

Westminster Presbyterian Church

Energy, Water and Cost
Initiatives



Energy Savings

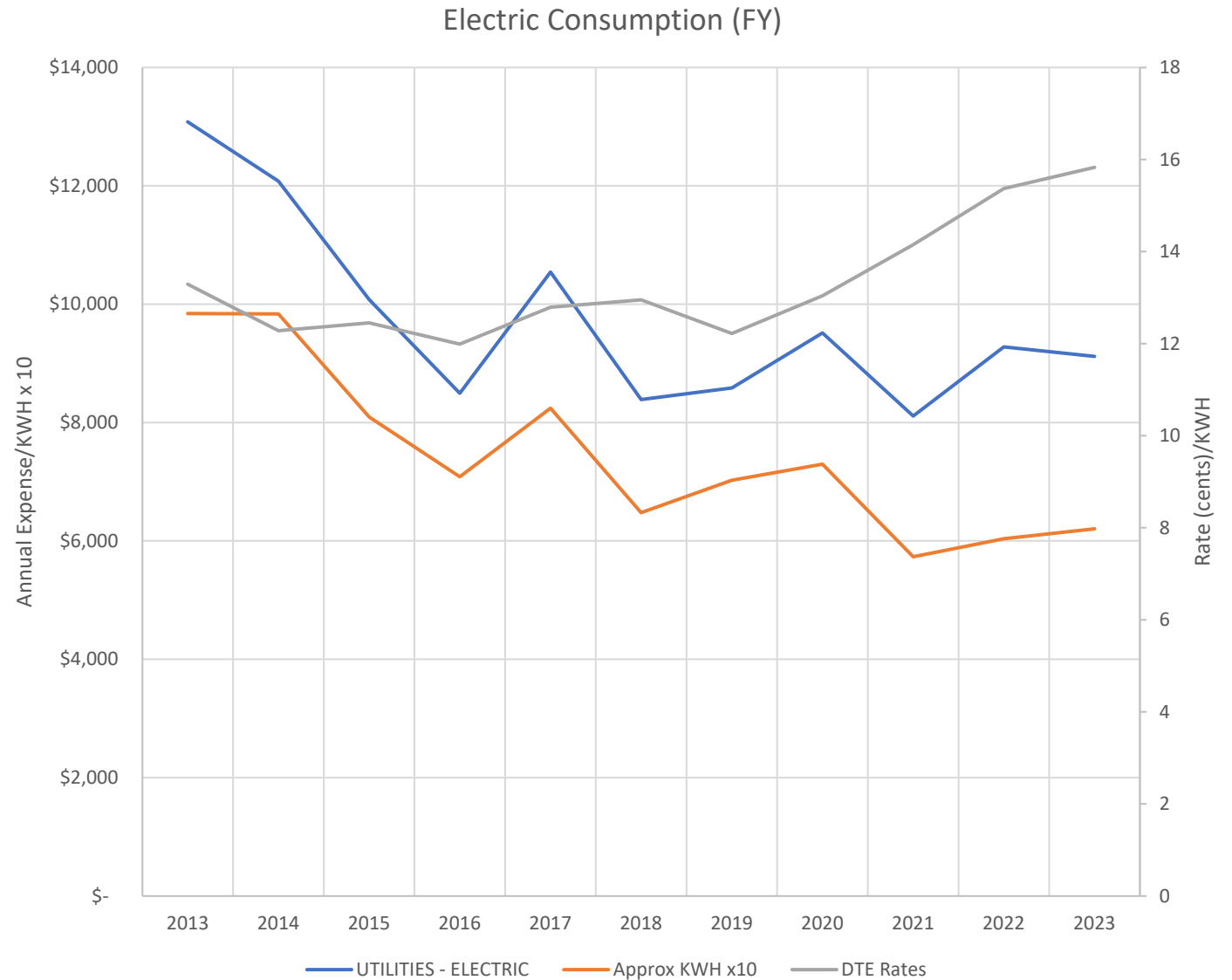
Step 1 – Use Less Energy

Impact

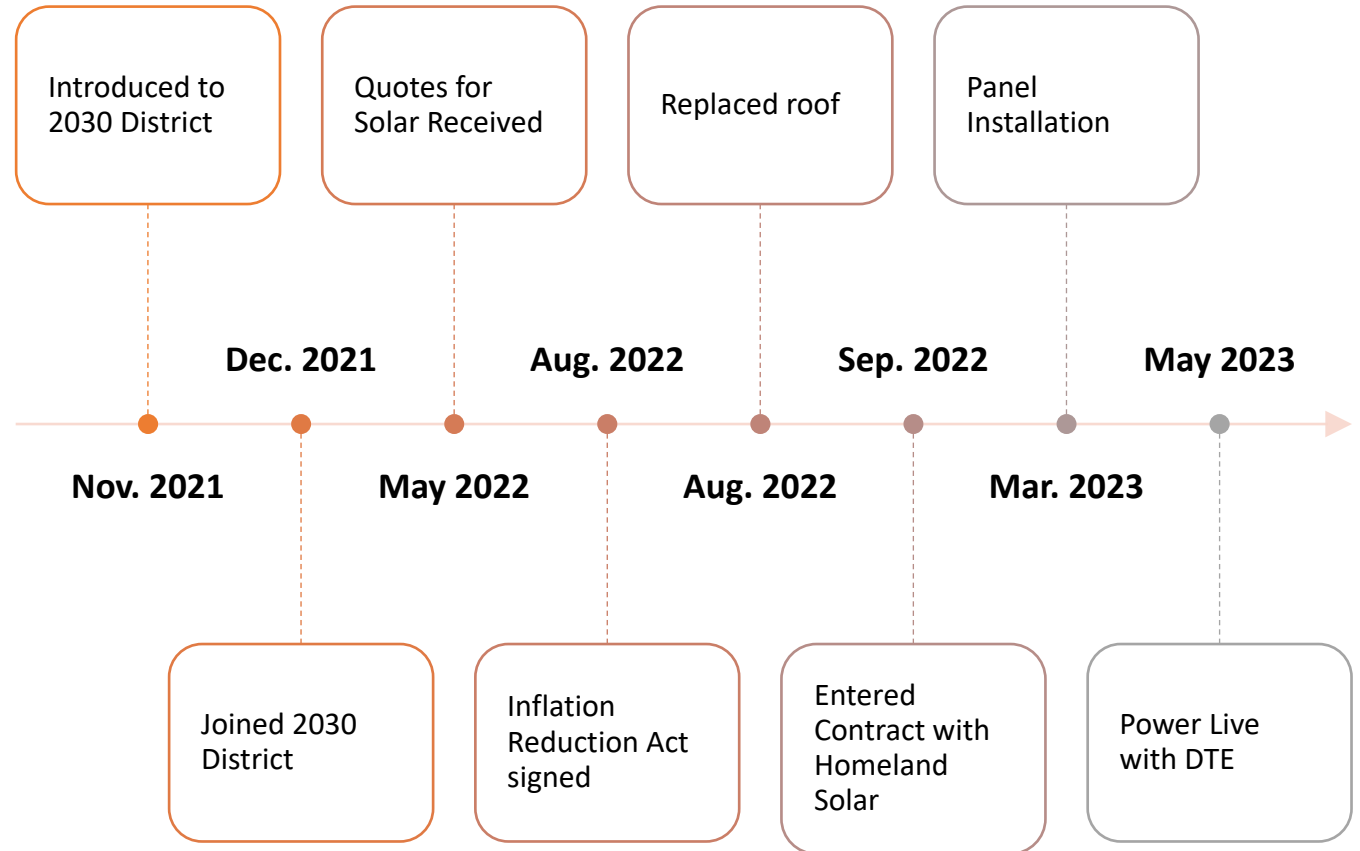
- Our usage has decreased by 40%
- Our costs have decreased by 31%
- Even though costs have increased about 19%.

Steps

- LED lighting and other fixtures
- Replaced a freezer (!)
- Reduced parking lot lighting hours



Step 2 – Go Solar



Solar Quotes Received (May 2022)

Vendor	# of panels	Total KW	Budget Cost	\$/watt
Homeland Solar	100	40KW	\$79,500	\$1.99
Absolute Solar	163	60KW	\$143,538	\$2.38
Distributed Power	74	30KW	\$70,000	\$2.33

Final System

- **Cost**
- \$85,000 (\$1.95/KW)
- Payments:
 - \$25k contract signing
 - \$35k installation start
 - \$25k go live
- Additional \$43k for roof replacement
- **Financing**
- \$13,000 donations
- \$15,000 endowment
- \$57,000 borrow from reserves and pay back over time (0% interest) - \$25.5k “tax” credit
- Expected finish payback: 6-8 years
- Overall breakeven period 9 - 11 years



Phone	3559187
Name	Westminster Presbyterian
Address	Scio Church Road 1500, Ann Arbor, Michigan, United St...
Called	05/22/2023
Updated	07/06/2023 20:03
Power	43.6 kWp

Estimated Performance

- Annual power supply:
 - Pre-installation Estimate: 67.7% of annual power supplied by system.
 - Could be >70% with reduced demand
- Demand:
 - Average: 5200 KWH/month (62,000 KWH/year)
 - Range: 4000 – 6000 KWH/month (highest use in winter)

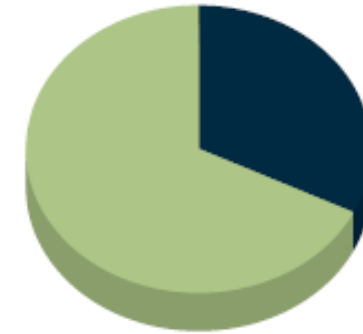
Solar PV System Rating

Power Rating: 40,000 W-DC

Power Rating: 34,124 W-AC-CEC

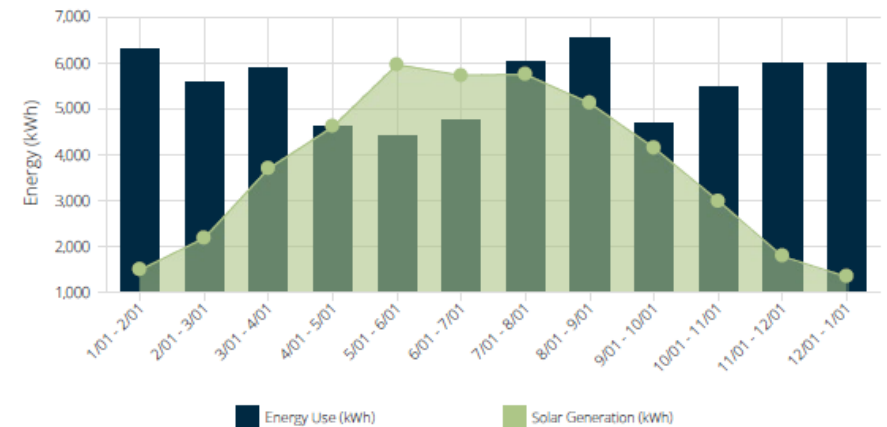
Energy Consumption Mix

Annual Energy Use: 66,252 kWh

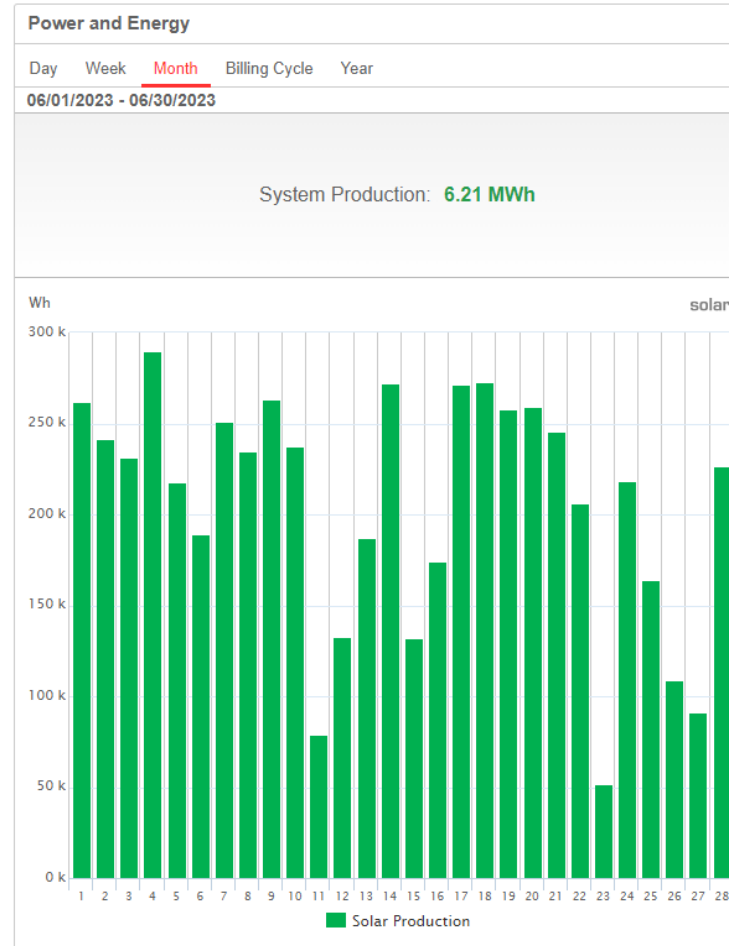
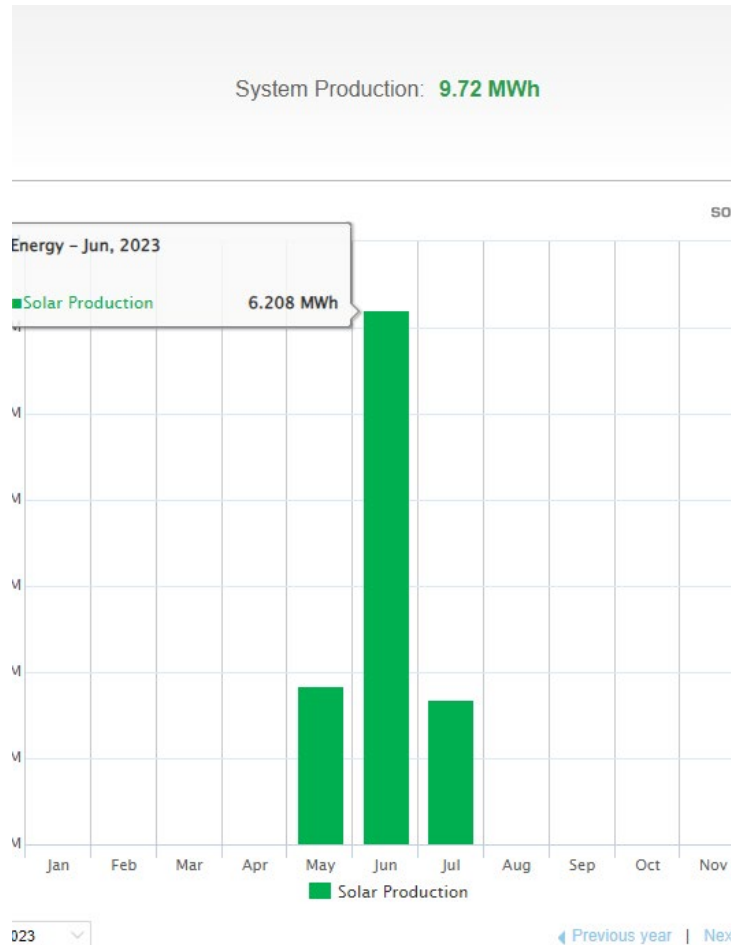


Utility	21,399 kWh (32.30%)
Solar PV	44,853 kWh (67.70%)

Monthly Energy Use vs Solar Generation



Performance to Date



- Generation:
 - June: 6200 KWH
 - 9720 KWH to date (as of 7/9/23 – 48 days)





Water Savings

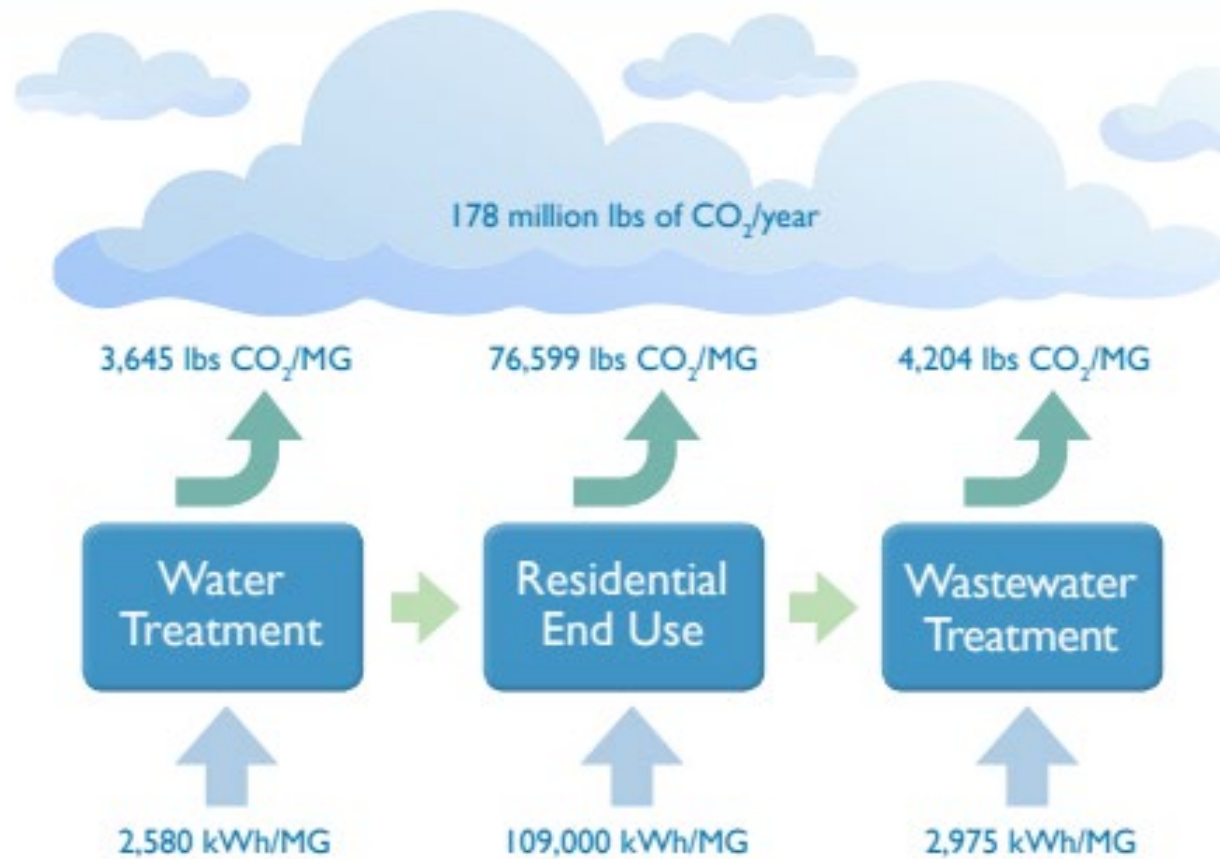
Why do we care about water?

- https://www.hrwc.org/wp-content/uploads/Carbon-Footprint-brochure_single-pages.pdf
- More than 13% of the nation's electricity consumption, nearly 521 billion kilowatt hours (kWh), is associated with water related energy use. The energy required to provide water to a running faucet for five minutes is equal to that needed to light a 60-watt bulb for 14 hours
- Fifty percent of the total energy consumed by the City of Ann Arbor goes to drinking water and wastewater treatment.



Huron River Watershed Analysis

FIGURE 2



The Carbon Footprint of Water in the Huron River Watershed

Estimate of total annual carbon dioxide released from the pumping, treating and heating of water for residential use in the Huron River watershed. Blue arrows represent energy inputs during each phase of the water cycle. Green arrows show carbon outputs.

Energy Use for Water Treatment

- Water treatment: 2580 kWh /MG
- Wastewater treatment: 2975 kWh /MG
- Overall, about 4.2 kWh/CCF
- About 1.41lb CO₂/kWh
- 5.9lb CO₂/CCF

Westminster's Water Journey



About AquaHawk

- Available to all City of Ann Arbor water users
- Provides in depth indication of water use.
- Strongly recommended

The screenshot shows the AquaHawk web interface for the City of Ann Arbor. The header includes the City of Ann Arbor logo and the AquaHawk logo. The main content is divided into three sections: Account Information, Bill Estimates, and Alerts. The Account Information section shows account details for 505786-105914, including the address and email. The Bill Estimates section shows the current billing period (Jun 20, 2023 - Sep 19, 2023) and estimated bills for \$136.32 and \$337.62. The Alerts section shows a list of abnormal water use alerts with dates and descriptions. Red arrows point from the labels below to the corresponding sections in the screenshot.

Water

Help April Wright Westminster Presbyterian

Account Information

505786-105914
WEST PRESBY CHURCH
1500 SCIO CHURCH RD
ANN ARBOR, MI 48103
Email Address bookkeeper@westpresa2.org
1 Registered Users
April Wright Westminster Presbyterian alwright@westpresa2.org

Current Billing Period
Jun 20, 2023 - Sep 19, 2023 (Day 20 of 92)

Estimated Bill (as of 7/10/2023 12:00 AM) \$136.32
Projected Bill (at last reported use rate) \$337.62

Water Use (as of 7/10/2023 12:00 AM) 8.11 CCF
Projected Water Use (at last reported use rate) 26.49 CCF
Last 24 Hours: 0.22

Export My Thresholds

505786-105914 Search

12/07/2022 Water Use: Abnormal water use detected.
07/08/2022 Water Use: Abnormal water use detected.
04/24/2022 Water Use: Abnormal water use detected.
01/21/2022 Water Use: Abnormal water use detected.
12/01/2021 Water Use: Abnormal water use detected.
09/22/2021 Water Use: Abnormal water use detected.
09/20/2021 Water Use: Abnormal water use detected.

Account Information

Bill Estimates

Alerts

Daily Data – July 2021 – July 2022

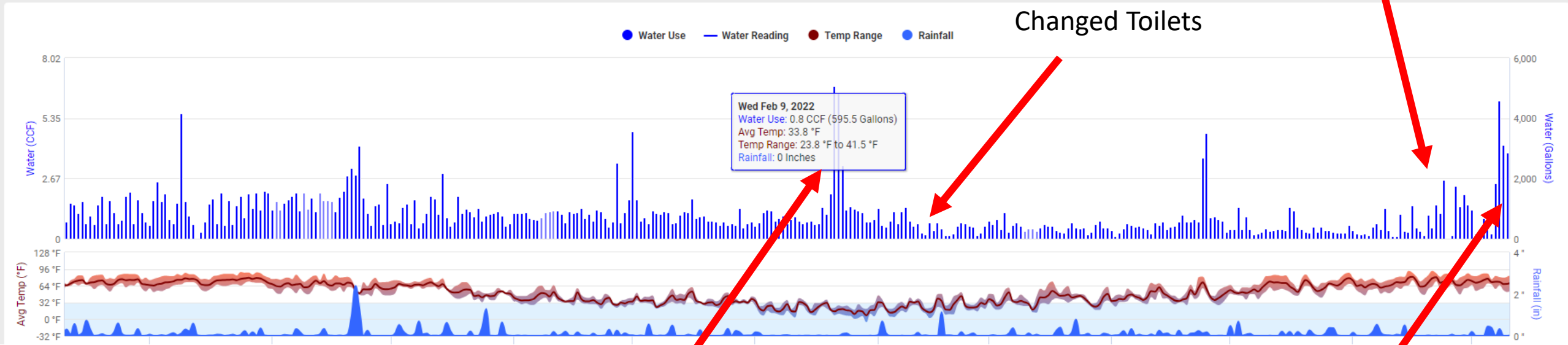
Account # 505786-105914 1500 SCIO CHURCH RD-WEST PRESBY CHURCH

Irrigation

365 Days (Sun Jul 11, 2021 - Sun Jul 10, 2022)

390.4 CCF (0.01 min, 1.07 avg, 6.77 max)

Back 24 hours 48 hours 72 hours 30 days 45 days 365 days 12 months Enter date to view < > Actual View Accumulating View



Changed Toilets

Wed Feb 9, 2022
Water Use: 0.8 CCF (595.5 Gallons)
Avg Temp: 33.8 °F
Temp Range: 23.8 °F to 41.5 °F
Rainfall: 0 Inches

Yikes! A leak!

Yikes! A leak!

All About Toilets

- Replaced 16 toilets
 - 2 as part of restroom renovation
 - 8 in continual use by preschool
 - 6 in parts of the building with more periodic use
- Original to building construction in 1956 and 1991
- Used 1.6 gallon/flush toilets
- Cost: \$4,024. Volunteer Labor



Other Excess Water Use

- Water cooled ice machine
 - Uses about 80 gallons / day
 - Turn off when not in use



- Irrigation

- Timed system: uses 600 gallons 2x/week
- Turn off in wet periods
- Other irrigation hand done



24 Hours (Thu Feb 16, 2023 12:00 AM - 11:00 PM)

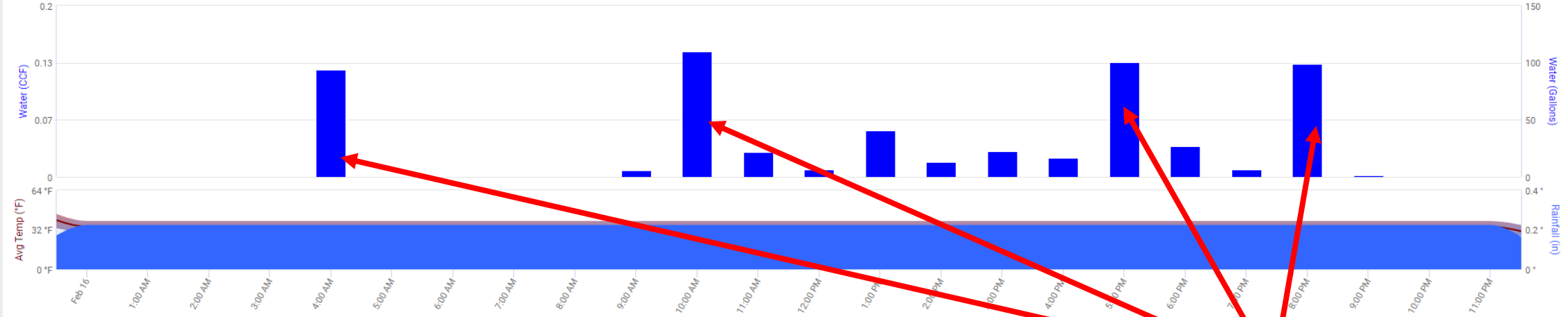
Old Meter

0.76 CCF (0 min, 0.03 avg, 0.15 max)

Back 24 hours 48 hours 72 hours 30 days 45 days 365 days 12 months Enter date to view < >

Actual View Accumulating View

Water Use Water Reading Temp Range Rainfall



Random 90 gallon spikes, generally every six hours

Old meter:
1 day use
0.76 CCF

New meter
2 day use
0.71 CCF

1 CCF =
\$11.35

Phantom readings about 150 CCF/year = \$1700/year

Gypsy Big Book
Tuesday evenings

New Meter

Choir Wed evening

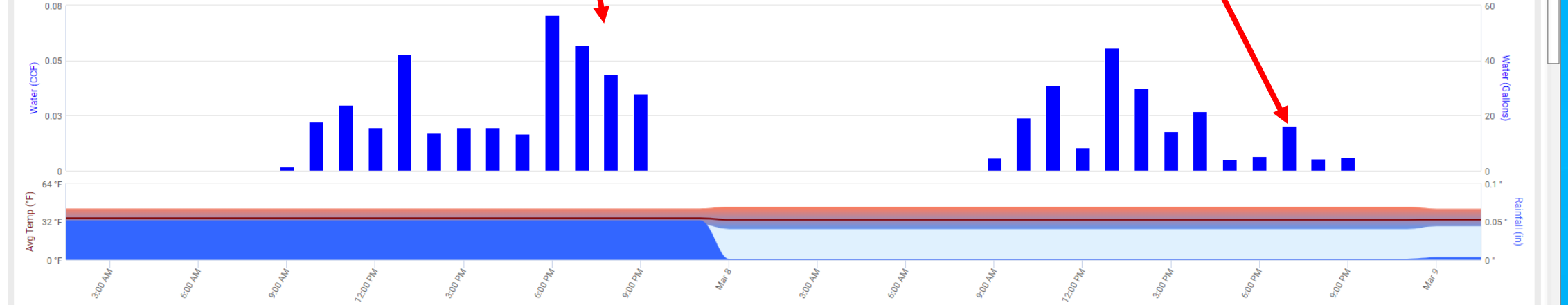
0.71 CCF (0 min, 0.01 avg, 0.08 max)

Last 48 Hours (Tue Mar 7, 2023 2:00 AM - Thu Mar 9, 2023 1:00 AM)

Back 24 hours 48 hours 72 hours 30 days 45 days 365 days 12 months Enter date to view < >

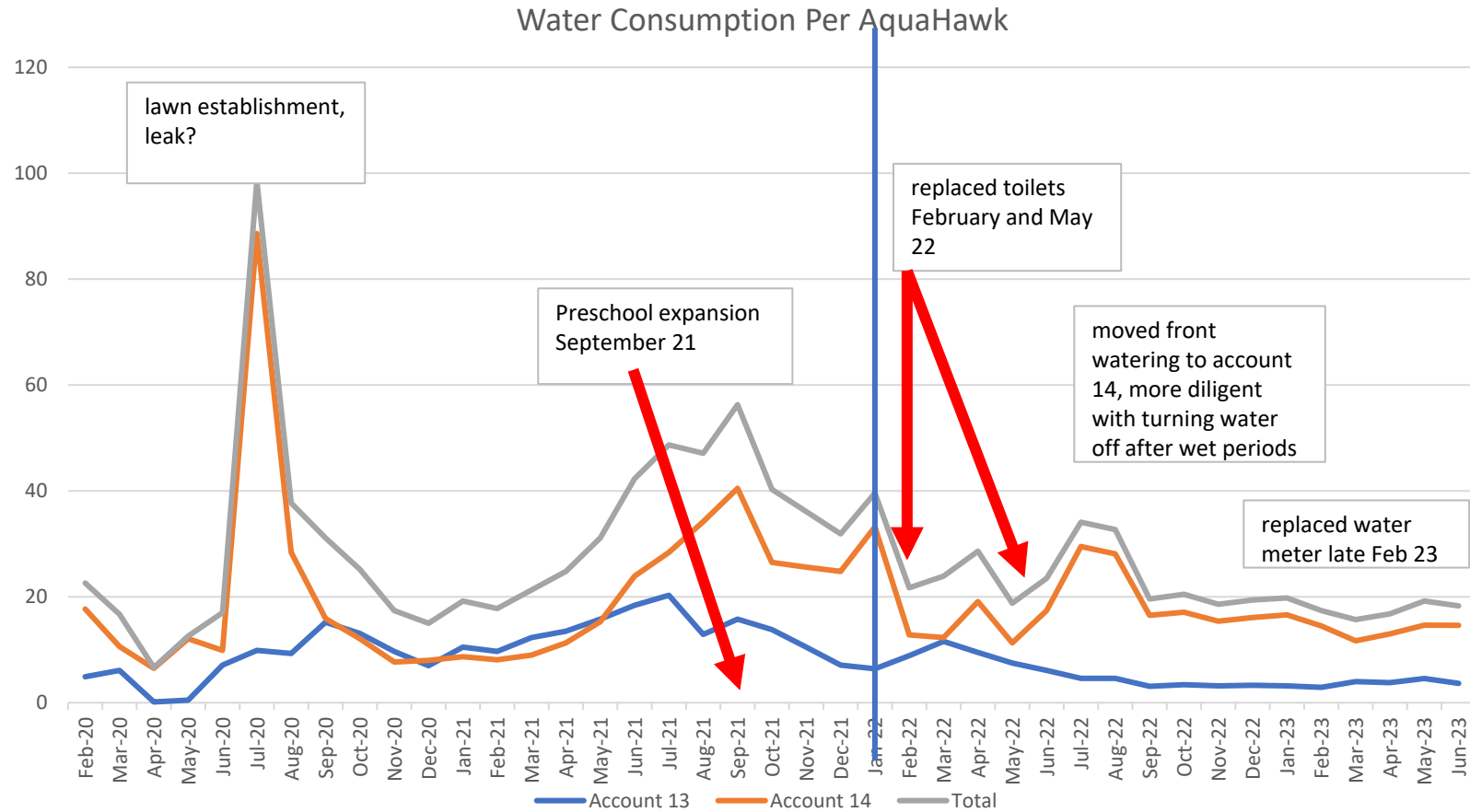
Actual View Accumulating View

Water Use Water Reading Temp Range Rainfall



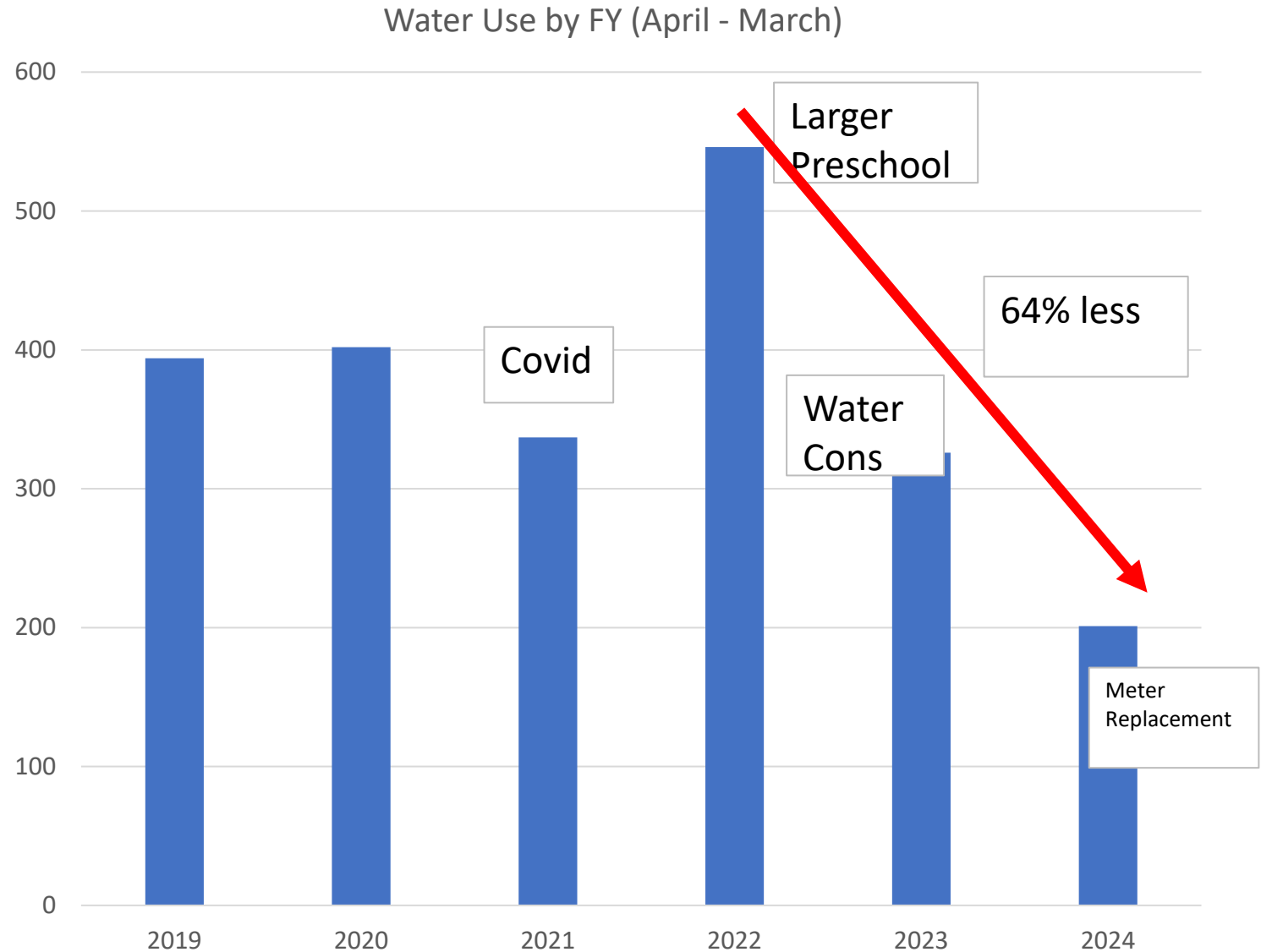
Pattern has been in place for close to two years with some variability on and off. Magnitude of spikes increased over time.

Results



Reduced Consumption/ Costs

- Consumption Charges
 - FY22: \$5,940
 - FY23: \$3,656
 - FY24: \$2,300 (projected)
- Two-year payback on toilet replacement
- Would have been quicker without faulty meter.



Energy Impact

- About 1500 KWH effective energy savings from highest year to lowest year (4.2 KWH * 346 CCF)
- Based on reduced water and sewer demand related to City of Ann Arbor Utilities
- 2,000 lbs CO2 equivalent.
- One week of our solar system.
- (But we are saving a lot of money!)

Thank You!

Westminster Presbyterian
Church, Ann Arbor
An Earth Care Congregation

