineering Analysis Audits identify no-cost and low-cost opportunities and also provide energy efficiency measure recommendations in line with financial plans and potential capital-intensive energy savings opportunities. Level II audits include an in-depth analysis of energy costs, energy usage and building characteristics and a more refined survey of how energy is used.

Level III: Detailed Analysis of Capital-Intensive Modification Audits provide solid recommendations and financial analysis for major capital investments. In addition to Level I and Level II activities Level III audits include monitoring, data collection and engineering analysis.



Energy Efficiency Measures

Almost every capital improvement to a Parish which is not cosmetic has some form of energy efficiency associated with it. The guideline as to which improvements a Parish may want to make to its facility is outlined in the energy audit. The following are brief descriptions of the various improvements that may be recommended.

Building Envelope

The building envelope refers to the roof, windows, walls and insulation and the flooring of the building. By having a tight building envelope, the property is able to keep cool air inside during the summer months and prevent warm air from escaping during the winter.

Roof

The energy properties of roofs are measured by the Cool Roof Rating Council. The Cool Roof Rating Council is an independent organization that rates various roofing products. Roofs are rated based on their solar reflectance and thermal emittance. Solar reflectance determines how much of the sun's energy is reflected by the roof. Thermal emittance determines how much of the building's heat is emitted by the roof.

Windows

When analyzing windows the following characteristics are measured and rated according to the following energy performance characteristics:

- **U-factor** is the rate at which a window, door, or skylight conducts non-solar heat flow. It's usually expressed in units of Btu/hr-ft^2-^{o}F. For windows a U-factor may refer to just the glass or glazing alone. The National Fenestration Rating Council (NFRC) U-factor ratings, however, represent the entire window performance, including frame and spacer material. The lower the U-factor, the more energy-efficient the window, door, or skylight.
- **Solar heat gain coefficient (SHGC)** is the fraction of solar radiation admitted through a window, door, or skylight -- either transmitted directly and/or absorbed, and subsequently released as heat inside a building. The lower the SHGC, the less solar heat it transmits and the greater it's shading ability. A product with a high SHGC rating is more effective at collecting solar heat during the winter. A product with a low SHGC rating is more effective at reducing cooling loads during the summer by blocking heat gain from the sun.
- **Air leakage** is the rate of air movement around a window in the presence of a specific pressure difference across it. It's expressed in units of cubic feet per minute per square foot of frame area (cfm/ft^2). A product with a low air leakage rating is tighter than one with a high air leakage rating.

The ability of glazing in a window to transmit sunlight into a building can be measured and rated according to the following energy performance characteristics:

- **Visible transmittance (VT)** is a fraction of the visible spectrum of sunlight (380 to 720 nanometers), weighted by the sensitivity of the human eye, that is transmitted through the glazing of a window. A product with a higher VT transmits more visible light. VT is expressed as a number between 0 and 1.
- **Light-to-solar gain (LSG)** is the ratio between the SHGC and VT. It provides a gauge of the relative efficiency of different glass or glazing types in transmitting daylight while blocking heat gains. The higher the number, the more light transmitted without adding excessive amounts of heat. This energy performance rating isn't always provided.

Lighting

As noted previously lighting and their related controls are a large portion of energy costs that can be saved through energy efficiency. Books have been written on lighting and individuals spend extensive time consulting on various types of lighting. The following is meant to be a preliminary introduction to lighting and the ways Parishes can save money.

The Formula for Lighting Energy Efficiency

Technology + Effective Design = Performance and Energy Savings

Lighting Technology

The following discusses lighting technologies and their efficiency and what might be right for your facility.

Incandescent Lighting Technology

Thomas Edison invented the first commercialized electric lighting technology in 1879, the incandescent lamp. This simple, yet inefficient, technology has dominated lighting applications ever since. Incandescent lamps come in two common type varieties:

- **Standard Incandescent Lamps**: Inefficient lamps used in many applications throughout a facility.
- **Halogen Lamps**: Halogen Lamps are a more advanced incandescent lamp technology commonly used to highlight architectural features due to their white light and "sparkle".

Compact Fluorescent Lamps (CFLs)

CFLs are fluorescent lamps that have been specifically made in a compact form to replace incandescent lamps in traditional screw-in fixtures. These energy-efficient lamps come in a variety of styles and sizes and are suitable for a variety of applications. ENERGY STAR qualified CFLs use 75% less energy than a standard incandescent bulb and last up to 10 times longer. Replacing a 100-watt incandescent with a 32-watt CFL can save approximately $30 in energy costs over the life of the bulb.

The long life of CFLs makes them ideal to use in hard-to-reach places due to their reduced need to be replaced as often. In addition, CFLs are cool to the touch, making them safer than incandescent and halogen lamps.

Improved Halogen Systems

Many incandescent lamps can be replaced with halogen lamps for a gain in efficiency and service life. Many standard halogens (aside from some specialty applications) can be replaced with high performance "Infrared" (IR) halogen lamps. These lamps work by increasing the operating temperature of the halogen lamp, increasing efficiency. Though more efficient than other incandescent and halogen lamps, these lamps are still inferior in efficiency to fluorescent and High Intensity Discharge (HID) lighting systems.

Fluorescent Lighting

Fluorescent lighting is the "standard" technology for lighting spaces such as offices and classrooms, and is up to four times more efficient than the incandescent lamp. However, older, obsolete fluorescent lighting systems can result in poor light quality and flicker. Advancements in fluorescent lighting systems have resulted in the introduction of new systems that provide improved energy efficiency, lighting quality, and design flexibility.

The primary components of standard fluorescent lighting systems are the ballast, which modifies incoming voltage and controls electrical current, and the lamp (bulb or tube), the source of artificial light.

Traditional Systems:

- **T12 Fluorescent Lamps**: One of the most common, but least efficient fluorescent systems. T12 lamps can be identified by their 1.5-inch diameter.
- **Magnetic Ballasts**: Magnetic ballasts are common and still used extensively today due to their low initial cost. However, these ballasts are considerably less efficient than new electronic ballast designs and are prone to flicker and humming (particularly as they age).

What energy-efficient technologies can replace T12 fluorescent lighting system?

Energy-Efficient Fluorescent Lighting Systems: These systems, using T8 (1" in diameter) and T5 (5/8" in diameter) lamps, offer improved efficiency, higher intensity, and potentially longer life due to reduced degradation in light output over time. T8 and T5 lighting systems are constantly increasing in flexibility and are now applicable to a variety of task and accent lighting applications, as well as general lighting of larger spaces

Energy-Efficient Electronic Ballasts: When specifying a fluorescent lighting system, always specify electronic ballasts. These ballasts provide near flicker-free operation while using up to 30% less energy than magnetic ballasts.

High-Intensity Discharge (HID) Lighting Systems

Due to their intensity, HID lighting systems are useful for lighting large areas from high ceilings, and range from 50 to 2,000 watts each. Older HID installations are often mercury vapor lamps, an extremely inefficient design. Like fluorescent lamps, HID systems have ballasts, and systems built before 1978 may contain potentially harmful substances such as PCBs (Polychlorinated biphenyls).

Fixtures

Specifying an energy-efficient lighting technology, such as T8 or T5 fluorescent lamps and electronic ballasts, is a critical step to improving the energy efficiency of your facility. However, lighting is a system and depends on the quality of the fixture (the apparatus that contains the lamp), combined with the lamp, ballast and placement (the position of fixtures in a room, which affects the amount of usable light that is supplied).

Fixtures come in a wide variety of applications. Fixture selection may be guided by:

- Efficient technology
- Ceiling height
- Spacing
- Amount of glare
- Distribution of light
- Task plane height
- Desired light level
- Appearance

Lighting Controls

Controls are a key part of any lighting system. Common controls include:

- **Bi-level Switching**: Control of a lighting system in groups of fixtures or lamps, for example bi-level switching allows you to turn-half of the lights in a room off when full illumination is not required. Bi-level switching is commonly used in offices, conference rooms, and classrooms.
- **Dimmers**: Dimming lighting systems allow you to control the amount of light and save energy. Dimmers are available for fluorescent and incandescent systems. Daylight dimmers are special sensors that automatically dim room lights based on the amount of free and natural daylight available. Dimmers are commonly used in conference rooms, classrooms, restaurants, and libraries.
- **Occupancy Sensors**: These sensors detect the motion of room occupants, turning off lights in unoccupied areas and turning them back on when movement is detected. Occupancy sensors are commonly used in restrooms, classrooms, and warehouses.
- **Daylight Sensor (Photocells):** A common inefficiency of exterior lighting systems is a tendency to "dayburn." This is when lights are on during the day, wasting energy and money. This problem can be prevented by installing light-sensitive controls that turn the lights on and off automatically based on daylight, thus producing convenient energy savings. Timers can be used, but do not react to changing daylight conditions.

LED Lighting

In the last 20 years, light-emitting diode (LED) lamps have advanced from being indicators on consumer electronics, to an increasingly versatile and efficient lighting source. LED lighting has the potential to provide high efficiency, durability, and extremely long life.

HVAC

Heating, ventilation and air conditioning can be responsible for up to 46% of the use of the facility's power usage depending on location and the quality of the building envelope. Savings in the HVAC area can be divided into the following categories:

a) The efficiency of the air conditioning and heating units
b) The electronic controls that control the heating and air conditioning units
c) The fan that circulates outside air through the building
d) The integrity of the ducting that carries the warm air or cool air conditioned air

The efficiency of the air conditioning units as well as heating units decreases over time causing them to utilize more and more energy even though they are providing heating and cooling. The replacement of older, 10 years+, heating and cooling units will significantly lower energy costs. Newer units are normally smaller, are quieter and more efficient in their ability to produce cool air.

HVAC costs rise significantly when we heat or cool spaces that are not occupied. It is often just not practical for a parish administrator to attend to various thermostats throughout a church facility. The result is that the users of the facilities often forget to turn air conditioning or heating units off or down resulting in rooms being air conditioned or heated when they are not occupied. The installation of controls allows the parish administrator to control the system(s) allowing for heating and cooling when facilities are being utilized and for the thermostat to be adjusted appropriately when they are not from any smart phone or other smart/wifi device. Thermostats allow basic system trouble shooting from any remote device by the parish administrator which can reduce or eliminate costly service calls. Although not particularly expensive controls can quickly add significant value in the form of reduced electrical demand and corresponding energy bills.

A little know user of electrical power are the fans that circulate air throughout the building. A fan that is not properly controlled can be constantly on resulting in electrical usage that might not be necessarily needed or required. By insuring that the fans themselves are efficient and that they are properly controlled the cost of electric usage may be reduced.

The ducting is the piping that carries the hot or cold air to the appropriate room. If the ducting has leaks, then the facility is heating or cooling crawl space and not the desired areas. It is prudent to make sure that all ducting is intact to ensure that dollars spent on heating and cooling are resulting in warmer or cooler rooms as the case may be.

Solar

Once the property and its building systems are optimized in terms of energy efficiency then the final step is to install a renewable energy power plant on the property – solar. Solar has two distinct benefits to the facility. First, solar allows the Church to produce power for 20+ years at an economic rate. We have seen that in most commercial solar installations that the cost savings from the solar exceeds the

cost of acquiring the system from day 1. The cost of the solar power plant also fixes the cost of electricity for the next 20+ years allowing the Church to avoid projected increases in electrical costs. The California Public Utility Commission projects that power cost increases will average 6% per annum for the conceivable future. The addition of solar allows the Church to avoid these increases saving money over the long term.

Just as important as the actual physical installation of the solar system is the ability of the Church to take advantage of various solar electric rates that reduce the cost of power. Depending on the amount of power used and the size of the solar system the Church can take advantage of utility rates associated with solar to further significantly reduce its cost of power.

Batteries

Normally a PV solar power installation is connected directly to the utility grid. As the system produces power the electricity goes into the grid. The Church draws power from the grid and is credited for the electricity produced by the solar installation. Should the grid go down in a brown out or blackout the Church would lose power even though its panels would still be producing electricity and sending it into the grid.

The addition of batteries to a PV solar system produces a micro grid where the power produced by the solar is used to recharge the batteries. Electricity from the batteries is used to power the Church and its facilities. Batteries bring two primary benefits to the Church. First, by installing batteries the Church can avoid demand charges charged by the electric utility. When lights, HVAC, etc. are initially turned on they create a surge in electrical demand. The grid must be able to accommodate the electrical surge created. The demand charge compensates the utility for having the capacity to handle the surge. The demand charge can be significant component of the overall electrical bill. By utilizing the electricity stored in its batteries the Church avoids the extra demand on the grid and the corresponding demand charge.

In times of natural disaster churches have always been places where people have congregated and received shelter. Should a church install solar and batteries it will become an oasis that will be able to serve the surrounding community in times of blackouts or brown outs. Since our society is completely dependent on power for refrigeration, cooking, communication, etc. the church would be a place where the community could congregate in times of problems with the electrical grid and be able to cook, eat and communicate with their loved ones.

Please note that battery technology is in its early stages of development. It is anticipated that due to technology improvements and increased demand that the cost of batteries will decrease in the future.

Financing

Most churches suffer from too many worthwhile projects and too little funding. The installation of energy efficiency and renewable energy falls into this category. Reducing energy costs as well as protecting our environment is important but other needs often take precedence. The good news is that financing is available which will provide 100% financing for both the energy efficiency, solar and battery improvements.

There are federal tax credits associated with the solar and batteries. There are two types of federal tax credits: a) Investment tax credit, ("ITC"); and, b) Modified Accelerated Cost Recovery System (MACRS) depreciation. When calculating the profit or loss for a project for tax purposes depreciation is deducted as an expense from revenues to determine the taxable income. The ITC is deducted directly from the taxable income to determine the amount of tax to be paid.

The value of the ITC is roughly:

Solar 30% of the total cost of the system

Battery 10% of the total cost of the system

Since each Church is a not for profit entity this means that the tax benefits need to be sold to entities that have to pay federal income taxes. The primary buyers are major corporations as well as investor groups.

The following outlines the methods for financing energy efficiency and renewable energy as well as methods to take advantage of the tax benefits associated with solar and batteries.

Power Purchase Agreement ("PPA")

A solar Power Purchase Agreement (PPA) is similar to a loan or lease, in that American Renewable Capital, ("ARC"), (Please see the description of ARC under Financing providers.), finances the entire cost of the solar energy system, and is repaid via customer payments over 12-20 years. SDG&E customers typically can achieve a 15% - 25% lower rate with an ARC PPA, provided the property allows for a solar installation with limited shading.

A solar PPA is a service agreement, not a loan. This means that the financing payments look similar to a loan financing, with an important difference. Under a PPA, you pay for power actually produced.

Your selected solar installer will design a system that will generate a predictable amount of power each year, based on the electricity usage at your facility. Every facility is different – so the amount of power you need, the size of the solar system you need, and the financial savings will vary. ARC works with experienced local solar installers that will develop comprehensive solar recommendations *free of charge* for customers considering solar.

The first step in the process to get a specific solar proposal to determine your potential renewable energy generation and financial savings is to ask a solar contractor for a no-cost feasibility study.

Property Assessed Clean Energy ("PACE")

PACE provides 100% financing for energy efficiency and renewable energy on commercial and industrial properties. Originally passed into law in 2008 in California PACE legislation has been passed in 32 separate states. PACE allows private lenders to finance approved energy efficiency and renewable energy projects on commercial and industrial properties. The law is written so broadly as to include almost every capital improvement that is not cosmetic. The financing is repaid via an assessment which appears on the property owner's property tax bill. The financing itself is in the form of a tax-exempt municipal bond that is backed by the assessment on the property.

Like conventional property taxes the PACE payments appear on the property tax bill which is paid in April and December of each year. Since the Church is a tax-exempt organization it will need to opt into the PACE tax assessment. This opt in process only exposes the Church to the PACE property tax assessment and not other types of property taxes.

PACE is able to finance 100% of all hard and soft costs associated with energy efficiency and renewable energy installations. This includes all engineering, construction, and financing costs associated with the project. The Church has no out of pocket costs associated with the PACE financing. The financing covers all energy efficiency improvements which includes: roof, HVAC, lighting, controls, motors, elevators, escalators, windows, curtain walls, etc. as well as water conservation. Renewable energy improvements covered include: wind, solar, co-gen as well as fuel cells. Almost every capital improvement, with the exception of cosmetic improvements, can be financed utilizing PACE.

Typical terms for PACE financing are as follows:

Type of Financing:	In the form of a property tax assessment. Payment is made twice a year with property taxes.
Amount:	There is no maximum subject to property credit analysis. PACE provides 100% of all soft and hard costs associated with capital expenditures as well as all financing costs. The minimum is approximately $100,000.
Term:	From 1 to 20 years. Most borrowers opt for 20 years which helps to lower the annual payment.
Rate:	Varies depending on the property but ranges between 4.5% to 5.0% for 20 years.
Types of Improvements:	HVAC, lighting, controls, roof, motor, windows, curtain wall, solar, co-gen, etc. as well as water conservation including toilets, irrigation, sinks, faucets, etc. and seismic improvements.

Refinance of Past Capital Improvements:	Improvements completed within the past 12-24 months can be refinanced utilizing PACE.
Guaranty:	No guaranty is required. Financing is non-recourse.
Tax credits, Utility incentives:	All are for the account of the property owner.
Credit Criteria:	a) The sum of existing mortgage debt + PACE financing < 80% of the value of property. b) No default on property taxes in past 5 years c) No bankruptcy in past 5 years
Sale of Property:	PACE transfers with sale of property; no prepayment or approval of buyer of the property is required.
Mortgage Lender Consent:	Consent of the mortgage holders is required. Structured Finance obtains the mortgage lender consent to PACE.
Prepayment:	Yield maintenance is standard. There are alternatives available.

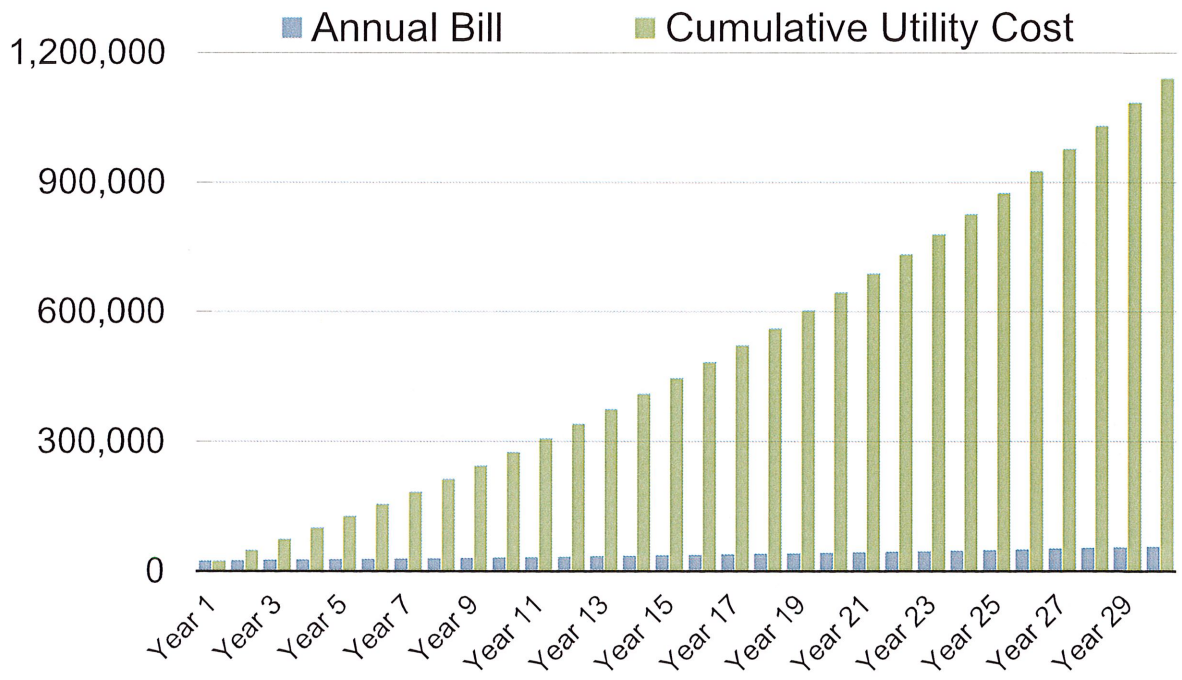
Since PACE financing is in the form of a property tax assessment PACE financing is senior to all private liens including any mortgage secured financing. Almost all PACE financing providers require any existing mortgage lender provide a written acknowledgement of the PACE financing prior to the closing of the PACE financing. (Lender consent) To date every major bank including Chase, Citibank, Bank of America, Wells Fargo and many other regional banks have provided their written acknowledgement. Normally the provider of the PACE financing facilitates the signing of the lender acknowledgement.

PACE financing in and of itself does not take advantage of the tax credits associated with the purchase of solar and batteries. Normally PACE is combined with a PPA in order to reduce the amount of the PACE financing and take advantage of the tax credits.

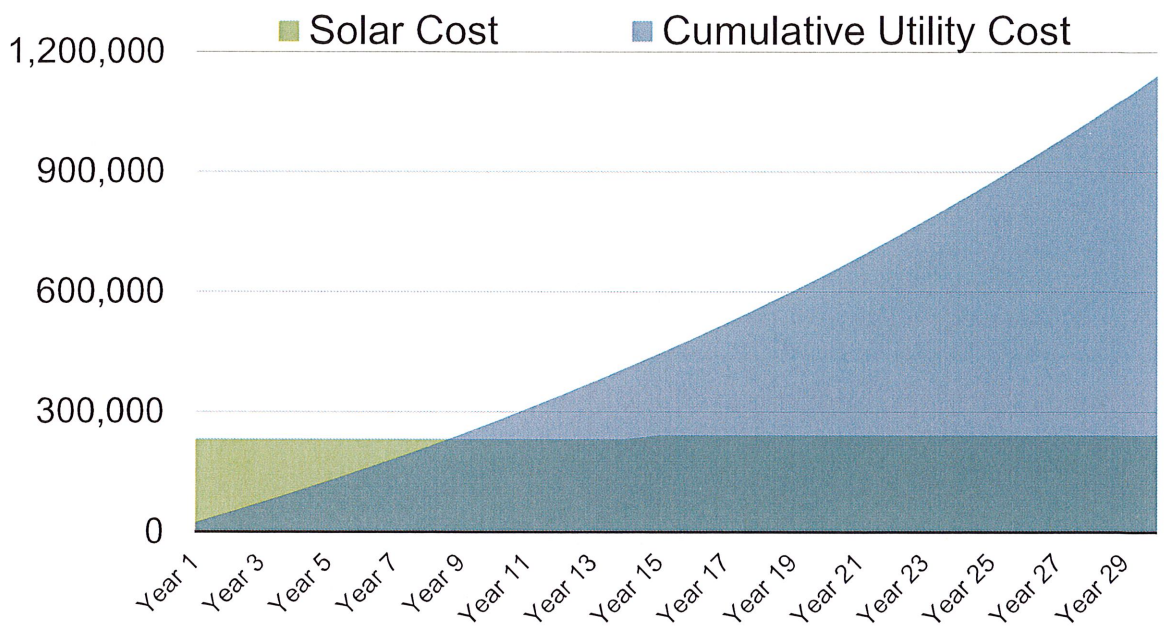
Conclusion – What if we do nothing?

The following chart illustrates the cost of electricity to the Church over the next 30 years assuming that the cost of electricity escalates 3% per annum. (Please note that the California Public Utility Commission utilizes 6% per annum.)

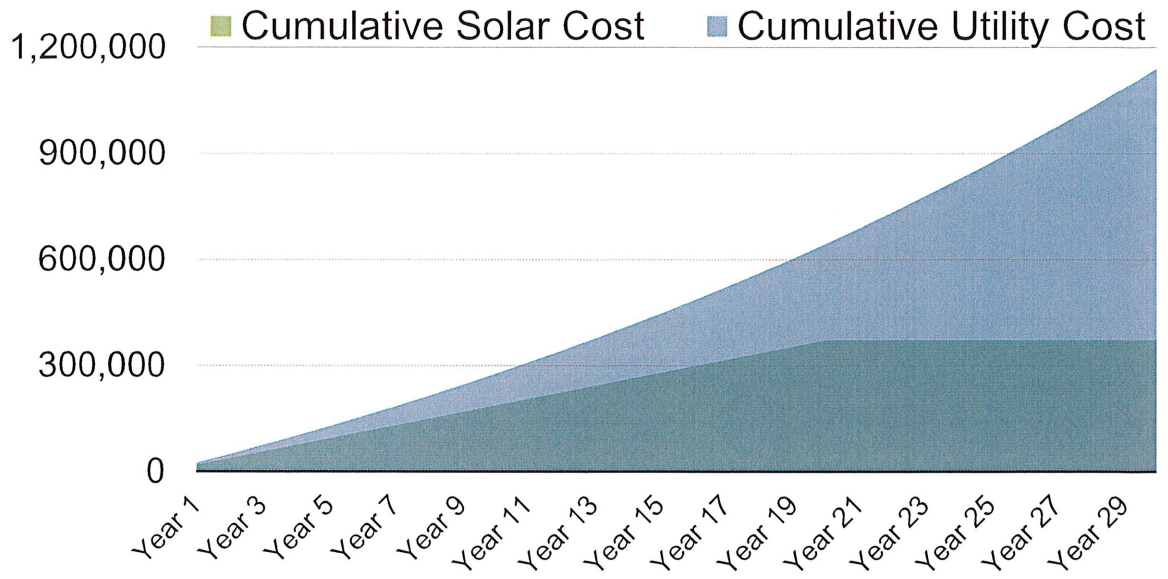
A $2,000 per month electric bill will cost $1.14 million over the 30-year term.



If the parish adds solar the cost of energy is fixed for the next 30 years as the following chart illustrates.



The following chart shows the cost of electric utility expense versus the cost of obtaining 100% financing utilizing the PACE financing approach. This chart does not contemplate the sale of the tax credits associated with the solar project which would further reduce the solar cost.



The question whether to go forward with the installation of energy efficiency and renewable energy on our facilities is more than doing the right thing for the world and our environment. It allows us to set an example to others and to our congregations that we will do our best to preserve the resources that we have been given. More importantly it helps to insure economically that each Church will be a house of worship for years to come.

That it may please thee to give and preserve to our use the bountiful fruits of the earth, so that in due time all may enjoy them,
We beseech thee to hear us, good Lord.

The Great Litany

Appendix

Description and Contact Information for Contractors

Please note that the following list of contractors and financing sources are provided as suggested providers of the services outlined and are not in any way endorsed by the Episcopal Diocese of San Diego. We would encourage parishes and schools to do their due diligence with regards to the names provided and seek out other contractors and financing providers should they choose to do so.

Energy Audit

Energy Independence Group

Energy Independence Group is committed to serving new and existing building owners and management, in their approach to net zero performance through energy and resource management, by providing the highest quality services and products available. We are committed to helping save energy, lower operating costs, increasing asset value and net operating income through innovative, state-of-the-art technologies along with unparalleled industry expertise. Energy Independence Group is the one-stop resource – the convergence of technology, labor, finance and highly skilled professionals in custom energy sustainable practices.

Contact Information:

Dennis Thurman
Chief Vertical Officer
Mobile: (310) 387-1949
dthurman@energyindependencegroup.com

Website: http://www.energyindependencegroup.com/

EMCOR Service/MESA Energy Systems

EMCOR provides energy audit services as well as HVAC contracting. Please see the description of EMCOR below.

HVAC

EMCOR Service/MESA Energy Systems, A Provider You Can Trust in HVAC and Energy Efficiency.

For over 30 years, EMCOR Services Mesa Energy Systems (Mesa) has provided its clients with high-quality mechanical, commercial HVAC, and building automation consulting and services. As commercial HVAC contractors with the knowledge and experience to also provide commercial refrigeration repair and chiller services, the Mesa team of specialists is ready to take on virtually any energy challenge that arises.

Using the latest equipment in advanced, state-of-the-art, diagnostic and automated control technologies, we are able to minimize the cost of operating your building environment without sacrificing occupant comfort. Our business is built on a tradition of innovation and is marked by principles of integrity, quality, functionality and dependability.

EMCOR Service/MESA Energy Systems is a division of the EMCOR Group which is a Fortune 500 company based in Norwalk, CT. EMCOR provides mechanical and electrical construction, industrial and energy infrastructure, and facilities services to a broad range of commercial, industrial, utility and institutional customers.

Contact Information:

Mr. James Miller
Director of Sales – Southern California
Office: (949) 460-4675
Mobile: (949) 254-3425
james_miller@emcorgroup.com

Web site: http://www.mesaenergy.com/

San Diego Mechanical Energy

San Diego Mechanical Energy designs, installs, and services all types of H.V.A.C. equipment including chillers, boilers, air handlers, fan wall technology, cooling towers, pumps, packaged units, variable frequency drives, and equipment utilizing Turbocor compressor technology. We are devoted to providing complete satisfaction to our customers by clearly understanding their goals and needs, then executing and delivering the high-quality solutions that meet those needs. Having many factory certifications, we can take care of all your H.V.A.C. needs quickly and correctly. On-staff designers' use of high-technology tools for design, fabrication, and energy analysis provide industry-leading skills to support our clients.

Our passion is in delivering energy savings to help both reduce financial operating costs and contribute to a more sustainable environment. The company name, San Diego Mechanical Energy, represents the quality, integrity and service that we deliver with every job. The company is independently owned and is operated in the greater San Diego area, as well as many surrounding areas including Orange County and Los Angeles.

Partial Client List:

San Diego State University	Marriott Hotels
County of San Diego	Hyatt Hotels
Irvine Company	Palomar College
Sanford – Burnham Institute	The Andaz San Diego

San Diego Rescue Mission

McCarthy-Cook

AirGo Services

The Sofia Hotel

Hilton Anaheim

Contact Information:

Neil Gibson
CEO
San Diego Mechanical Energy
7568 Trade Street
San Diego, CA 92121
(858) 586-8200
ngibson@sdme-inc.com

Solar / Battery

KRC Enterprises, Inc.

KRC Enterprises, Inc. has evolved as a leader in photovoltaic installations since its founding as K. Roberts Company in 1982. KRC holds both a C-10 Electrical and B-1 General California Contractor's License. Originally specializing in commercial and industrial electrical, the company quickly expanded to include the construction of commercial, industrial and residential buildings from the ground up. In 1989, the company expanded further to form Pacific Utility, an electrical and cable company, specializing in placing and repairing both aerial and underground cables, aerial and underground power supplies and pulling and activating cable for over 100 miles of forced moves. Pacific Utility has maintained long-term contracts with such companies as AT&T, Comcast, and Media One, to name a few.

In 2002, KRC completed its first photovoltaic system, a 450-kilowatt crystalline system located in Los Angeles, California. Since that time KRC Enterprises, Inc. has become a leader in the photovoltaic industry, constantly exploring new ways to provide effective renewable energy and streamline the installation process. We have thousands of hours of experience with the design, construction, implementation and maintenance of photovoltaic solar systems. We also have extensive experience with design and installation of batteries and Advanced Energy Storage technologies.

KRC Enterprises, Inc. has installed in excess of 30 megawatts of systems located in California, Arizona, Nevada, Oregon, Washington, New Mexico, Massachusetts, Connecticut, Boston, Virginia, New Jersey, New York, Maryland, Hawaii, Japan, Guam and Canada. It is our diversity of experience that gives KRC Enterprises the know how to deliver solar solutions that stand the test of time. We believe solar is the path to renewable energy independence.

While every solar system is different, the need to install a well engineered system designed to stand the test of time is always our priority. Among those clients that have trusted KRC with their Photovoltaic projects include:

Frito-Lay	Coca-Cola
Fresh and Easy	U.S. Air Force
Harvard University	Veg-Fresh Farms
Coast Hills Church	IKEA
San Diego Unified School District	Kellogg Garden Products
Sempra Energy	Luke Air Force Base

Contact Information:

Dave Johnson
Office: (949) 500-3542
djohnson@krcsolar.com

Web site: www.krcsolar.com

Solar Optimum

At Solar Optimum, we are believers. We believe in the preservation of the Earth's natural resources and consider them a priceless, precious gift of Creation.

For nearly a decade, Solar Optimum has lead the clean-energy charge, transforming into one of the most dedicated and proven teams in the solar-power industry. Our business experience, combined with the tremendous value we place on each customer, puts us one step ahead of the competition.

Solar Optimum is made up of experts and professionals who are passionate about protecting the environment with the latest technologies as well as offering "energy peace of mind" to our customers.

LOCAL EXPERTS. REAL RELATIONSHIPS. HONEST TALK.

Contact Information:
Bill McNeese
Mobile: (760) 707-8313
bill@solaroptimum.com

Web site: www.SolarOptimum.com

Financing

PPA

American Renewable Capital

Expertise in Solar Project Financing for Houses of Worship

Who we are: American Renewable Capital (ARC) specializes in financing solar projects for houses of worship and non-profit customers. ARC has financed over 60 projects across 6 states since 2010.

What we do: ARC finances solar projects ranging from $100,000 to over $3 million. ARC has a deep capital base, enabling us to offer our customers cost-effective solar financing solutions.

Experience & Execution: ARC has extensive experience financing solar for churches and houses of worship. We understand the financial statements, operations, and administrative structures that enable us to quickly review, underwrite, and finance house of worship customers. ARC's financial resources enable it to underwrite and commence financing in days, rather than months. ARC also finances private schools, assisted living, healthcare, community service organizations, fire departments, and other non-profit customers looking to achieve sustainability goals and financial benefits from solar energy.

ARC provided PPA financing to St. Timothy's Episcopal Church in San Diego for their solar project.

Contact Information:

James Coombes
Mobile: (415) 715-7628
james@arcap.energy

Web site: http://www.americanrenewablecapital.com/

PACE

Structured Finance Associates, LLC

Structured Finance Associates, LLC, ("SFA"), was formed to provide financing to commercial and industrial properties for energy efficiency and renewable energy improvements and to manage the assets created by providing such financing. Our primary vehicle for providing this financing is through the use of the PACE assessment, ("Property Assessed Clean Energy").

History

The original PACE legislation, AB811, was passed in August of 2008. The founder of SFA, L. Jean Dunn, initially began looking into the legislation in 2009. The Company was founded in 2010 and began working with municipalities in California at that time. During 2010 the FHFA announced that they would

call mortgage loans that had PACE assessments placed ahead of them. SFA changed its business plan from a focus on residential housing to the commercial real estate market.

Current Operations

In 2016 SFA help to develop and pioneered the use of PACE for tax-exempt property owners with a focus on houses of worship. SFA is currently working with a number of different religious organizations throughout California.

SFA's current pipeline of PACE transactions exceeds $150 million. The firm has offices in San Diego and Los Angeles.

Contact Information

L. Jean Dunn
CEO
(760) 304-4371
ljdunn@strucfinance.com

(Mr. Dunn is a member and on the finance committee of St. Andrew's Episcopal Church in Encinitas, CA. He also serves on the Diocesan Property Committee for the Diocese of San Diego.)

Please note that Structured Finance is a for profit entity. Many firms provide PACE financing for commercial properties in California. To the best of its knowledge Structured Finance is the only firm providing PACE financing for houses of worship at tax-exempt rates.