

RENEWABLE ENERGY REPORT

SUSTAINABLE SOLUTIONS FOR
DOWNTOWN CHURCH



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INTRODUCTION



As the global demand for energy continues to rise, the need for sustainable and eco-friendly solutions has become paramount.

Renewable energy sources like solar, wind, and hydropower offer clean alternatives to traditional fossil fuels, reducing carbon footprints and promoting long-term energy security.

This report is designed to provide innovative ideas for efficient, reliable, and environmentally responsible energy solutions for Downtown Church.

WHY CHOOSE RENEWABLE ENERGY?

Switching to renewable energy offers numerous advantages.

ENVIRONMENTAL IMPACT

Reduces carbon emissions and aids in the fight against climate change.

COST EFFICIENCY

Lower energy bills through sustainable, long-term solutions.

ENERGY INDEPENDENCE

Reduces reliance on traditional power grids and fossil fuels

TYPES OF RENEWABLE ENERGY SOLUTIONS



CHANGE BEHAVIORS



E.G. TIME-SHIFTING

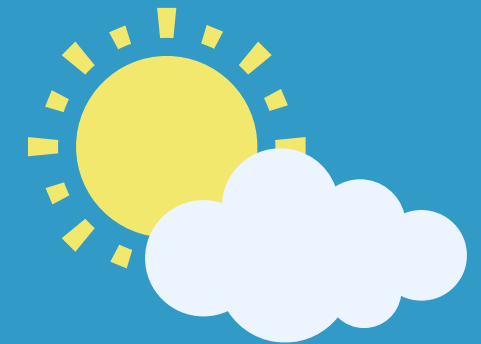
RENEWABLE ENERGY
SYSTEMS

INCREASE EFFICIENCY



E.G. INSULATION (DRAPES
& CURTAINS) & SHADE

EXAMPLES & IDEAS FOR BEHAVIORAL CHANGES



- Match thermostat temps to age of activities (youth are much more tolerant than older people)
- Programmable feedback (post charts or monitors of energy use and savings)
- Incentives: Economic Savings can go to other programs in church
- Suggestion box to include everyone in the project
- Ride sharing or Bus pick up
- Electric vehicle charging (Not just cars) delivery vans, transit, light electric vehicles, Bikes



TIME SHIFTING OF ACTIVITIES



- earlier during hot weather (i.e. 9 am services)
- later during cooler weather (afternoons)



INCREASING EFFICIENCY

Energy efficiency is the practice of using less energy to achieve the same outcome. It's a key indicator of sustainability and can lead to cost savings.



Some ways to improve energy efficiency include:

- Energy-efficient appliances
- Sealing and insulating
- Upgrading doors and windows
- Using low-flow bathroom fixtures
- Turning off lights and appliances when not in use
- Using LED light bulbs
- Managing heating and cooling
- Planting shade trees



INCREASING EFFICIENCY



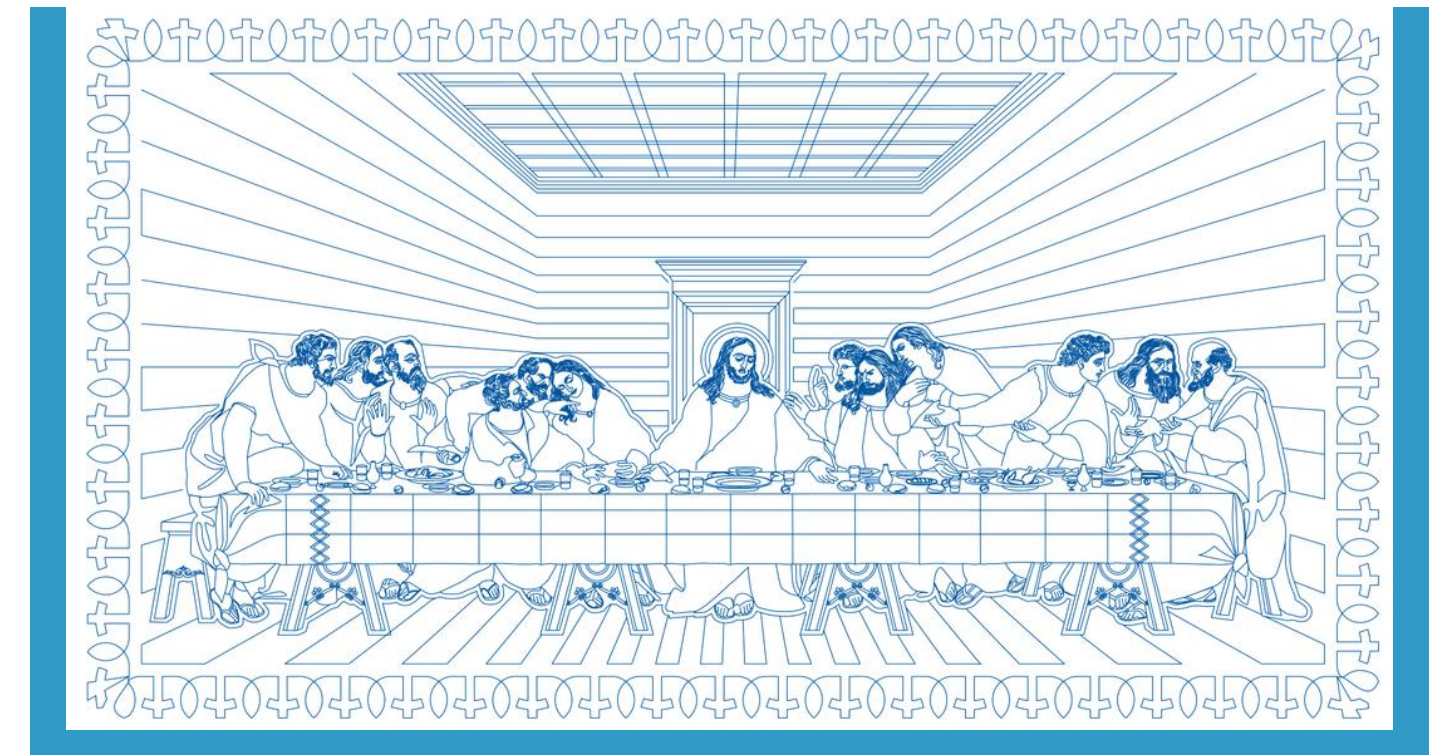
- Maintain infrastructure (e.g. caulking* – involve congregation, youth to help)
- Skytherm** for heating and cooling (heat pumps)
- Exterior and/or Interior atrium to control treated air loss
- Revolving door at the main entrance
- Big fans to move air

**Caulk is a flexible material used to fill cracks, leaks, and joints.*

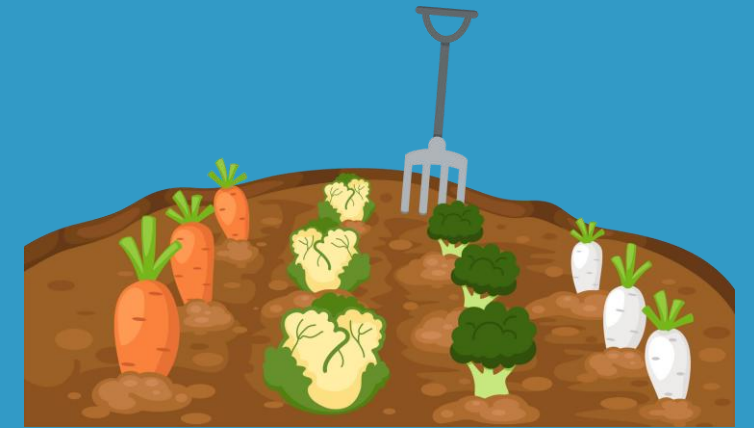
***The skytherm system uses a roof covered with water filled plastic bags equipped with moveable insulation. It is like a waterbed in your ceiling or roof. During hot days, panels are closed to keep the sun out while the water absorbs heat. At night, the panels are removed to allow the water to radiate heat into the night air. In the winter, the process is reversed.*

INCREASING EFFICIENCY

- Vertical moving insulated curtains over large doors (useful for light control and theatre. White curtains can act as screens for projections and lights can come from chimney supports.)
- Movable drapes over windows
- Increase overhangs over large doors (blocking summer sun, allowing winter sun)



INCREASING EFFICIENCY



- Plant deciduous trees along roadway on southside of building
- Place composting south of that – leaves that shed in winter will be raked directly into the compost pile.
- Plant a garden for using the compost
- Mobile garden boxes in front of doors during summer



YOU'RE DOING THINGS RIGHT!



- The facilities are modern relatively new and efficient.
- A white reflective roof
- A heat pump for the large open space and a smaller one for enclosed spaces
- Limited access programmable thermostats
- Efficient lighting
- Lots of efficient glazing (plenty of daylighting)
- You are next to a power transformer yard which is very fortunate for solar.



Solar Perimeter Fence

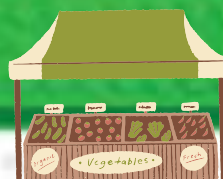
The church is here



Vineyards on wall

2.87 ACRES

Front Porch



Climbing plants

1.29 ACRES

Specific Recommendations by Space



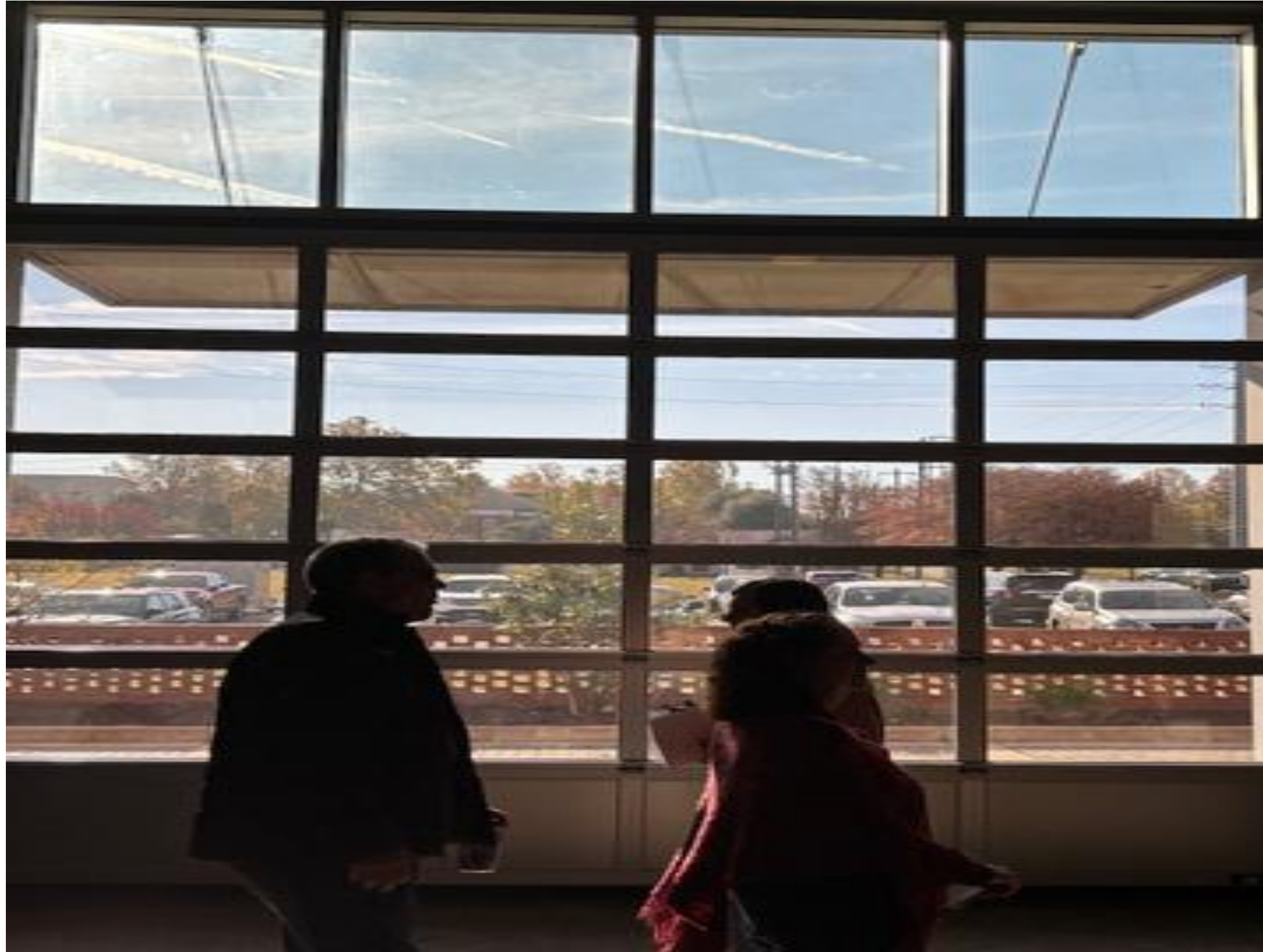
Recommendation:

Moveable insulation or curtains inside the glass doors to preserve air conditioning or heat and to block sun in the summer.



Recommendation:

This should have either a revolving door or preferably an outdoor atrium to contain conditioned air.



Recommendation:

The overhangs should be larger to shade summer sun and moveable insulation (such as curtains) should be installed.

(Added benefit: could be used for theatrical productions as a stage.)



Recommendation:

Leave this field alone as overflow parking for larger events, playground, etc.



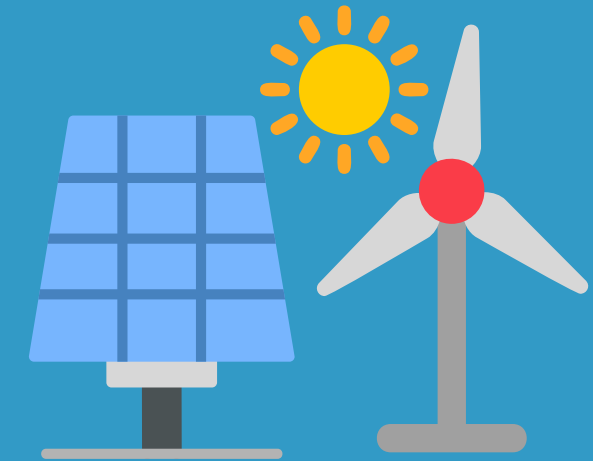
Recommendation:

This should have either a revolving door or preferably an outdoor atrium to contain conditioned air.

Add rolling planters to reduce reflected sunlight in the summer. (And they look nice.)

RENEWABLE ENERGY

Renewable Energy is green energy that can be replenished on a human timescale. It is from renewable natural resources.



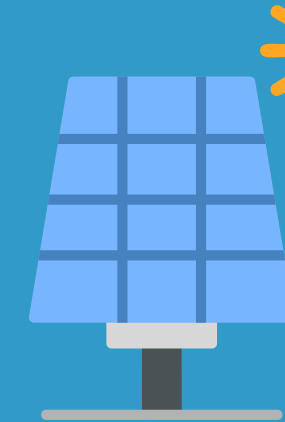
Renewable energy types are:

- solar energy,
- wind power,
- hydropower
- bioenergy
- geothermal power



RENEWABLE ENERGY

How do I know how much I need?

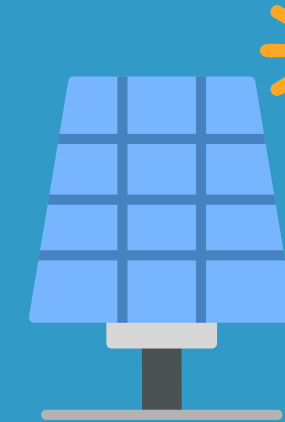


1. Know how much energy you actually use. Choose your highest month.
2. Figure out what size solar will meet the requirements.
3. What is the maximum amount of solar you can get from your property?
4. What are the costs?



RENEWABLE ENERGY

Calculations



Highest energy Consumption July, 14,120 Kwh round up to 15,000 Kwh

$(15,000 \text{ Kwh/month}) / (30 \text{ days/month}) = 500 \text{ Kwh/day}$

$(500 \text{ Kwh/day}) / (4 \text{ hrs/day}) = 125 \text{ Kw array (125,000 w)}$

1000 w/meter squared full sun = 100 w/ foot squared. 20% efficient = 20 w/ foot squared

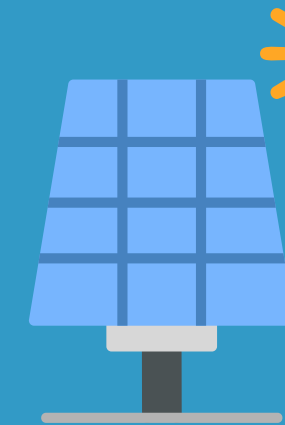
$(125,000 \text{ w}) / (20 \text{ w/ foot squared}) = 6250 \text{ feet squared } 80 \text{ feet} \times 80 \text{ feet}$

$(125,000 \text{ w}) / (500 \text{ w panels}) = 500 \text{ panels} \times \$170 \text{ each} = \$85,000$



RENEWABLE ENERGY

Calculations for maximum power



Church needs 125 Kw of solar to meet its maximum electric demand 500 meters squared (may be available on roof in front of stacks).

It has the ability to produce much more power from its property. An investment could pay off a return.

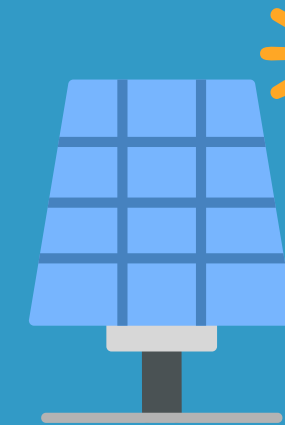
One option is a solar canopy over a parking area. This not only provides electricity but the coverings reduce the heat in the cars, reducing the amount of air conditioning necessary to cool the car in summer.

More information: <https://www.energysage.com/business-solutions/solar-canopy-installations-bring-shade-clean-energy-parking-lot/>



RENEWABLE ENERGY

What is the most the property can handle?



1 acre= 43,560 feet squared=
871,200 w (871Kw) @20%
efficiency

100 parking spaces per acre

1 acre Property beyond Back
lawn could have permeable
paving and covered with solar
(10x what church requires)

Recommendations:

Contract with a company to install and pay rent to the church. OR

Partner with a company. Church provides the funding and the materials and the company does design, installation, operation, and maintenance for a fee. The church gets the income. OR

Join SkyPower and produce 25+ for yourselves.



Recommendation:

Looking to the north, this is a good place for a perimeter fence with solar on it.



Recommendation:

Covered solar parking in the northeastern quadrant, bordered by the power transformer yard to the south.

THE FUTURE OF RENEWABLE ENERGY



As renewable energy technology continues to evolve, new innovations are emerging that make clean energy more accessible and efficient.

Energy Storage: Advances in battery storage allow for more reliable energy availability.

Microgrids: Decentralized energy systems that enhance resilience and reduce dependency on traditional grids.

Smart Grid Technology: Integrating renewable energy with advanced monitoring and automation tools.

Emerging Markets: Growing opportunities for renewable energy in developing regions and underserved communities.

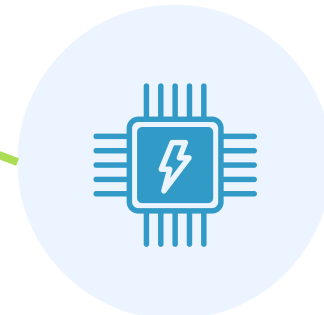




THE INSTALLATION TIMELINE



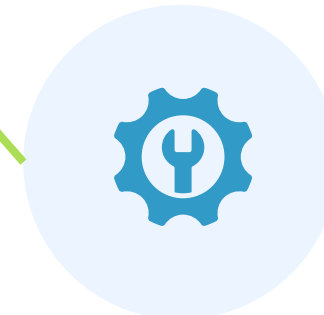
INITIAL CONSULTATION



SYSTEM DESIGN &
BUDGETING



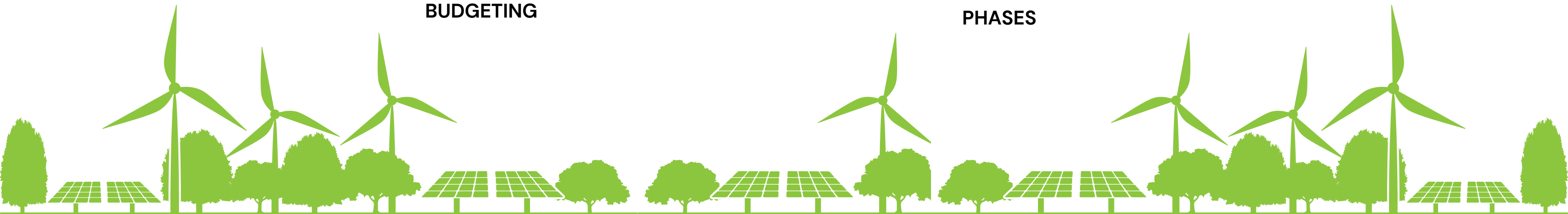
IDENTIFY & CHOOSE
AMONG OPTIONS &
PROVIDERS



INSTALLATION BY
PHASES



SYSTEM
TESTING AND
ACTIVATION





THANK YOU



Recommendations by
“Sustainable Jack” Martin.



Slide presentation
by
J. Kim Wright.



<https://sustainablejack.com/>