

Enhance your monitoring with RTL-SDR

@JayFoxytrot

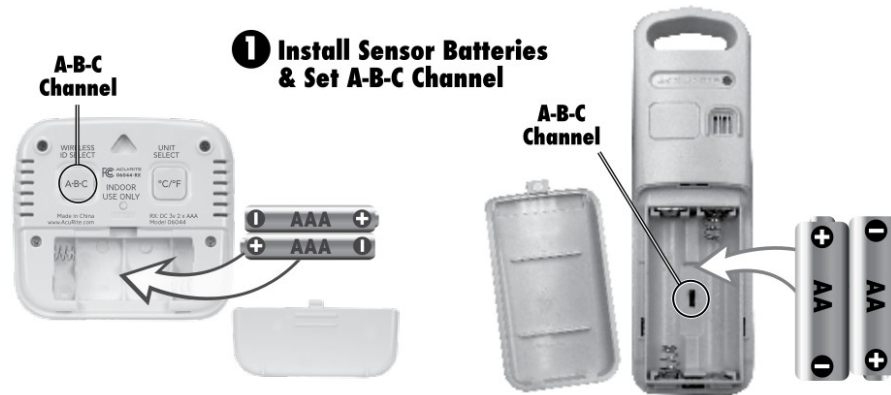
# Simple Monitoring of Temperature and Humidity

- Acurite temp and humidity 3-pack
  - Reasonably priced (\$70 on amazon)
  - One console which has temp/humidity sensor
  - Decent range (within 300 ft)



# Simple Monitoring of Temperature and Humidity Problems

- Instantaneous data but no history
- No logging and notifications
- Can't increase sensors (channel selectors support only A, B, C)



# SDR to the rescue

- Add a computer and a cheap SDR dongle
  - Raspberry Pi (\$30-\$100)
  - Noo Electric RTL-SDR (\$27 amazon)
  - Additional sensors 06002M (\$35 amazon)



# Raspberry Pi

- Plug in RTL-SDR USB adapter
- Run rtl\_433 code
  - Decodes data from temp sensors
- Run a time series database (InfluxDB)
  - Any TSDB can work
- Grafana to host dashboard

# Building and Installing rtl\_433

- Easy to build/install on rasbian
- Instructions in the documentation
- But rough steps:

```
sudo apt install -y librtlsdr-dev
git clone https://github.com/merbanan/rtl\_433.git
cd rtl_433
mkdir build
cd build
cmake ..
make -j $(nproc)
cd ..
./build/src/rtl_433 -d rtl_tcp -C customary -F json | ~/temp_to_influx.py
```

# Running rtl\_433

## • Sample Output

```
pi@stream1:~ $ rtl_433/build/src/rtl_433 -d rtl_tcp -C customary -F json
rtl_433 version 21.12-160-g869e7 branch master at 202210252023 inputs file rtl_tcp RTL-SDR
Use -h for usage help and see https://triiq.org/ for documentation.
Trying conf file at "rtl_433.conf"...
Trying conf file at "/home/pi/.config/rtl_433/rtl_433.conf"...
Trying conf file at "/usr/local/etc/rtl_433/rtl_433.conf"...
Trying conf file at "/etc/rtl_433/rtl_433.conf"...
Registered 191 out of 223 device decoding protocols [ 1-4 8 11-12 15-17 19-23 25-26 29-36 38-60 63 67-71 73-100 102-105 108-116 119 121 124-128 130-149
151-161 163-168 170-175 177-197 199 201-215 217-223 ]
rtl_tcp input from localhost port 1234
connect: Connection refused
rtl_tcp connected to localhost:1234 (Tuner: R820T)
Sample rate set to 250000 S/s.
Tuner gain set to Auto.
Tuned to 433.920MHz.
baseband_demod_FM: low pass filter for 250000 Hz at cutoff 25000 Hz, 40.0 us
{"time" : "2023-01-29 19:40:51", "model" : "Acurite-Tower", "id" : 14435, "channel" : "C", "battery_ok" : 1, "temperature_F" : 68.900, "humidity" : 41,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15574, "channel" : "C", "battery_ok" : 1, "temperature_F" : 69.440, "humidity" : 43,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15574, "channel" : "C", "battery_ok" : 1, "temperature_F" : 69.440, "humidity" : 43,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15574, "channel" : "C", "battery_ok" : 1, "temperature_F" : 69.440, "humidity" : 43,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15441, "channel" : "C", "battery_ok" : 1, "temperature_F" : 47.300, "humidity" : 55,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15441, "channel" : "C", "battery_ok" : 1, "temperature_F" : 47.300, "humidity" : 55,
"mic" : "CHECKSUM"}
{"time" : "2023-01-29 19:40:52", "model" : "Acurite-Tower", "id" : 15441, "channel" : "C", "battery_ok" : 1, "temperature_F" : 47.300, "humidity" : 55,
"mic" : "CHECKSUM"}
```

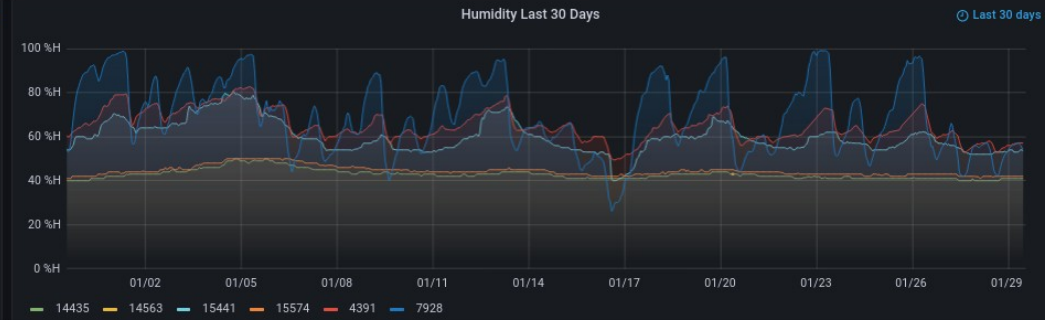
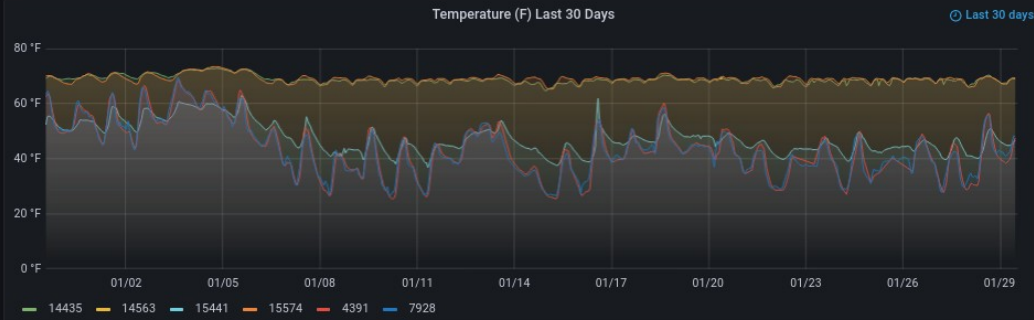
# Grafana Temp Dashboards



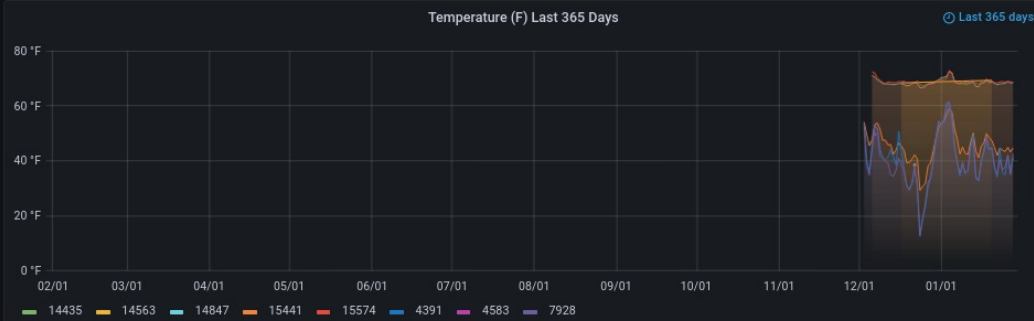


# Grafana Temp Dashboards

▼ Past 30 Days



▼ Past 365 Days



# Power Monitoring

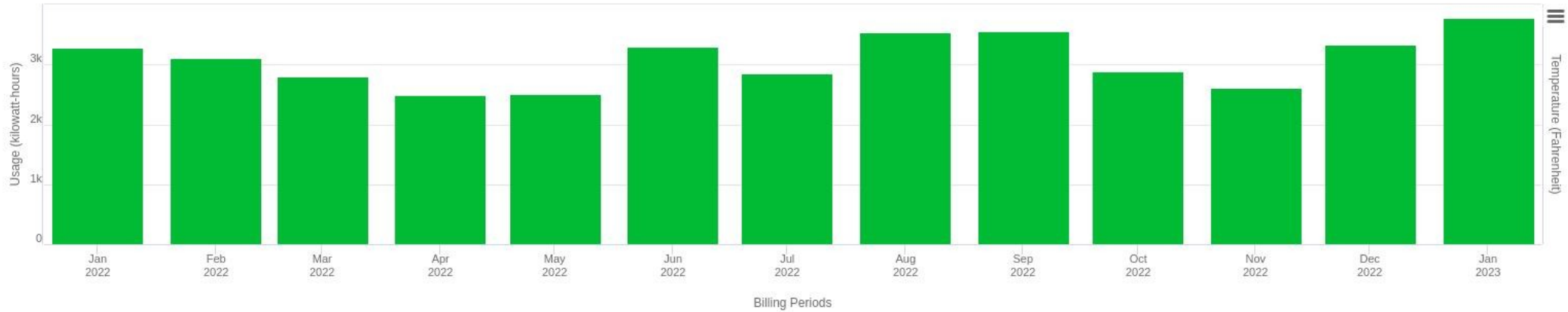
- Many homes have Itron Smart Meters
  - Power company reads them once a month from a vehicle in close proximity
  - Some have cellular capabilities to eliminate the need for close proximity

# Power Monitoring

- Data is seldom accessible to users from the power company
- NOVEC launched a new customer portal last year
- Users can now download their data
- Already had access to the last year of monthly data

# Power Monitoring

Monthly Usage Jan 2022 to Jan 2023  
Customer since: September 4, 2015



Custom Date Range Selector



Meter(s): ☒ ☐



# Power Monitoring

Download Usage Data

Step 1

Select Account:

Select Service:  
☒ Electric

Step 2

Choose the start and end dates for your data.  
From To  

01/01/2022

 - 

02/15/2022

Choose the time interval for your data from Monthly, Daily, or Hourly.  
☐ Monthly  
☐ Daily  
☒ Hourly

Step 3

Select a file format.  
☒ Green Button XML  
☐ CSV

Click the "Download Usage Data" button.  
Save the zipped file to your computer.  
[Extract the file](#) to view it directly or upload to an approved vendor for further analysis.

Download Status

Waiting to begin download.  
[Click "Download Usage Data"](#)

Cancel

Download Usage Data

Download Usage Data

Step 1

Select Account:

Select Service:  
☒ Electric

Step 2

Choose the start and end dates for your data.  
From To  

01/01/2022

 - 

02/15/2022

Choose the time interval for your data from Monthly, Daily, or Hourly.  
☐ Monthly  
☒ Daily  
☐ Hourly

Step 3

Select a file format.  
☒ Green Button XML  
☐ CSV

Click the "Download Usage Data" button.  
Save the zipped file to your computer.  
[Extract the file](#) to view it directly or upload to an approved vendor for further analysis.

Download Status

No usage data is available for the Daily view. Please change your selection to Monthly.

Cancel

Download Usage Data

Great idea...  
but not available

# RTL-SDR and rtlamr

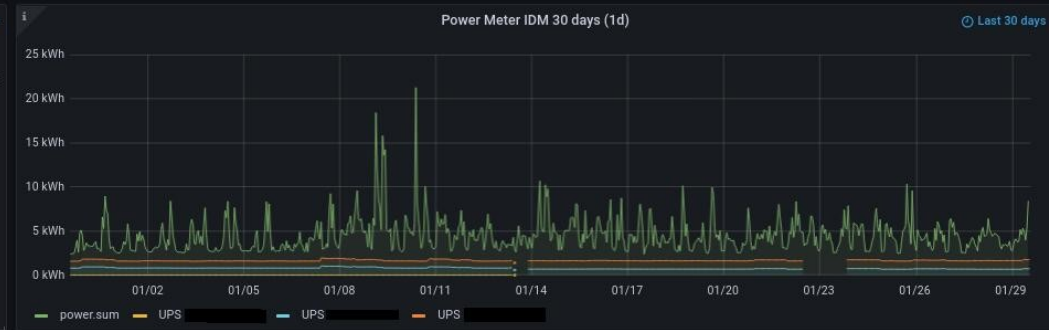
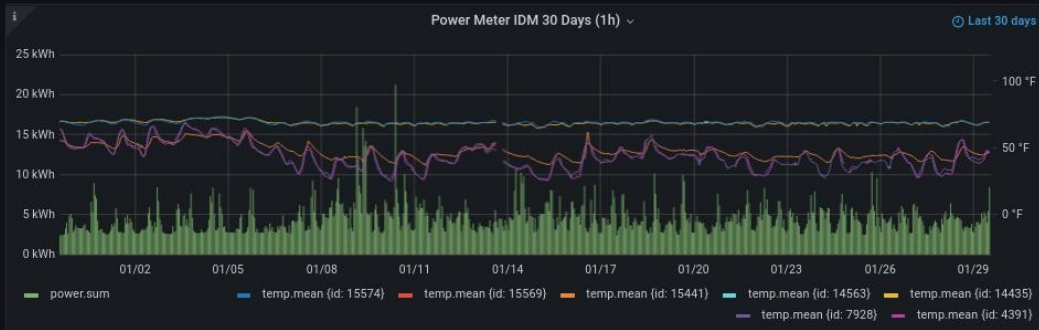
- Where NOVEC fails, open-source delivers
  - <https://github.com/bemasher/rtlamr>
  - <https://github.com/bemasher/rtlamr-collect>
- Go code to decode Itron power meters and insert into a Influx DB

# Grafana Power Dashboards

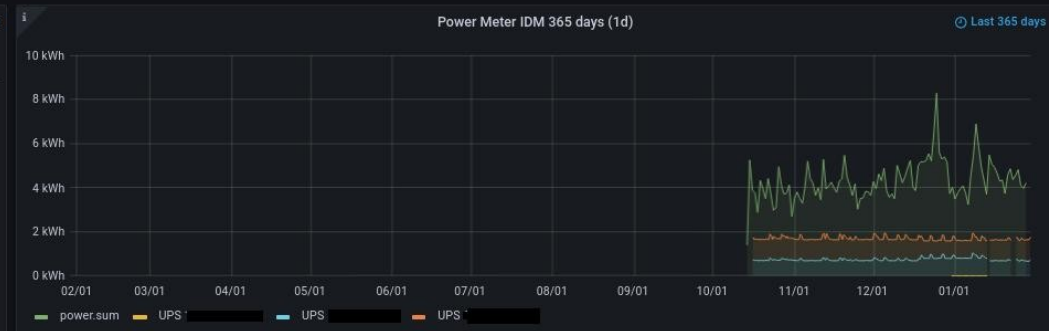
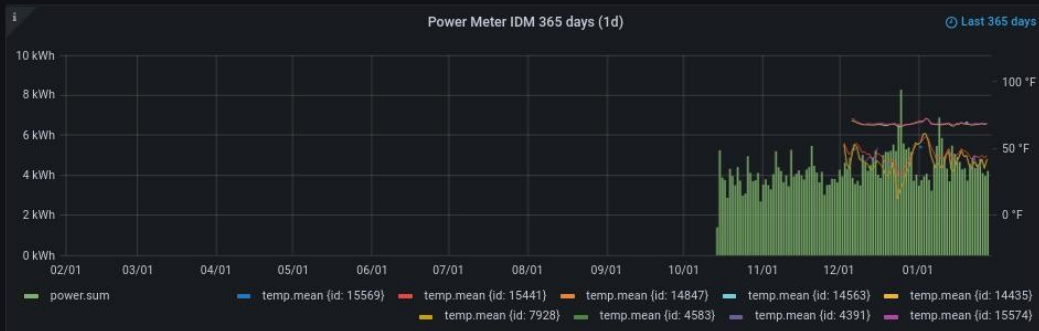


# Grafana Power Dashboards

▼ Past 30 Days



▼ Past Year





# Resources:

- <https://github.com/bemasher/rtlamr>
- <https://github.com/bemasher/rtlamr-collect>
- [https://github.com/merbanan/rtl\\_433.git](https://github.com/merbanan/rtl_433.git)
- <https://github.com/hmatuschek/libsdrr.git>