Model the energy intensity of the solar light imput over the year

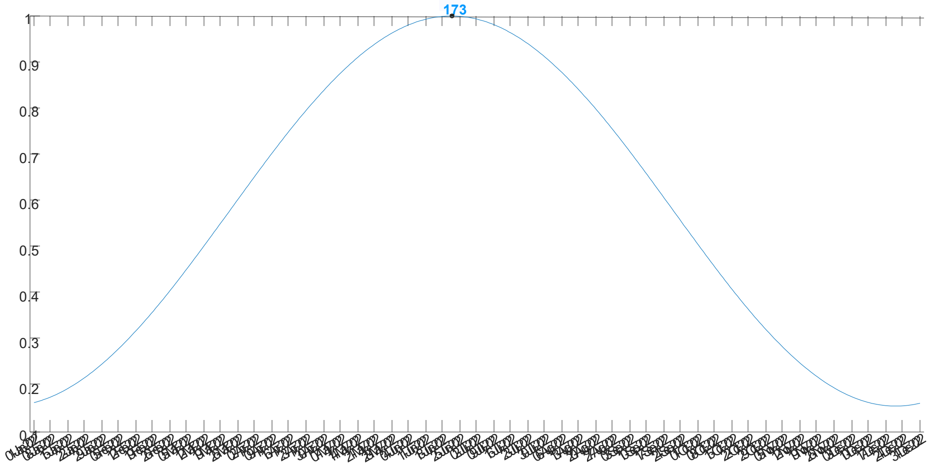
https://github.com/Snellparlings/SolarPanelEfficiency

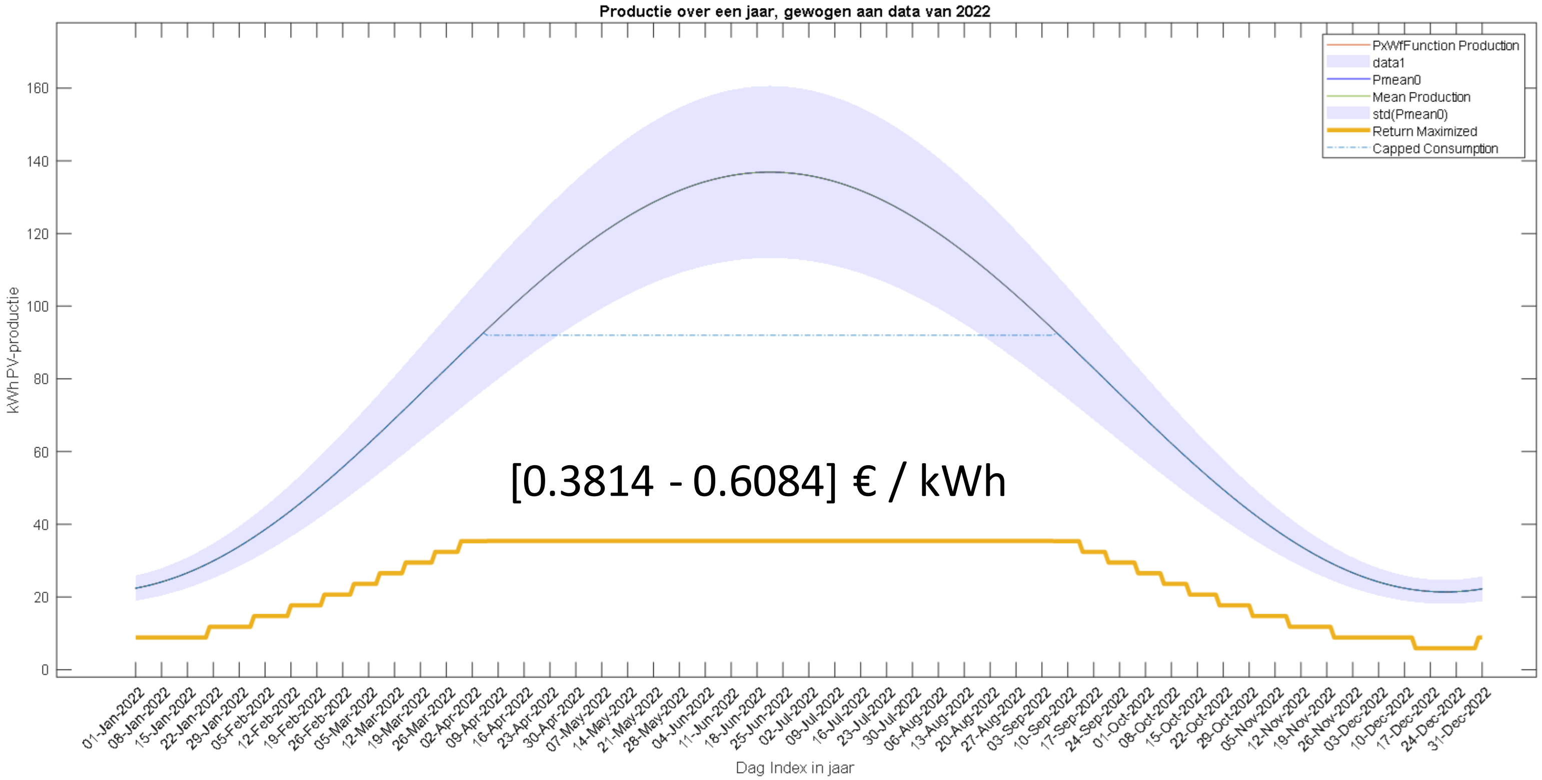
val(x) = a*sin(b*x) - Coefficients (with 95% confidence bounds): a = 13.25 (12.62, 13.87) | b = 1.224 (1.204, 1.245)

$$PxDay = \frac{1.318 * \sin\left(1.224 * \left[\frac{1}{365} : 1\right] * \pi - 0.365\right) + 1}{\pi/2}$$

$$PxDay = \frac{1.328 * \sin^2\left(\pi * \left(\frac{1}{365} : \frac{1}{365} : 1\right) + 10 * \pi/365\right)}{\pi/2}$$

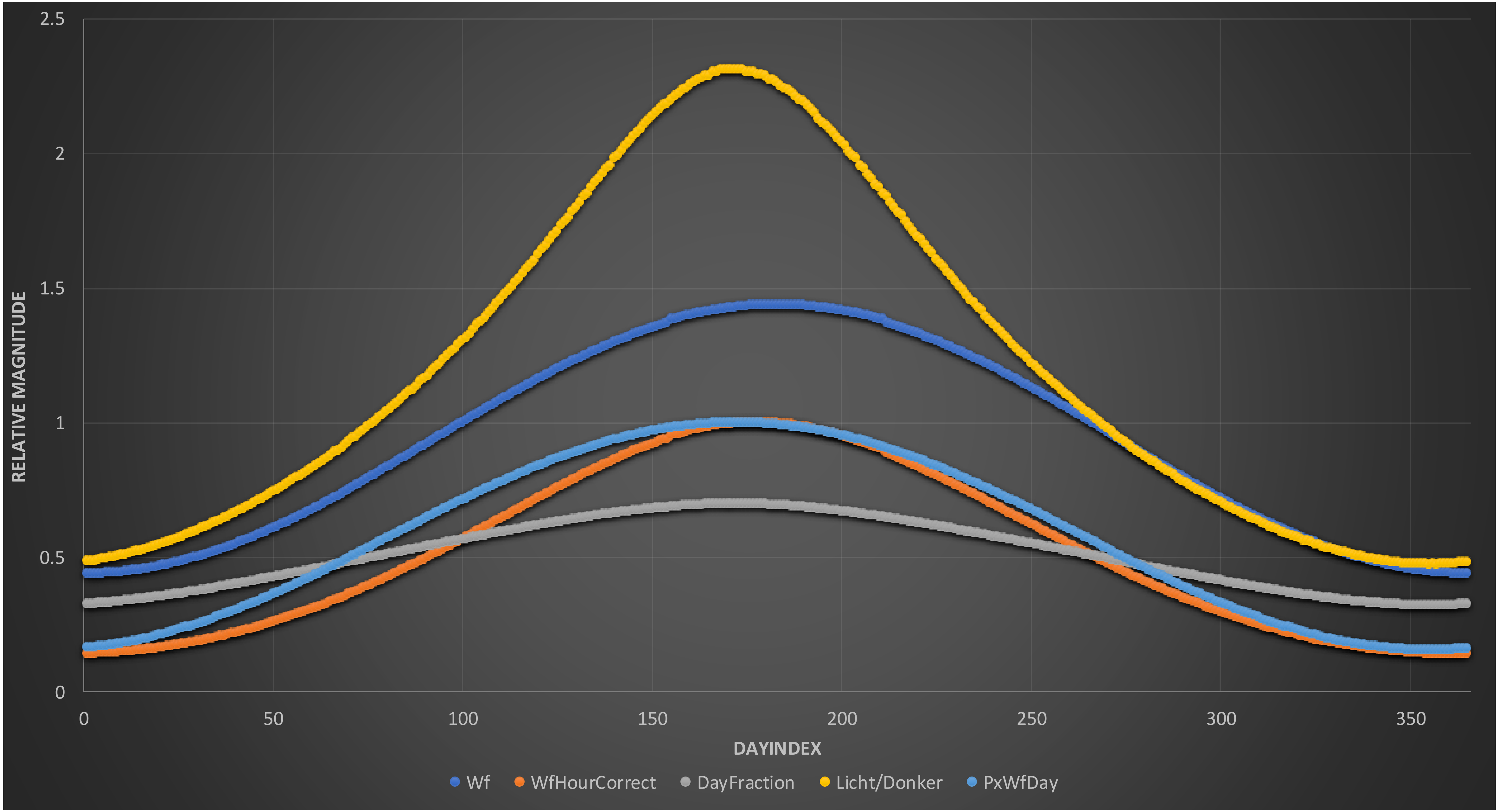
Shift = 1-max(PxDay)





[€9290,4 - € 14820] Revenue / Year

24358 kWh / Year



RELATIVE MAGNITUDE
2.5
2
1.5
1
0.5
0
0
50
100
150
200
250
300
350
DAYINDEX
Wf
WfHourCorrect
DayFraction
Licht/Donker
PxWfDay

The MATLAB code

```
% Dayvector cycling year
dayC=[365/211:365/211:365];
% Circle Cycling vector in rad
xdata = (0:.1:2*pi)';
y0 = sin(xdata);


% Form of Pmax(y(dayC)+offset on 1 jan)
% y(t) = P(t)/Pmax sin(phi*(y0 + pi/2*T))

%Half Period Vector
xdataTfull = (0:pi/62:2*pi)';
xdataThalf = (pi/211:pi/211:pi)';

SampleWeightedDataAtos = [0.50
0.50
...
0.84
..
0.76
...
1.02
..
1.50
..
1.32
..
1.16
];


ycalc = 2.28.*sin(xdataThalf.*SampleWeightedDataAtos + xdataThalf./dayC');
%%
%%
% Add noise to the signal:

noise = 2*y0.*randn(size(y0)); % Response-dependent noise
ydata = y0 + noise;

noise = 2*ycalc.*randn(size(ycalc));
ydata = ycalc + noise;

xdata = xdataThalf;
%%
% Fit the noisy data with a custom sinusoidal model:
f = fittype('a*sin(b*x)');
fit1 = fit(xdata,ydata,f,'StartPoint',[1 1]);
%%
% Find the derivatives of the fit at the predictors:


[d1,d2] = differentiate(fit1,xdata);
```

Integrating over pi / 211 steps*

Test the sampleweightedData factor

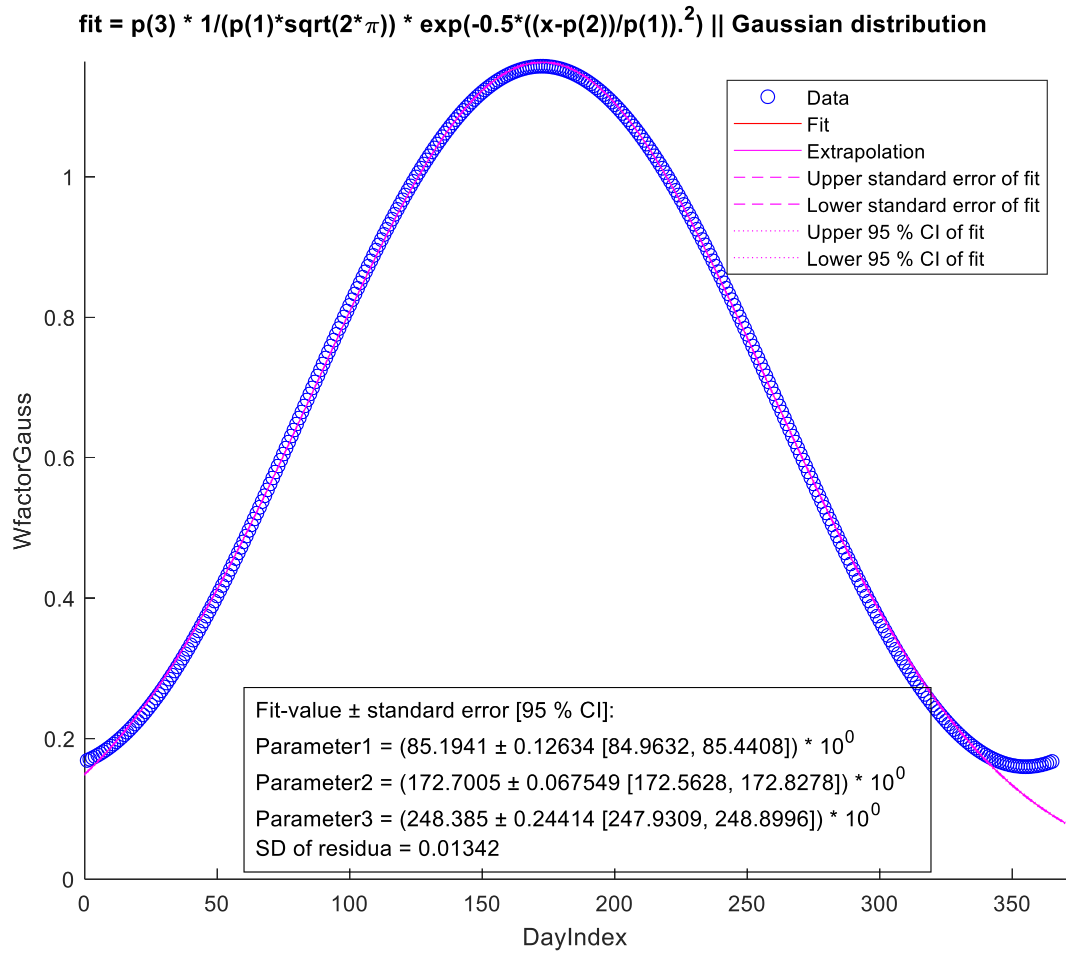
For difference between F(yreal²-ycalc²) to minimize derivate function and find local minima F by: F'(yreal²-ycalc²) == 0 as optimal assymptote

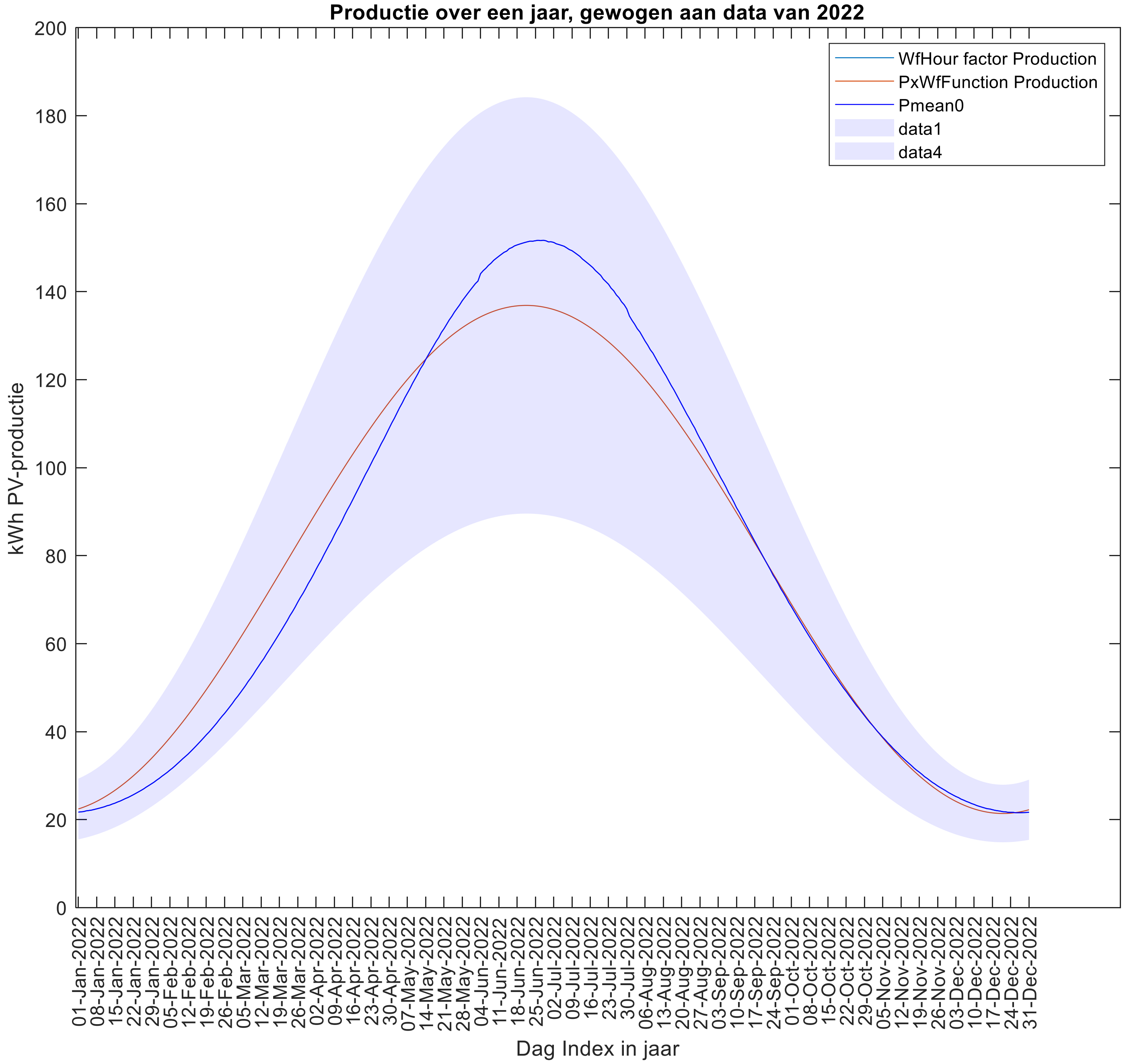
Input the real std(measured data) here instead

```
%%
% Plot the data, the fit, and the derivatives:

subplot(3,1,1)
plot(fit1,xdata,ydata) % cfit plot method
subplot(3,1,2)
plot(xdata,d1,'m') % double plot method
grid on
legend('1st derivative')
subplot(3,1,3)
plot(xdata,d2,'c') % double plot method
grid on
legend('2nd derivative')


%%
% Note that derivatives can also be computed and plotted directly with the
% cfit plot method, as follows.
% The plot method, however, does not return data on the derivatives.


plot(fit1,xdata,ydata,{'fit','deriv1','deriv2'})


%%
% Find the integral of the fit at the predictors:


int = integrate(fit1,xdata,0);


%%
% Plot the data, the fit, and the integral:


subplot(2,1,1)
plot(fit1,xdata,ydata) % cfit plot method
subplot(2,1,2)
plot(xdata,int,'m') % double plot method
grid on
legend('integral')


%%
% Note that integrals can also be computed and plotted directly with the
% cfit plot method, as follows.
% The plot method, however, does not return data on the integral.


plot(fit1,xdata,ydata,{'fit','integral'})
```

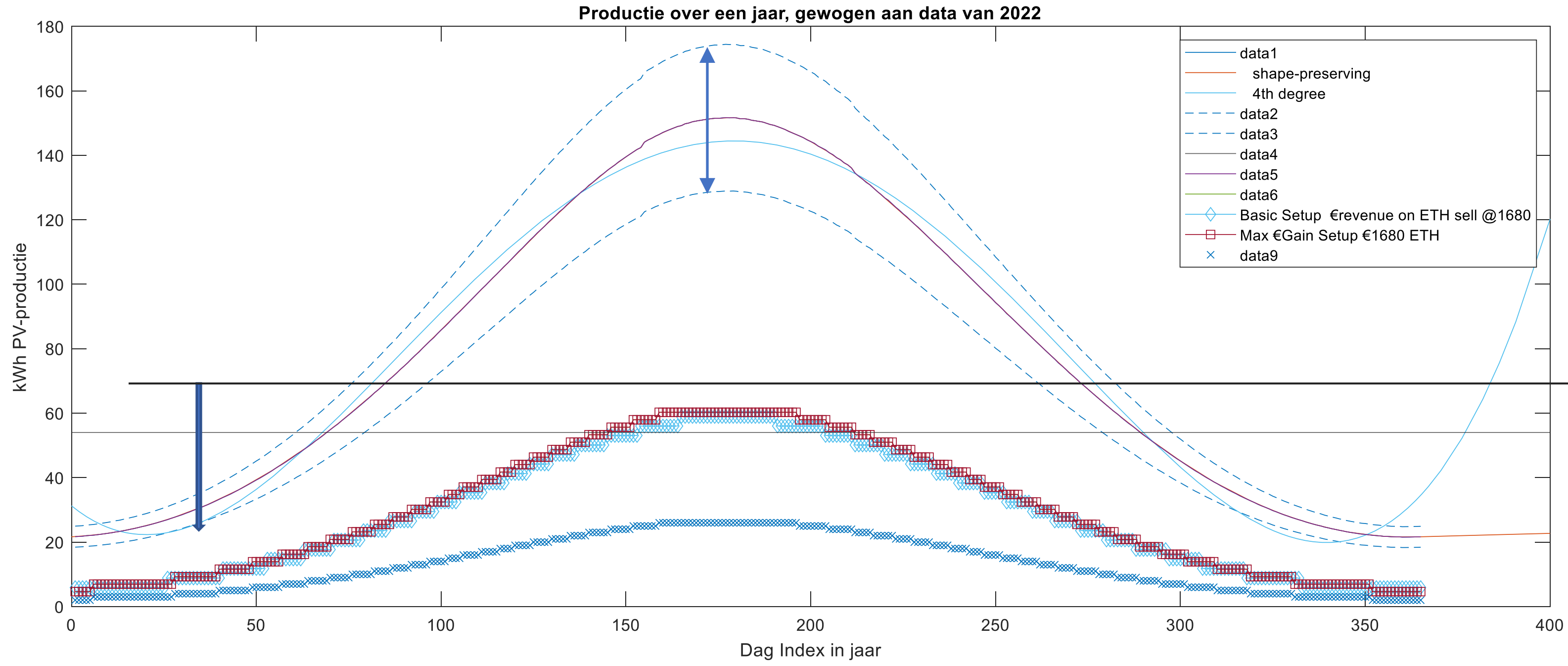
* There were only 211 days of data available, this is an example code on how to extrapolate the data based on the yearly day/night cycle

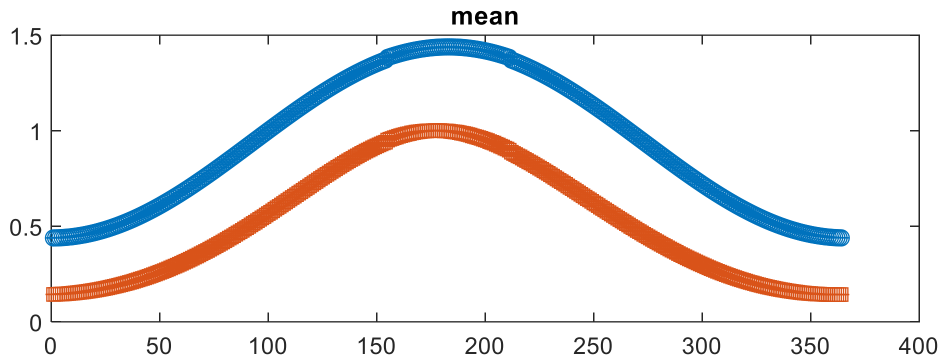
Set the day Index at 1 on 21 december last year. This overcomes inconvinient shifts required to place the gauss curve in the middle -> see next slide

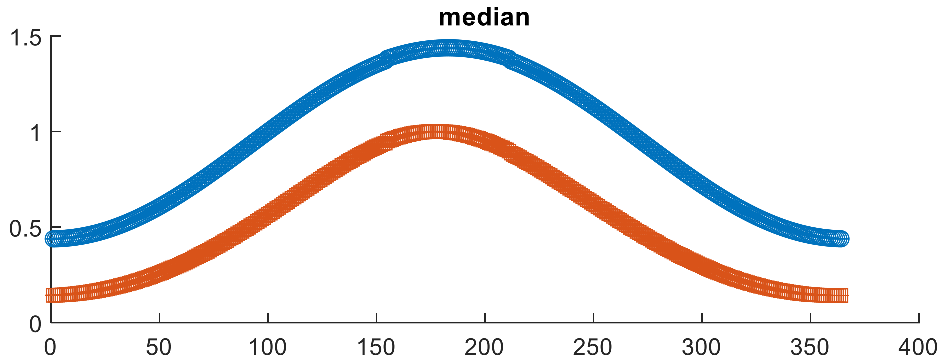




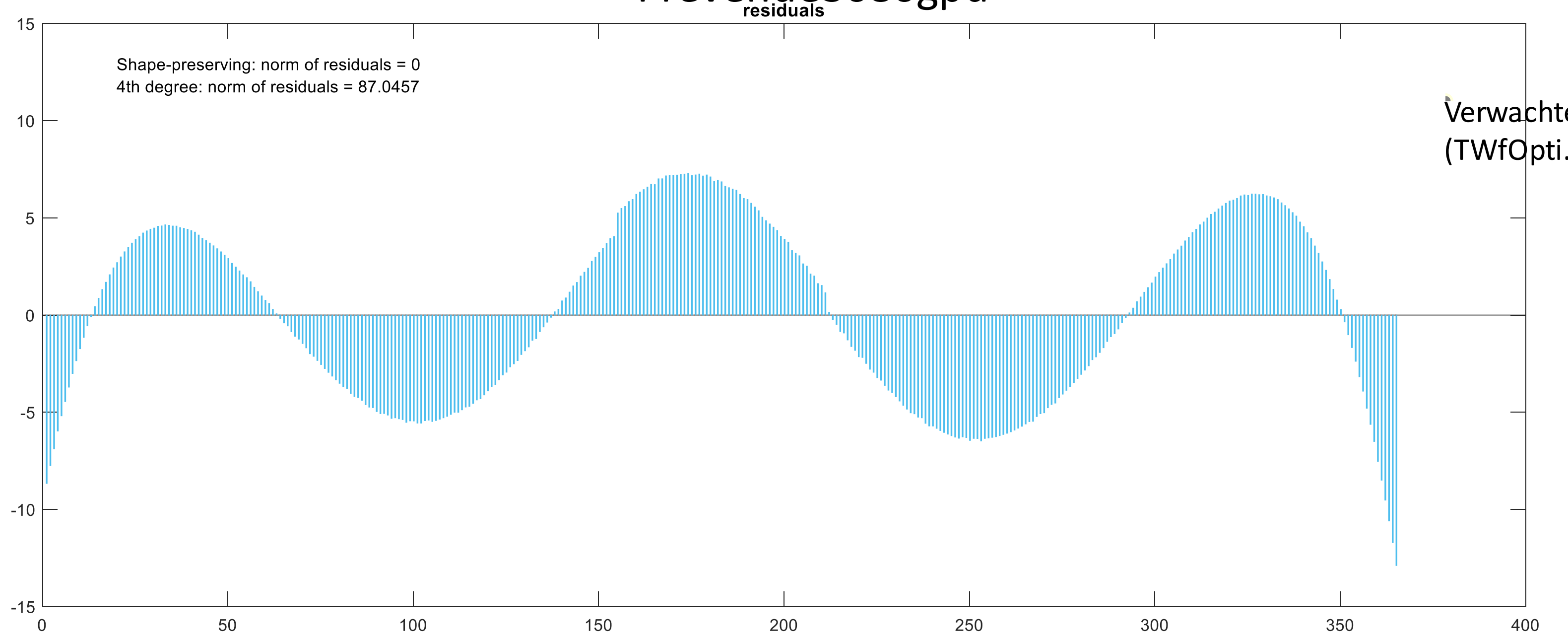
FunctionFittingGauss = 365 * 1/(135*sqrt(2*pi)) * exp(-0.5*((TWfOpti.DayIndex-182.5)/135).^2)



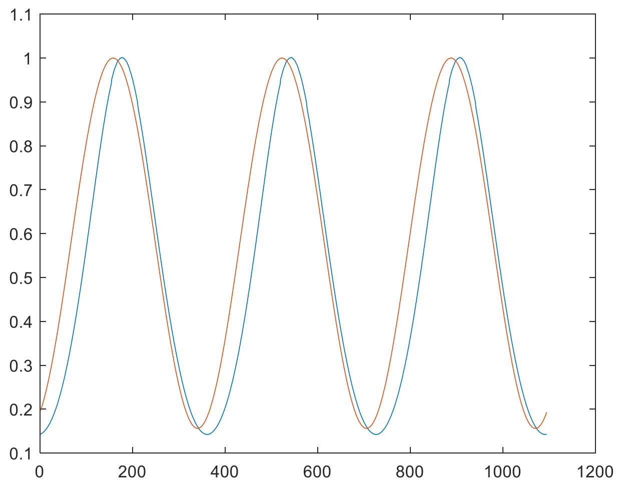


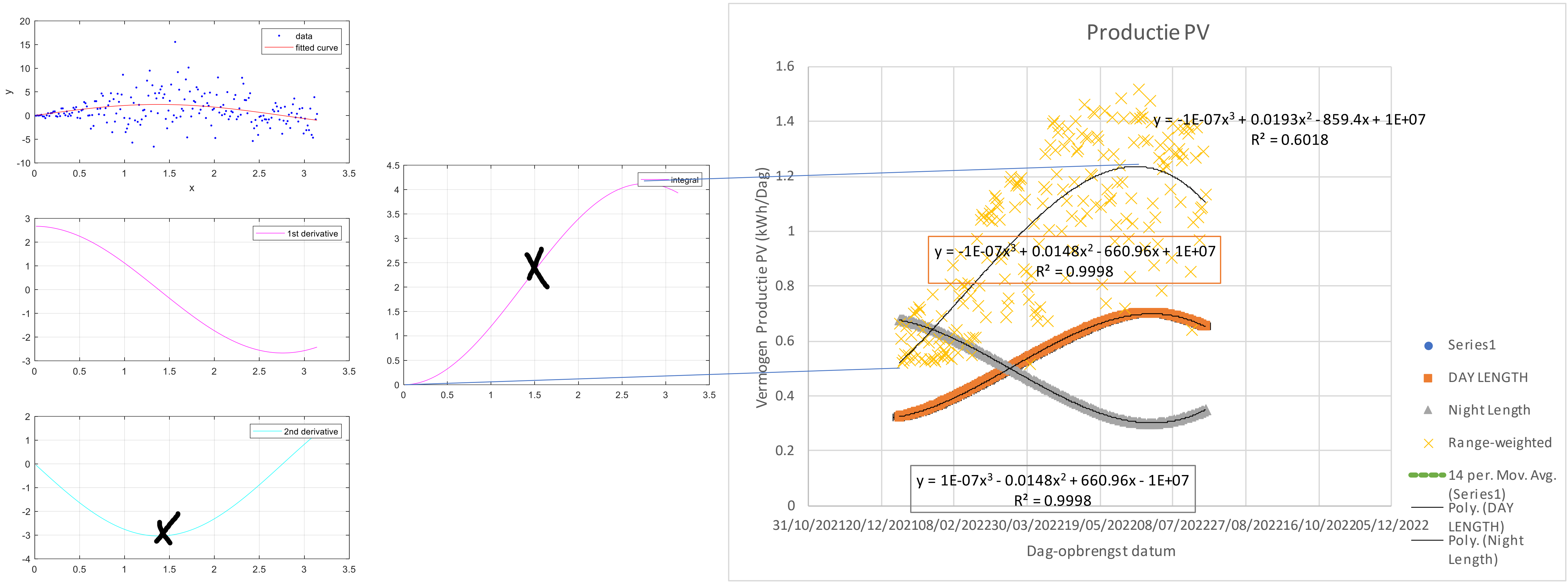


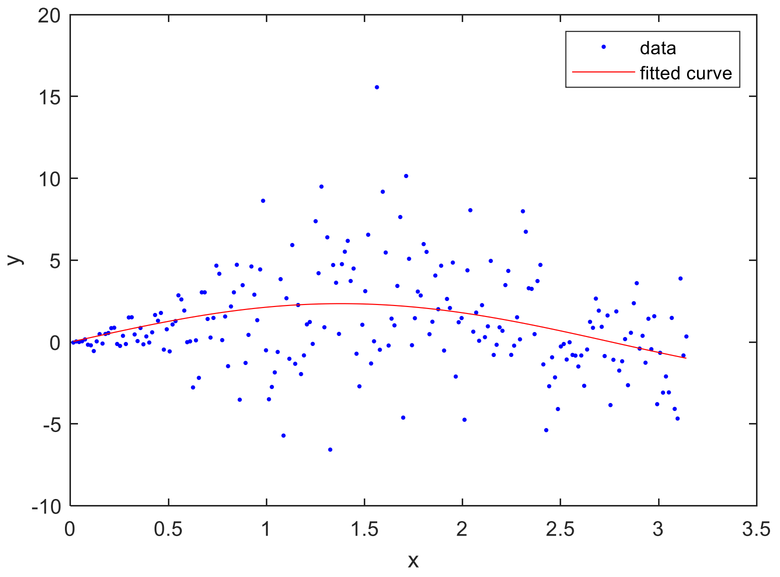
Prevenue3080gpu



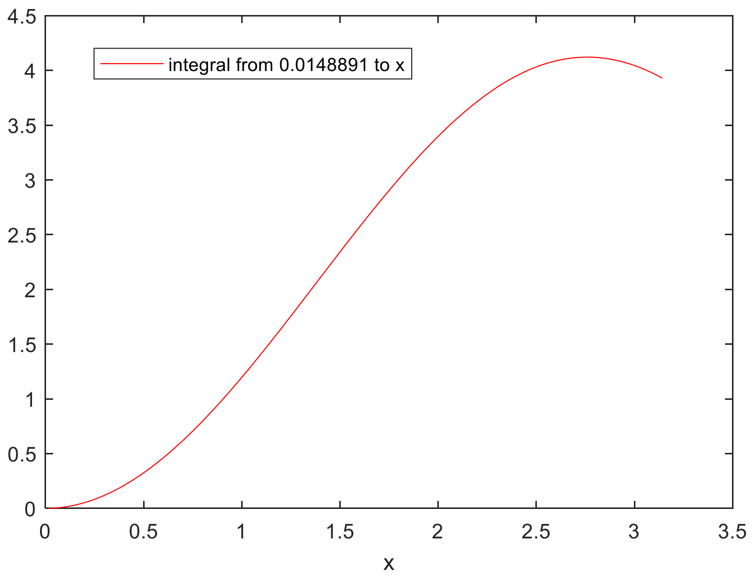
VerwachteDagOpbrengst = (TWfOpti.WfHourCorrect ./ SumWfHH)*WppYmeanHH*365*24;



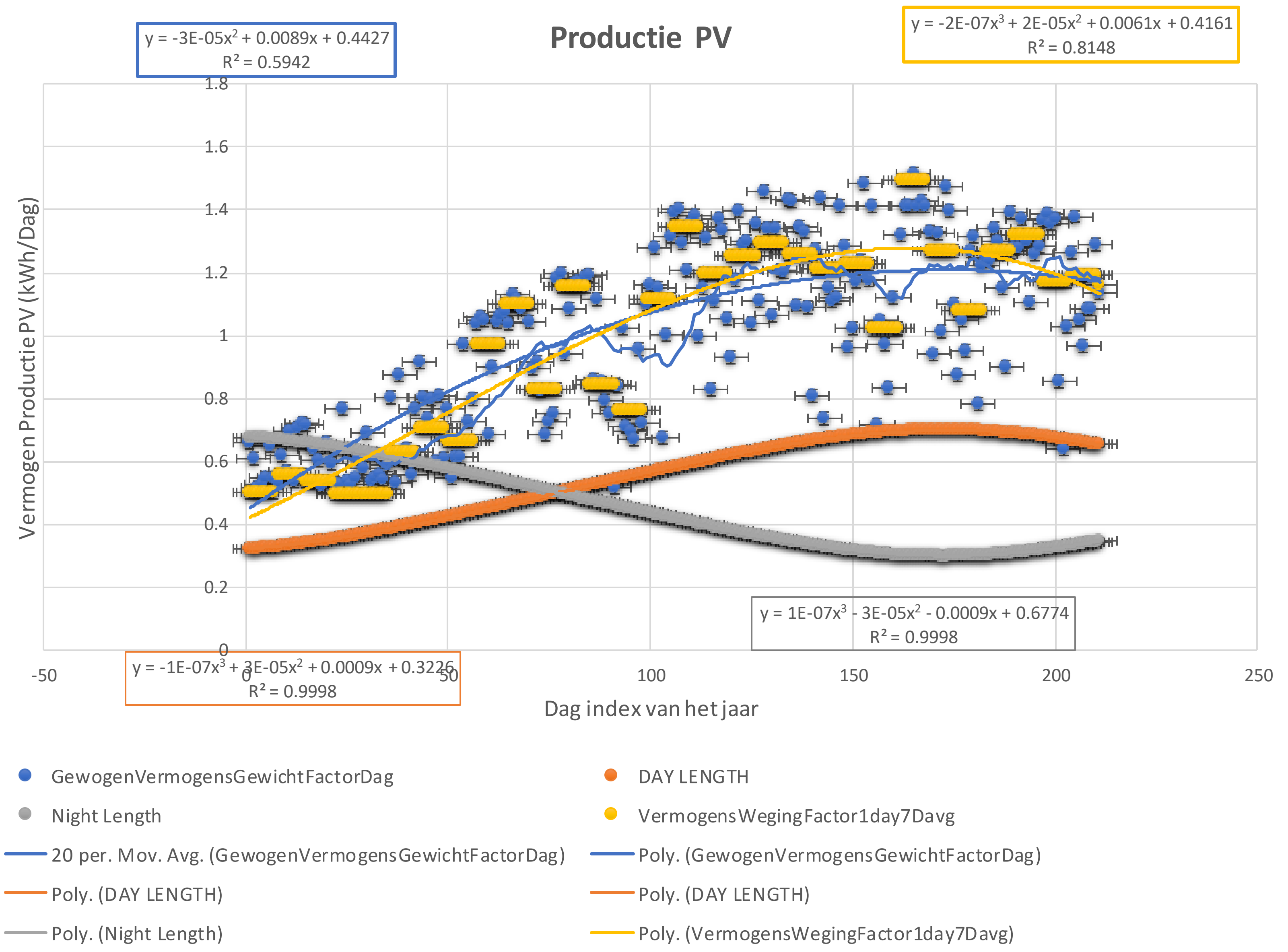

data
fitted curve
y
x
1st derivative
2nd derivative
integral
Productie PV
y = -1E-07x³ + 0.0193x² - 859.4x + 1E+07
R² = 0.6018
y = -1E-07x³ + 0.0148x² - 660.96x + 1E+07
R² = 0.9998
y = 1E-07x³ - 0.0148x² + 660.96x - 1E+07
R² = 0.9998
Vermogen Productie PV (kWh/Dag)
Dag-opbrengst datum
31/10/2021 20/12/2021 08/02/2022 30/03/2022 19/05/2022 08/07/2022 27/08/2022 16/10/2022 05/12/2022
Series1
DAY LENGTH
Night Length
Range-weighted
14 per. Mov. Avg. (Series1)
Poly. (DAY LENGTH)
Poly. (Night Length)



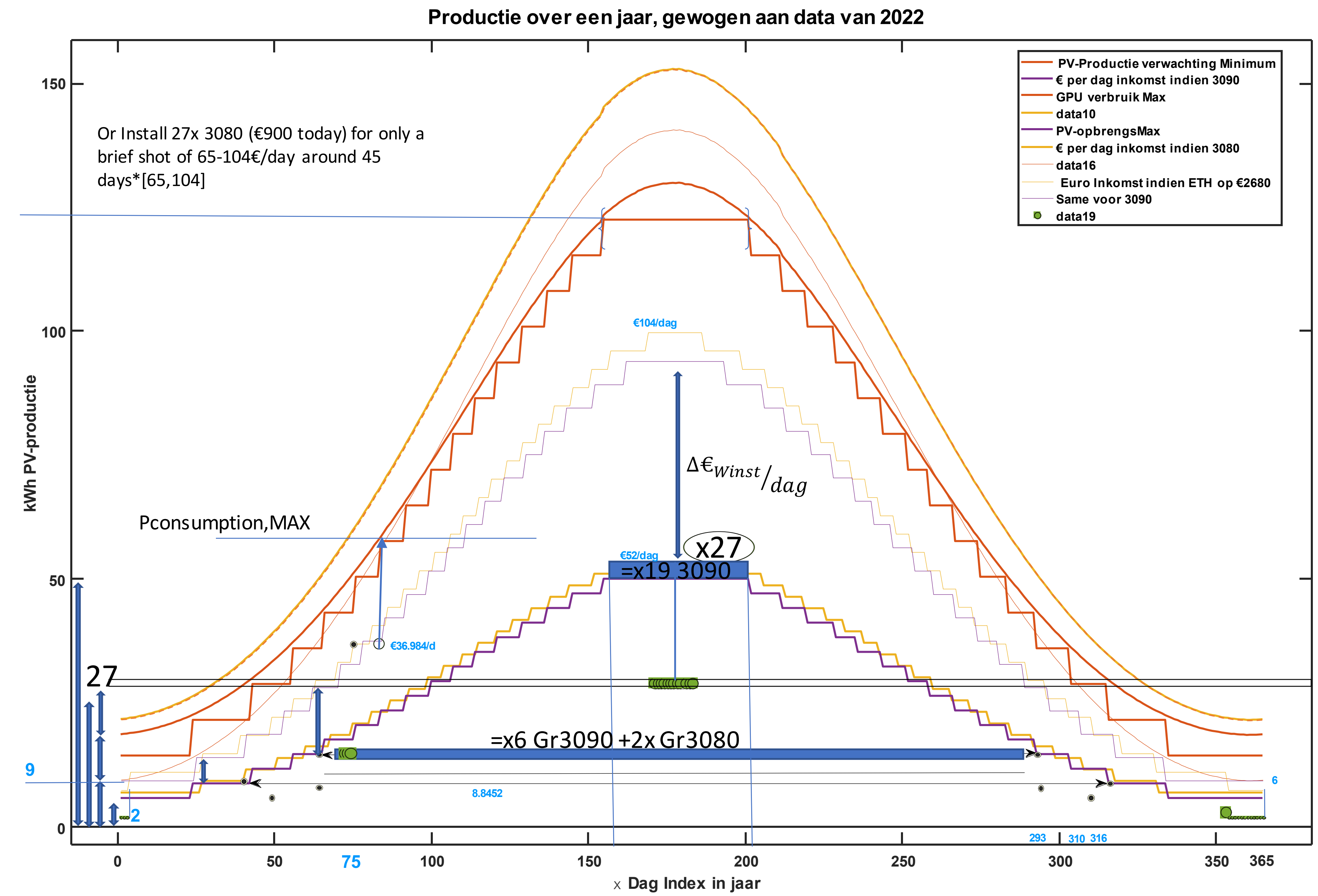
data
fitted curve
y
x



integral from 0.0148891 to x
x



Productie PV
y = -3E-05x² + 0.0089x + 0.4427
R² = 0.5942
y = -2E-07x³ + 2E-05x² + 0.0061x + 0.4161
R² = 0.8148
y = 1E-07x³ - 3E-05x² - 0.0009x + 0.6774
R² = 0.9998
y = -1E-07x³ + 3E-05x² + 0.0009x + 0.3226
R² = 0.9998
Vermogen Productie PV (kWh/Dag)
Dag index van het jaar
GewogenVermogensGewichtFactorDag
DAY LENGTH
Night Length
VermogensWegingFactor1day7Davg
20 per. Mov. Avg. (GewogenVermogensGewichtFactorDag)
Poly. (GewogenVermogensGewichtFactorDag)
Poly. (DAY LENGTH)
Poly. (DAY LENGTH)
Poly. (Night Length)
Poly. (VermogensWegingFactor1day7Davg)



Optimizing GPU Allocation on Motherboards

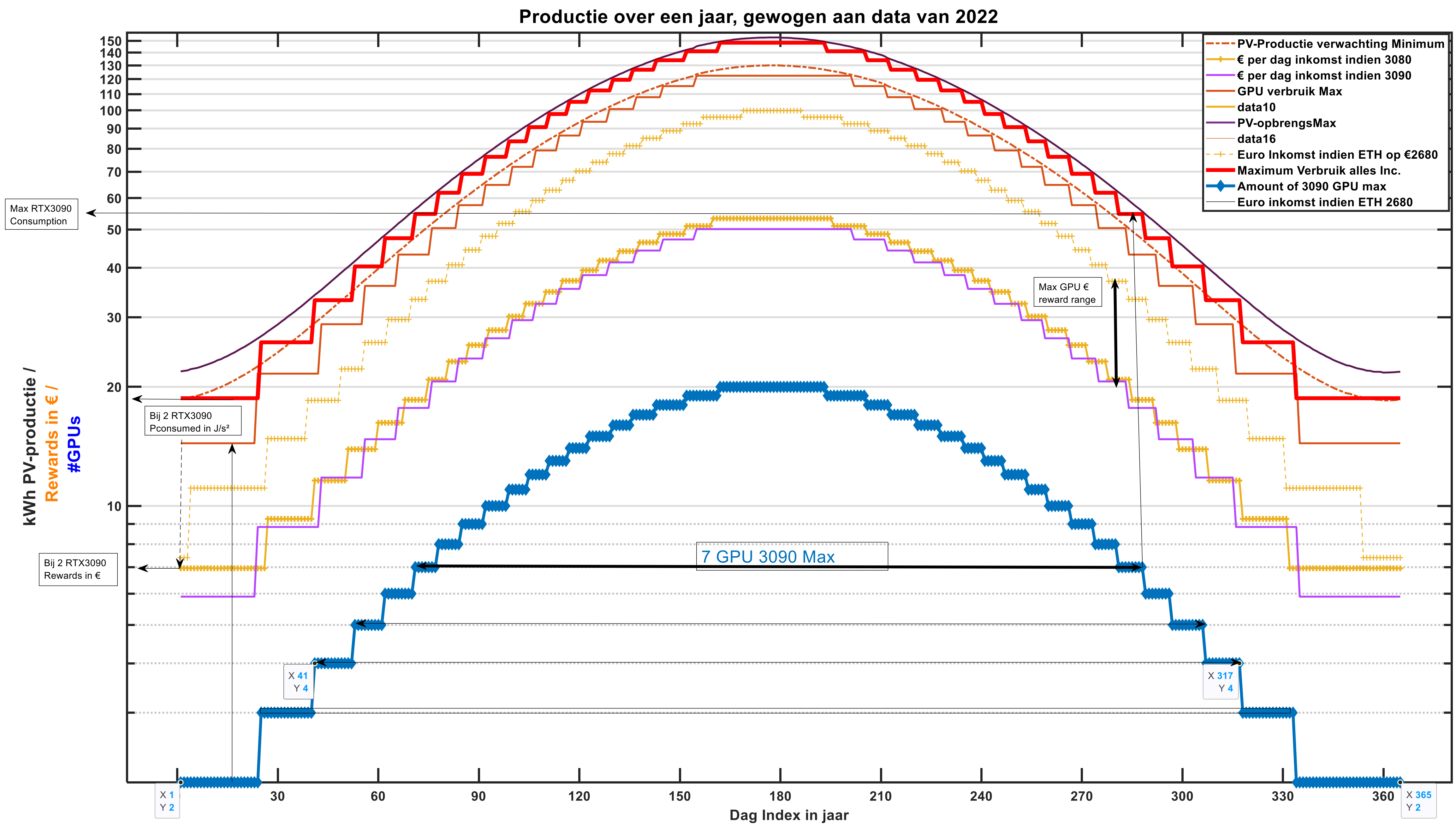
- Baseline Consumption Awareness: It's crucial to be mindful of the baseline power consumption when configuring GPUs.

- Mainboard Capacity: Each mainboard has a finite capacity for GPUs.
Safety Considerations: Ensure a secure quantity of GPUs is allocated to prevent overloading the motherboard.

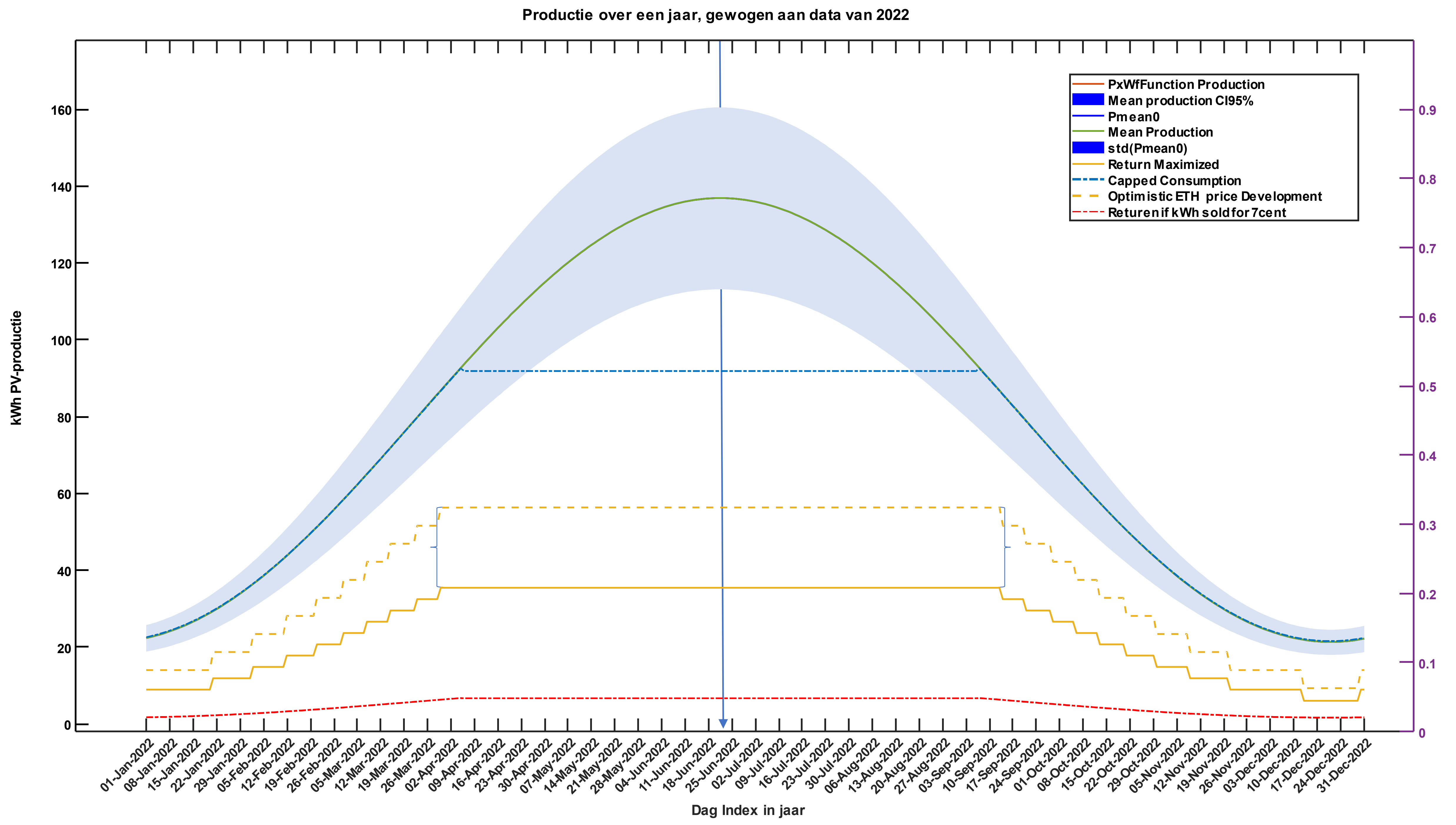
- Winter Power Modulation: In colder months, 27 GPUs may optimistically require as few as 6 motherboards, impacting the baseline consumption by approximately 90-120W.

- Conclusion: Maximizing the number of efficiently fitted GPUs on fewer motherboards likely offers the best return-to-cost ratio.

- Size matters, too big is too big and w ill fail.. E.g. 900€ implying 8 GPU per motherboard (€280 + I3 processor & RAM = €450) implies that the initial investment is € 26000-30000 for 45 days in a year the yield based on this prognosis is €4500-9000 in this period.
- => it takes much longer and a lot more optmization w ork as input to yield maybe the optimized



Productie over een jaar, gewogen aan data van 2022
PV-Productie verwachting Minimum
€ per dag inkomst indien 3080
€ per dag inkomst indien 3090
GPU verbruik Max
data10
PV-opbrengsMax
data16
Euro Inkomst indien ETH op €2680
Maximum Verbruik alles Inc.
Amount of 3090 GPU max
Euro inkomst indien ETH 2680
Max RTX3090 Consumption
Bij 2 RTX3090 Pconsumed in J/s²
Bij 2 RTX3090 Rewards in €
Max GPU € reward range
7 GPU 3090 Max
X 41 Y 4
X 317 Y 4
X 1 Y 2
X 365 Y 2
kWh PV-productie / Rewards in € / #GPUs
Dag Index in jaar


Productie over een jaar, gewogen aan data van 2022
kWh PV-productie
Dag Index in jaar
PxWfFunction Production
Mean production CI95%
Pmean0
Mean Production
std(Pmean0)
Return Maximized
Capped Consumption
Optimistic ETH price Development
Returen if kWh sold for 7cent
0
20
40
60
80
100
120
140
160
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
01-Jan-2022
08-Jan-2022
15-Jan-2022
22-Jan-2022
29-Jan-2022
05-Feb-2022
12-Feb-2022
19-Feb-2022
26-Feb-2022
05-Mar-2022
12-Mar-2022
19-Mar-2022
26-Mar-2022
02-Apr-2022
09-Apr-2022
16-Apr-2022
23-Apr-2022
30-Apr-2022
07-May-2022
14-May-2022
21-May-2022
28-May-2022
04-Jun-2022
11-Jun-2022
18-Jun-2022
25-Jun-2022
02-Jul-2022
09-Jul-2022
16-Jul-2022
23-Jul-2022
30-Jul-2022
06-Aug-2022
13-Aug-2022
20-Aug-2022
27-Aug-2022
03-Sep-2022
10-Sep-2022
17-Sep-2022
24-Sep-2022
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
05-Nov-2022
12-Nov-2022
19-Nov-2022
26-Nov-2022
03-Dec-2022
10-Dec-2022
17-Dec-2022
24-Dec-2022
31-Dec-2022

Considerations Tech and Crypto Investments

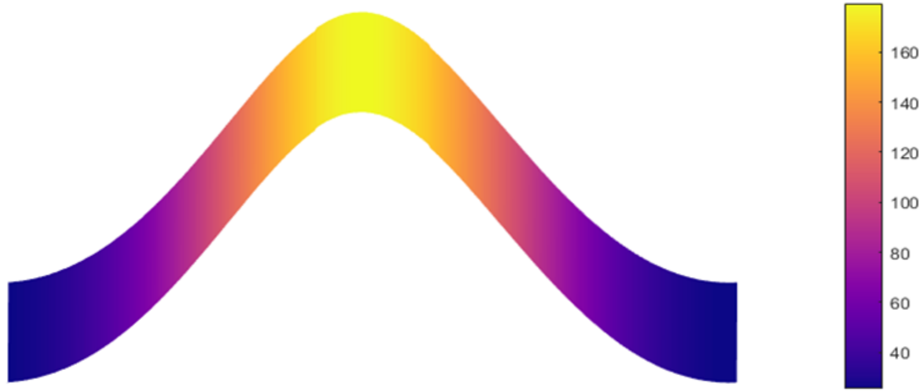
1. **Security Measures**: Assess the security implications of using Wake On Lan (WOL) for remote management of Ubuntu OS across diverse WLAN/LAN ports.

2. **Market Trends**: Stay informed about the Proof of Stake (PoS) adoption in cryptocurrency markets:
   - PoS full adoption could undermine current operating models.
   - Bitcoin's reliance on Proof of Work (PoW) secures its market position, pending miner reward depletion.

3. **Economic Forecasting**:
   - Prepare for potential economic shifts due to Bitcoin’s PoW model in a superinflationary context.
   - Anticipate changes when miner rewards diminish, impacting the deflationary nature of the currency.

4. **Financial Planning**:
   - Consider investment costs between €7000-€10000 for a 213-day option on 6-7 GPU RTX 3090s + 2 GPU RTX 3080s.
   - Adjust power usage of lower Watt GPUs in response to significant winter energy shortages.
   - Monitor Ethereum's price, particularly if it approaches the €6000 all-time high (ATH)

Prognosis lifetime: 12-15y for both panels and GPUs



To do's

Optimization Tasks for GPU Utilization and Computational Demand

Differential Equation Resolution:
- Determine the optimal combination of Nvidia RTX 3080 and 3090 GPUs for maximum profit efficiency, measured in delta € per delta kWh.
- Initial configuration to test: 7x RTX 3090 + 2x RTX 3080 GPUs.

Market Research:
- Investigate the current shortage of graphical computing power, focusing on molecular modeling within institutional frameworks.
- Understand how this shortage impacts demand and supply dynamics.

Versatility and Application:
- Assess the flexibility of GPU power for various computational tasks beyond graphics, considering the limitations when using ASICs (Application-Specific Integrated Circuits).

Feasibility Analysis:
- Conduct a feasibility study on the proposed GPU configurations under current energy consumption constraints and economic models.
- Evaluate potential alternative uses and ROI for computational power in case of market shifts.

So why do we care….

The Undervalued Power of Graphical Computing

1. **Immediate Value Creation**:
    1. Understanding that purchasing assets like GPUs can generate immediate returns in kWh, offering quick ROI.
2. **Accelerated Payback**:
    1. A methodological approach can reduce the ROI period from the conventional 8-13 years to just 2-3 years.
3. **Energy as Currency**:
    1. Recognizing kWh as an intrinsic asset whose value has been overshadowed by a lack of awareness.
4. **Computing as an Asset**:
    1. Reevaluating graphical computing power as an underappreciated asset with substantial value and utility.
5. **Vision for Self-Sustainability**:
    1. The pursuit of self-sustained living through smart integration of technology is not only viable but necessary in the 21st century.

Caring about the environment can be a profitable cause ☺