WELCOME TO OUR SOLAR TOUR

United Christian Church

8525 New Falls Road

Levittown PA 19056

https://www.ucclevittown.org/

(215) 946-6800

ucclevittown@verizon.net

A Brief Introduction

- United Christian Church.
  - A congregationally-run church.
  - Affiliated with two national denominations: the United Church of Christ (UCC) and the Christian Church (Disciples of Christ) [DOC].
  - This church was established in 1986 by the union of the former Church of the Reformation (this location since 1955) and First Christian Church (formerly located on Woodbourne Road, Levittown).
- A Progressive Faith Community.
  - Progressive Christianity is not necessarily synonymous with progressive politics. Progressive Christianity is characterized by a willingness to question tradition, acceptance of human diversity, a strong emphasis on social justice and care for the poor and the oppressed, and environmental stewardship of the earth. Progressive Christians have a deep belief in the centrality of the instruction to love one another (John 15:17) within the teachings of Jesus Christ.

Tour Agenda

- Why Solar?
- Presentation of UCC’s two systems using solar energy.
  - A Solar PV System generates electricity via the photovoltaic effect.
  - A Solar Thermal System captures thermal energy from the sunlight to heat water.
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WHY SOLAR?

- The quantity of sunshine that the planet receives in an hour and a half is enough to power the world for a year.

- Solar energy is a renewable and harvested form of energy over time. It is free and has no negative impact on the environment.

- Solar energy does not discharge any pollutants into the atmosphere, making it a clean form of energy that does not harm our environment.

- Save money.

Solar PV System.

The photo shows the Solar Photovoltaic (PV) panels mounted on the church's roof.

We have a mix of PV panels. There are 18 300W Trina* panels, 5 290W Jinko* panels and 1 295W Jinko panel. They make up a 7.145 kW Direct Current (DC) system.

The PV Panels are mounted on the southwest facing side of the roof. This maximizes the time direct sunshine is directed on the panels.

* Trina and Jinko are manufacturers of PV panels.

Solar PV System (con’t).

The photo is a rooftop close-up of the Solar Photovoltaic (PV) panels mounted on the church’s roof.

Solar PV System (con’t).

The roof-mounted PV panels generate direct current (DC) electricity. It needs to be converted to alternating current (AC) electricity, which the electrical grid uses.

The DC power generated by the PV panels are routed through a cable to an inverter for conversion to AC electricity. The photo shows our Solaredge SE-6000H inverter that is located in our utility room.

Solar PV System (con’t).

From the inverter the AC electricity is routed through a conduit to a circuit breaker panel and made available for use.

Also observe in the photo the two electric meters.

The one on the left (as you look at them), is marked as “IN-MTR”. It measures the church’s electricity consumption.

.The meter on the right, marked “OUT-MTR” measures the electricity generated by our Solar PV system.

Solar PV System (con't).

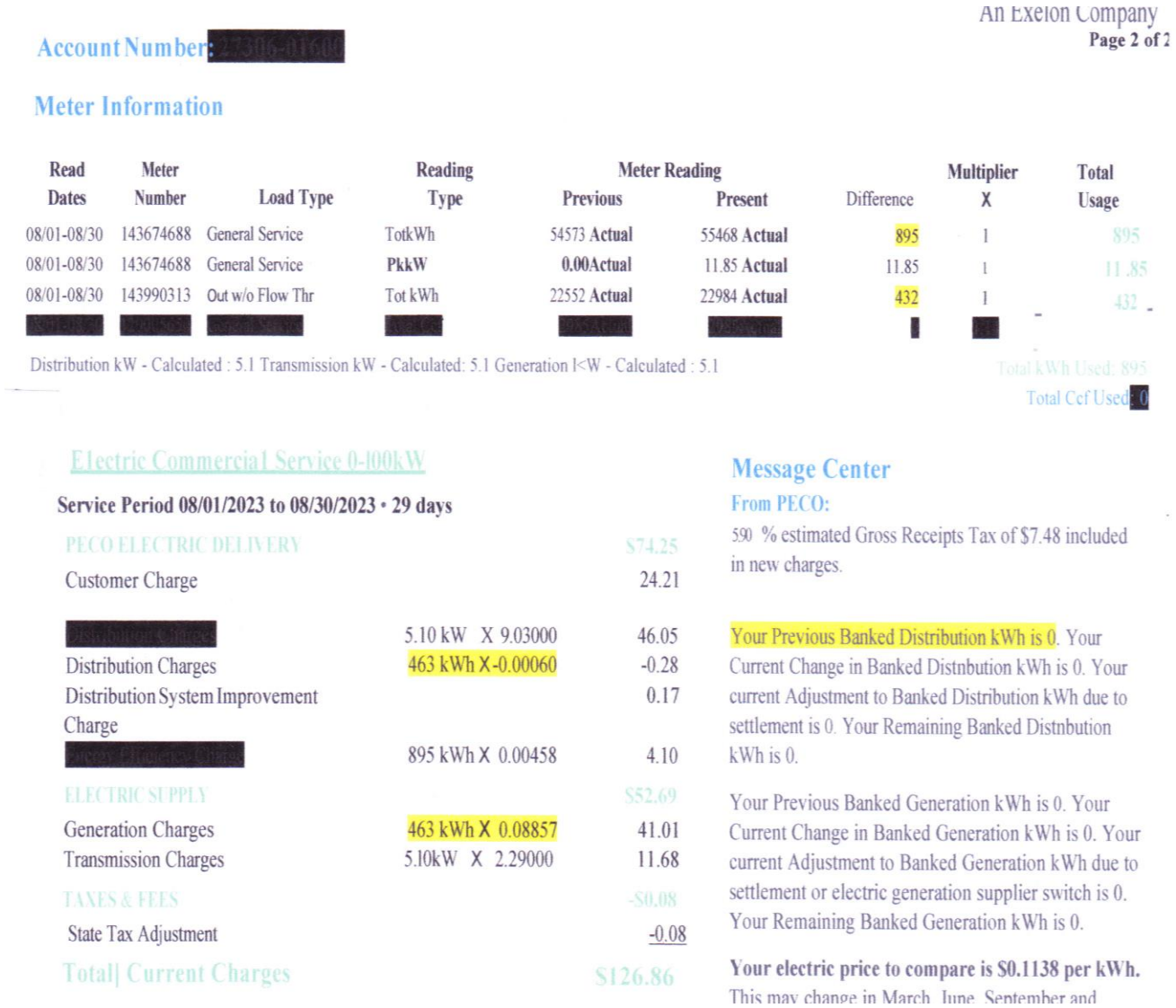
Shown here is a recent bill from our electricity company, PECO.

The church used a total 895 kWhs.

The solar PV system produced 432 kWhs, approximately 48.25 % of the total usage.

Instead of paying for generation of 895 kWhs ($79.27) we paid only for the difference between the total 895 used and the 432 kWhs we produced; thus 463 kWhs ($41.01); a monetary savings of $38.26.

It is beyond the scope of this presentation to account for the environmental benefit of not having to burn fossil fuels and release carbon into the atmosphere.



An Exelon Company
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Account Number: [redacted]

Meter Information

Read Dates	Meter Number	Load Type	Reading Type	Meter Reading Previous	Meter Reading Present	Difference	Multiplier X	Total Usage
08/01-08/30	143674688	General Service	TotkWh	54573 Actual	55468 Actual	895	1	895
08/01-08/30	143674688	General Service	PkkW	0.00Actual	11.85 Actual	11.85	1	11.85
08/01-08/30	143990313	Out w/o Flow Thr	Tot kWh	22552 Actual	22984 Actual	432	1	432
[redacted]								

Distribution kW - Calculated : 5.1 Transmission kW - Calculated: 5.1 Generation kW - Calculated : 5.1

Total kWh Used: 895
Total Ccf Used: 0

Electric Commercial Service 0-100kW

Service Period 08/01/2023 to 08/30/2023 • 29 days

PECO ELECTRIC DELIVERY		$74.25
Customer Charge		24.21
[redacted]	5.10 kW X 9.03000	46.05
Distribution Charges	463 kWh X-0.00060	-0.28
Distribution System Improvement Charge		0.17
[redacted]	895 kWh X 0.00458	4.10
ELECTRIC SUPPLY		$52.69
Generation Charges	463 kWh X 0.08857	41.01
Transmission Charges	5.10kW X 2.29000	11.68
TAXES & FEES		-$0.08
State Tax Adjustment		-0.08
Total Current Charges		$126.86

Message Center

From PECO:

590 % estimated Gross Receipts Tax of $7.48 included in new charges.

Your Previous Banked Distribution kWh is 0. Your Current Change in Banked Distnbution kWh is 0. Your current Adjustment to Banked Distribution kWh due to settlement is 0. Your Remaining Banked Distnbution kWh is 0.

Your Previous Banked Generation kWh is 0. Your Current Change in Banked Generation kWh is 0. Your current Adjustment to Banked Generation kWh due to settlement or electric generation supplier switch is 0. Your Remaining Banked Generation kWh is 0.

Your electric price to compare is $0.1138 per kWh.
This may change in March, June, September and

Solar Thermal System (Hot Water System)

The photo shows the two Solar Thermal panels on the classroom wing roof.

The church purchased its solar thermal system from Exact Solar in 20XX. Exact Solar provided us a generous discount.

Comfortable showers, clean dishes, and clean clothes depend on hot water. But it often comes with a cost making it the second largest energy expense in the home. (18% of the utility bill per the DOE). A significant component of that cost is maintaining the water in the tank at the desired temperature.

In our system the free heat from the sun is used to achieve and maintain the desired water temperature. A backup electric heating coil is used for cloudy days and high demand.

Solar Thermal System (con’t.)

Glycol in a closed loop is circulated through the Solar Thermal panels to capture heat from the sunlight and transfer the heat to the water in the storage tank.

In this active system a Steca TR 0301 U Temperature differential controller constantly compares the temperatures between the collector (T1) and the lower area of the storage tank (T2). Once the sun heats the collector and the controller senses a preset temperature difference between the collector and the storage tank, a circulation pump is switched on.

The pump extracts the glycol from the lower cooler area of the storage tank and pumps it to the collector. The glycol in the collector is heated by the sun and flows back to the storage tank. The glycol then heats the domestic water via a heat exchanger located in the storage tank.

Solar Thermal System (con’t.)

We do not have a method to track the savings achieved by using heat from the sun to create hot water from use in the building.

However, the Steca TR 0301 U controller has an animated graphic display, which offers a complete visualisation of the solar energy system's operating status and solar circuit. In other words we can see that the system is working as designed. In addition, we can confirm hot water is available at the faucet.

COMPLETION OF OUR TOUR

ANY QUESTIONS?

THANK YOU.