ENERGY DATA HACKDAYS

Real-Time Grid Load Visualization and Consumer Impact Analysis



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Real-Time Grid Load Visualization and Consumer Impact Analysis

Motivation:

- Consumers often contribute unknowingly to grid overloads and peaks → **higher costs and inefficiencies**.
- If end-users see when they're contributing to peaks → empowered and motivated to reduce energy costs and aid grid stability → energy systems more sustainable.

Goal: Consumer Awareness & Reducing Grid Peaks

- Visualize the grid loads and peaks using data from Smart meter & grid measurement
- Understand their energy consumption and contribution to overall grid load and how it affects peaks and costs.

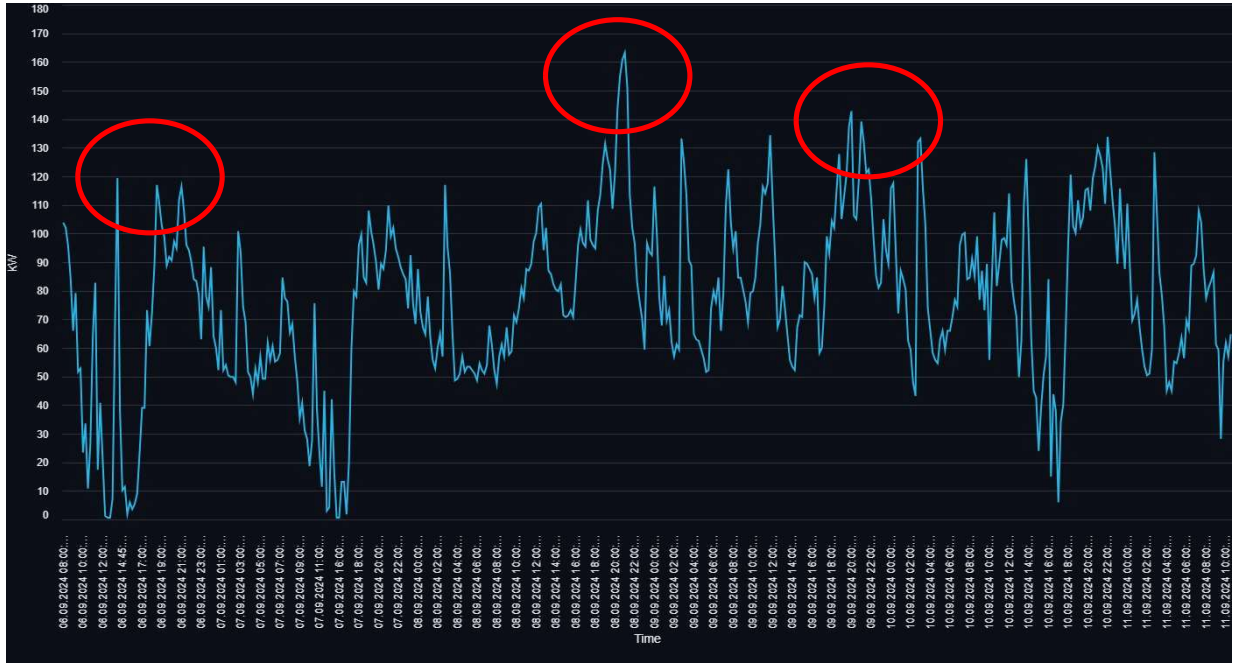
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Challenges and solutions

Goal: To avoid peaks before they occur.

- How do we identify and measure peaks in real time?

- Grid Load Visualisation



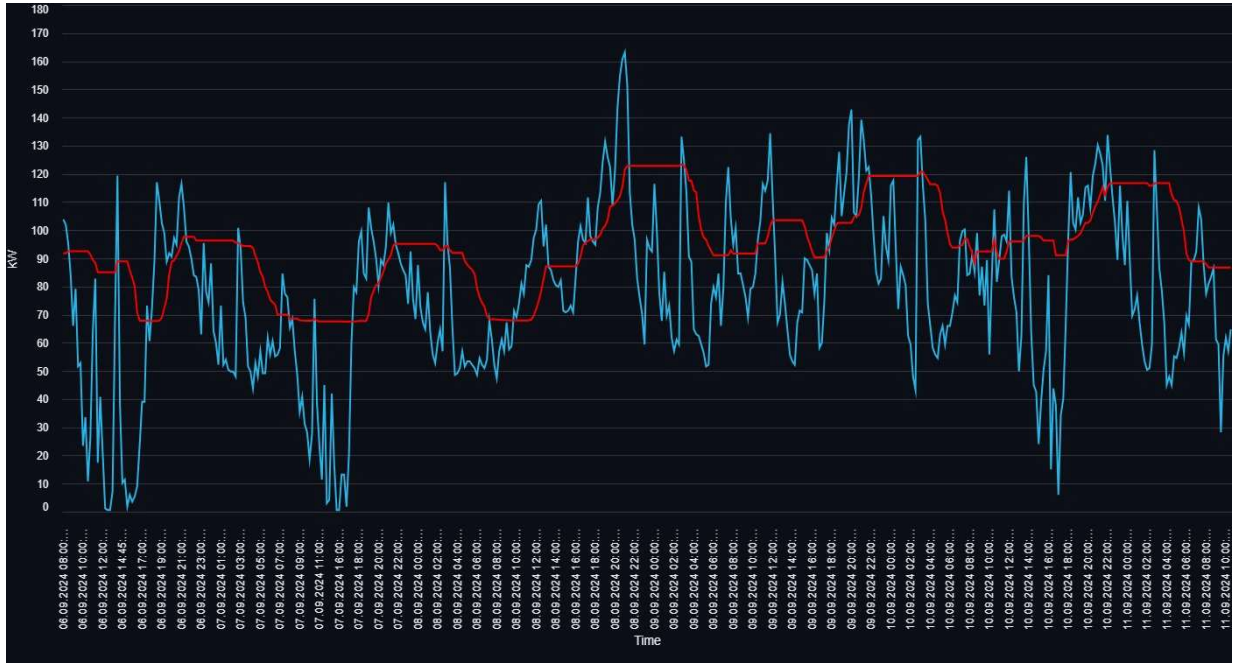
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Challenges and solutions

- Dynamic threshold for peaks
- Threshold is the 75th quantile of the past 8 h,
- Lower-bounded with the average over the past 7 days

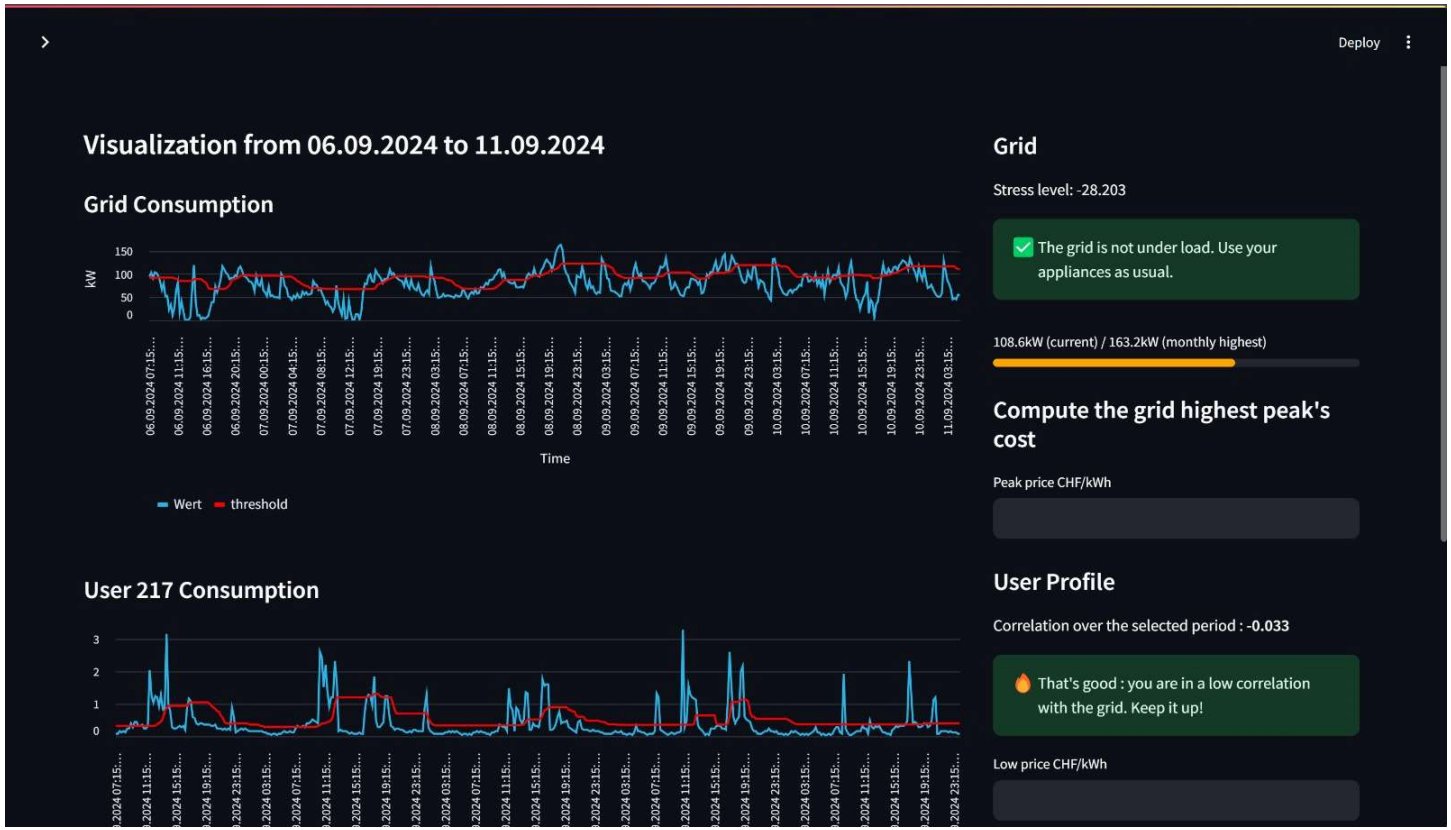
Threshold = max{Q_{75}(8h), P_{avg}(7 days)}

- Grid Load Visualisation



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Visual Interface



Visual Interface



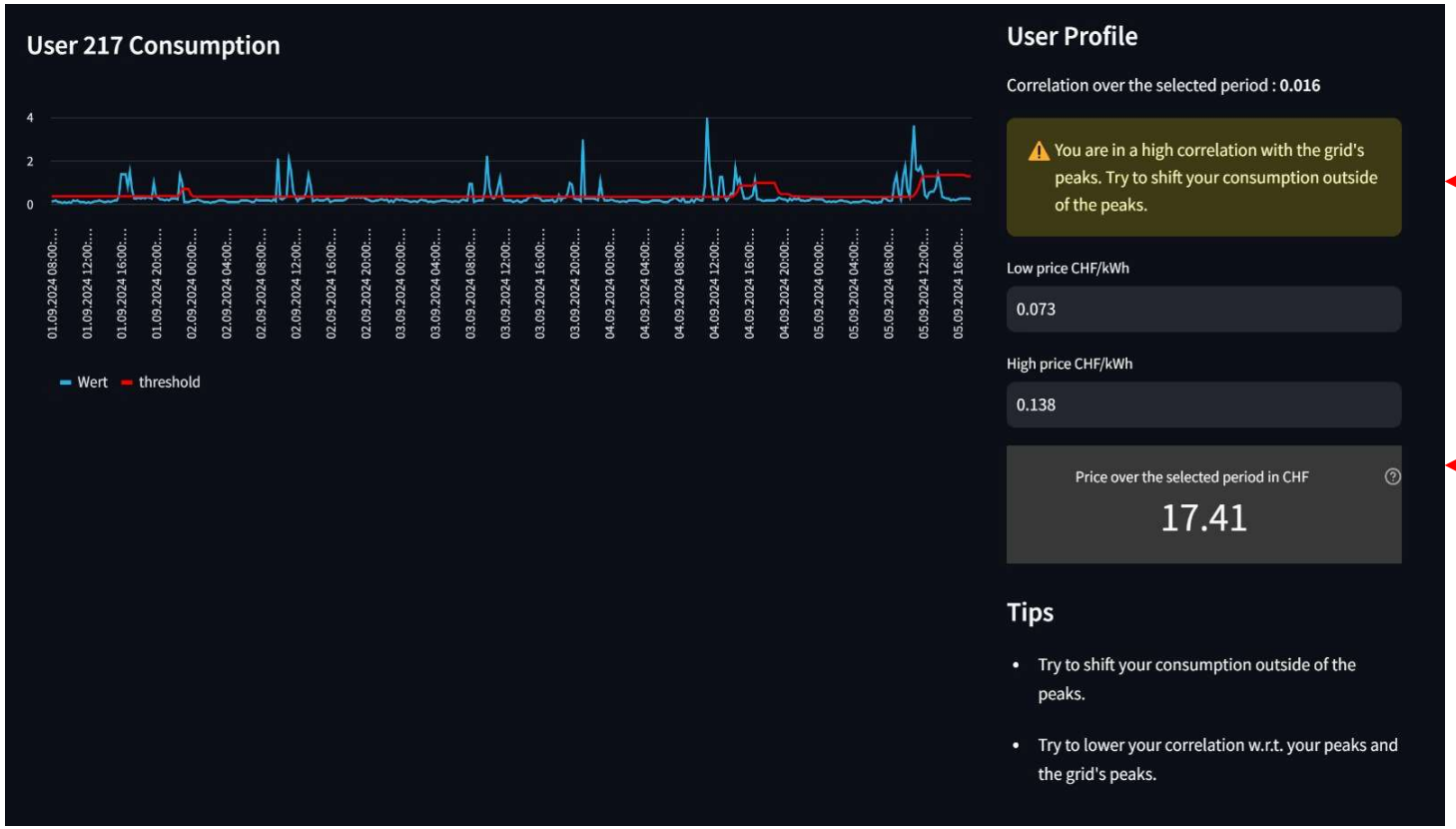
Alerts

Closeness to the peak

Current peak price and costs

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Visual Interface

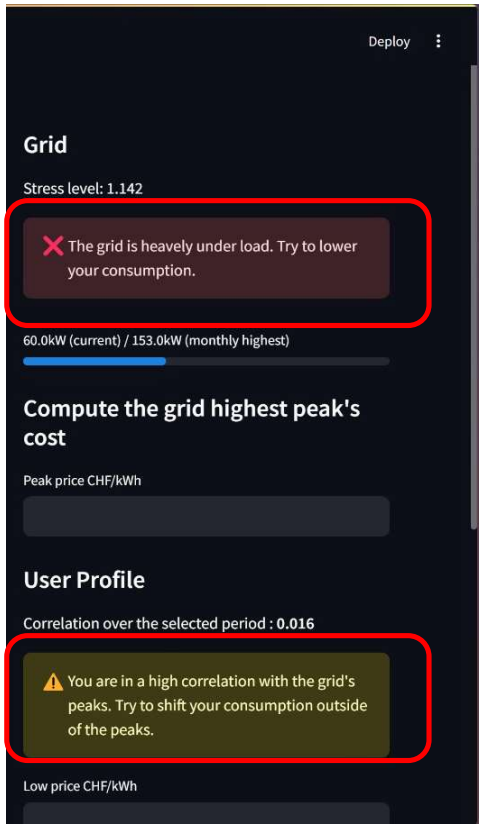


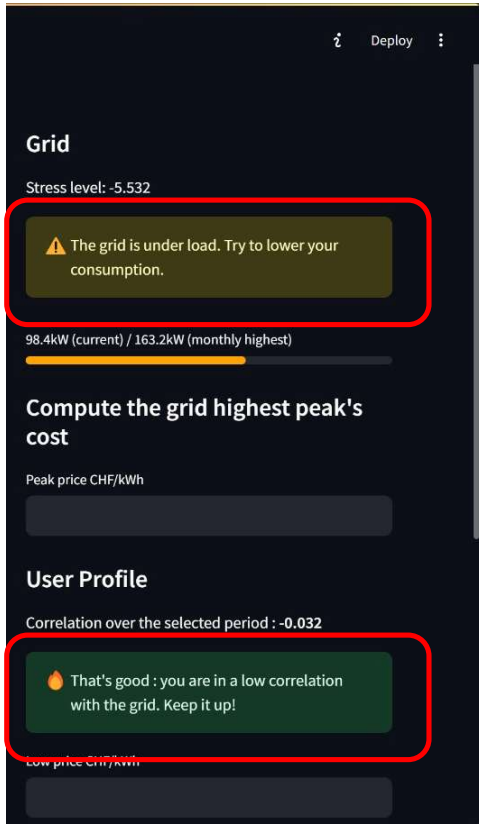
Correlation to grid

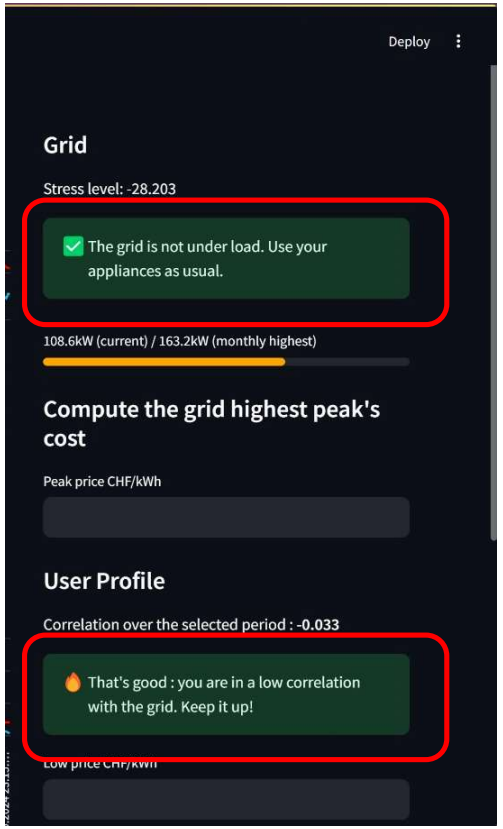
Current energy costs

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Grid Load Alerts







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Demo – User Interface

[Traffic Signal (mardawa.github.io)]

