

Data Interpretation

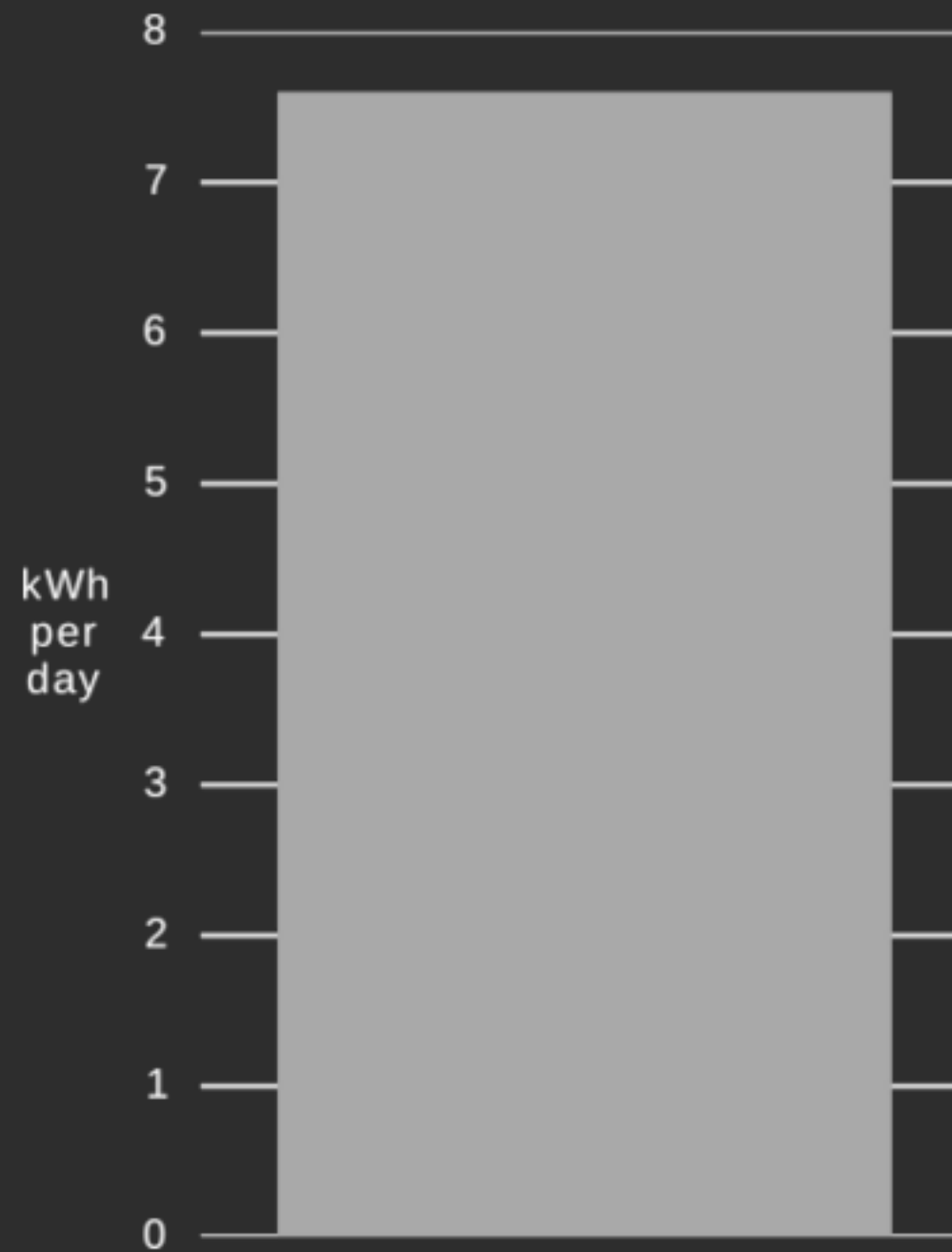
Energy Disaggregation

Jack Kelly

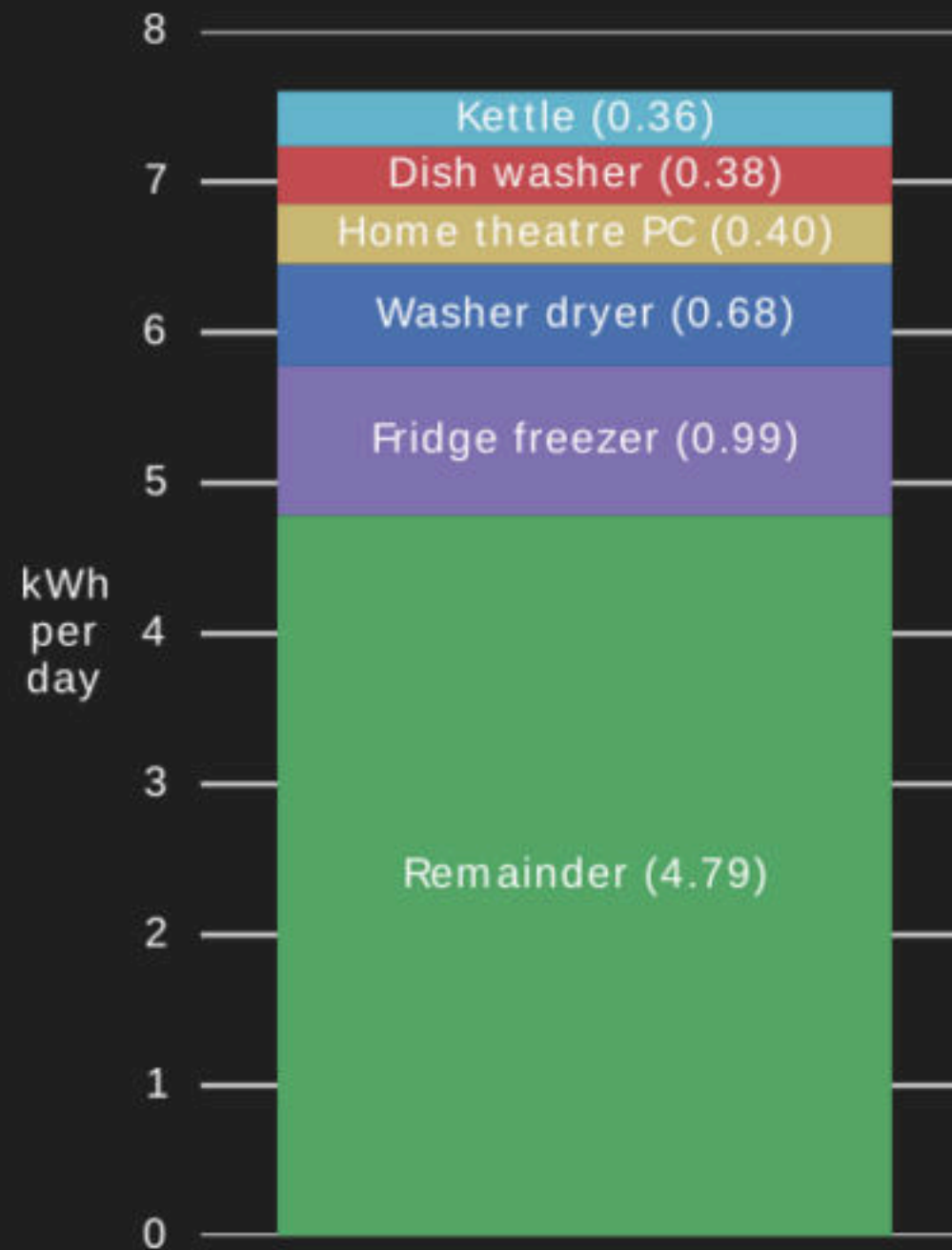
jack.kelly@imperial.ac.uk

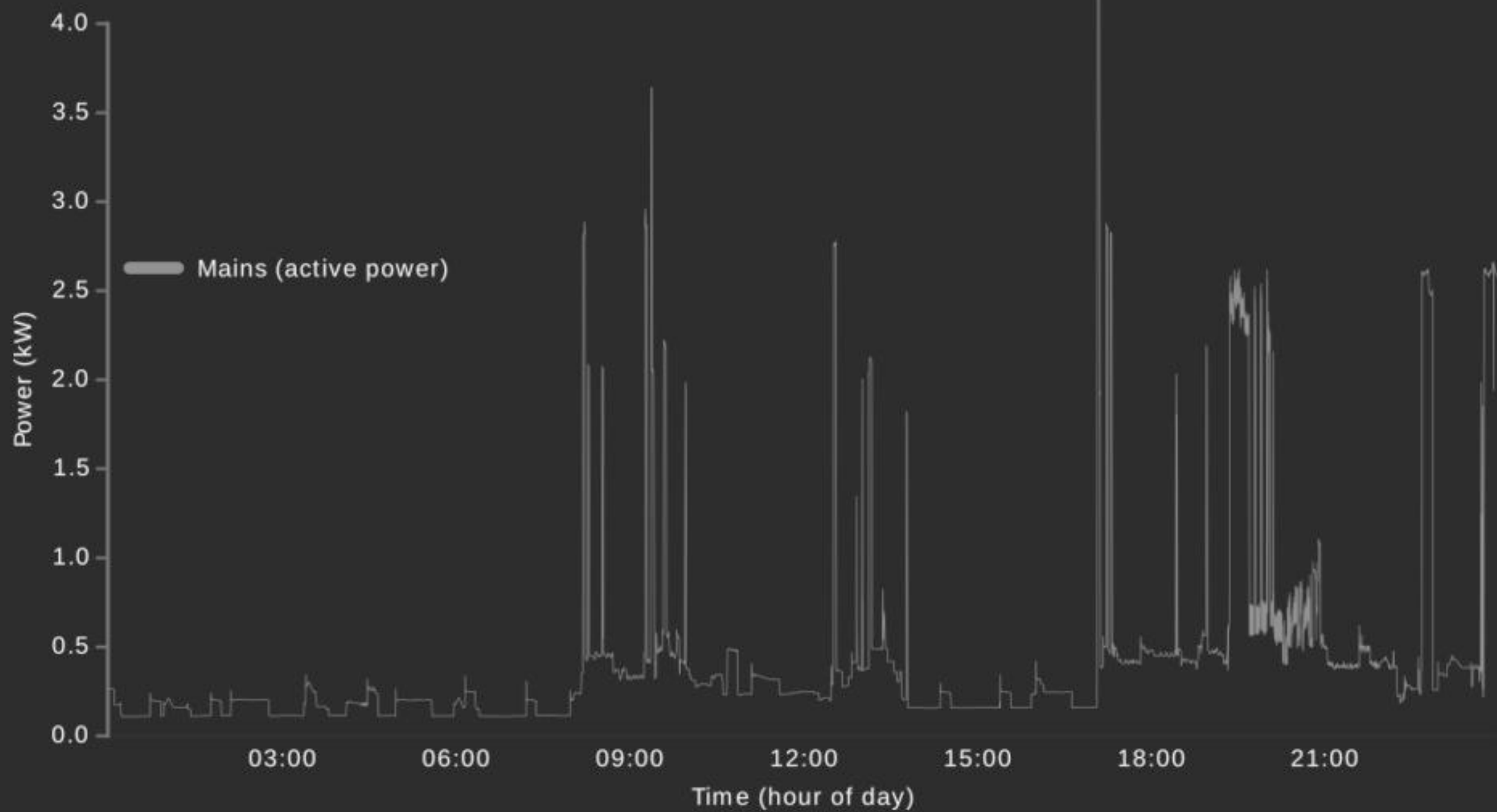
What is Energy Disaggregation?

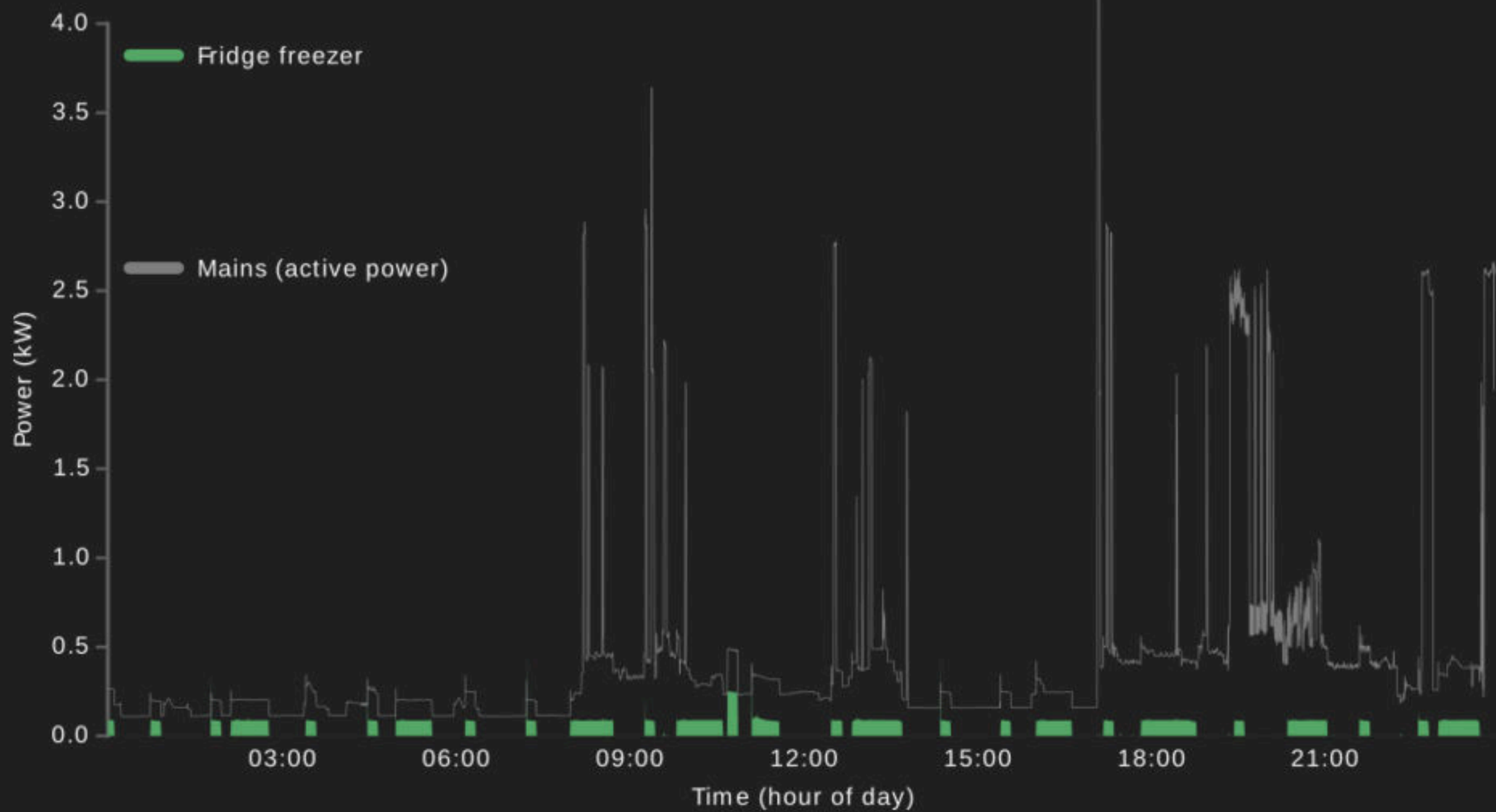
Aggregate Energy Bill

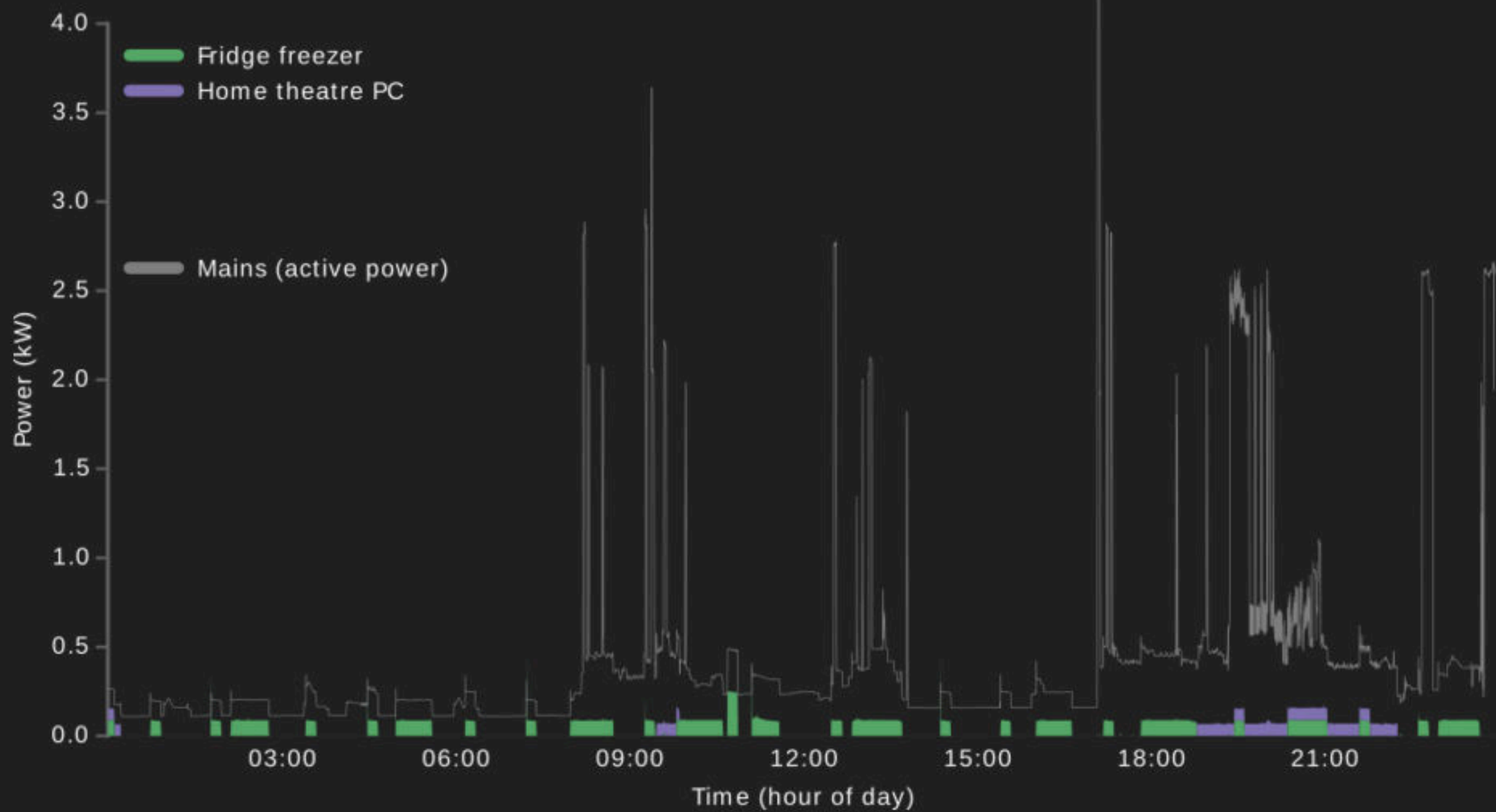


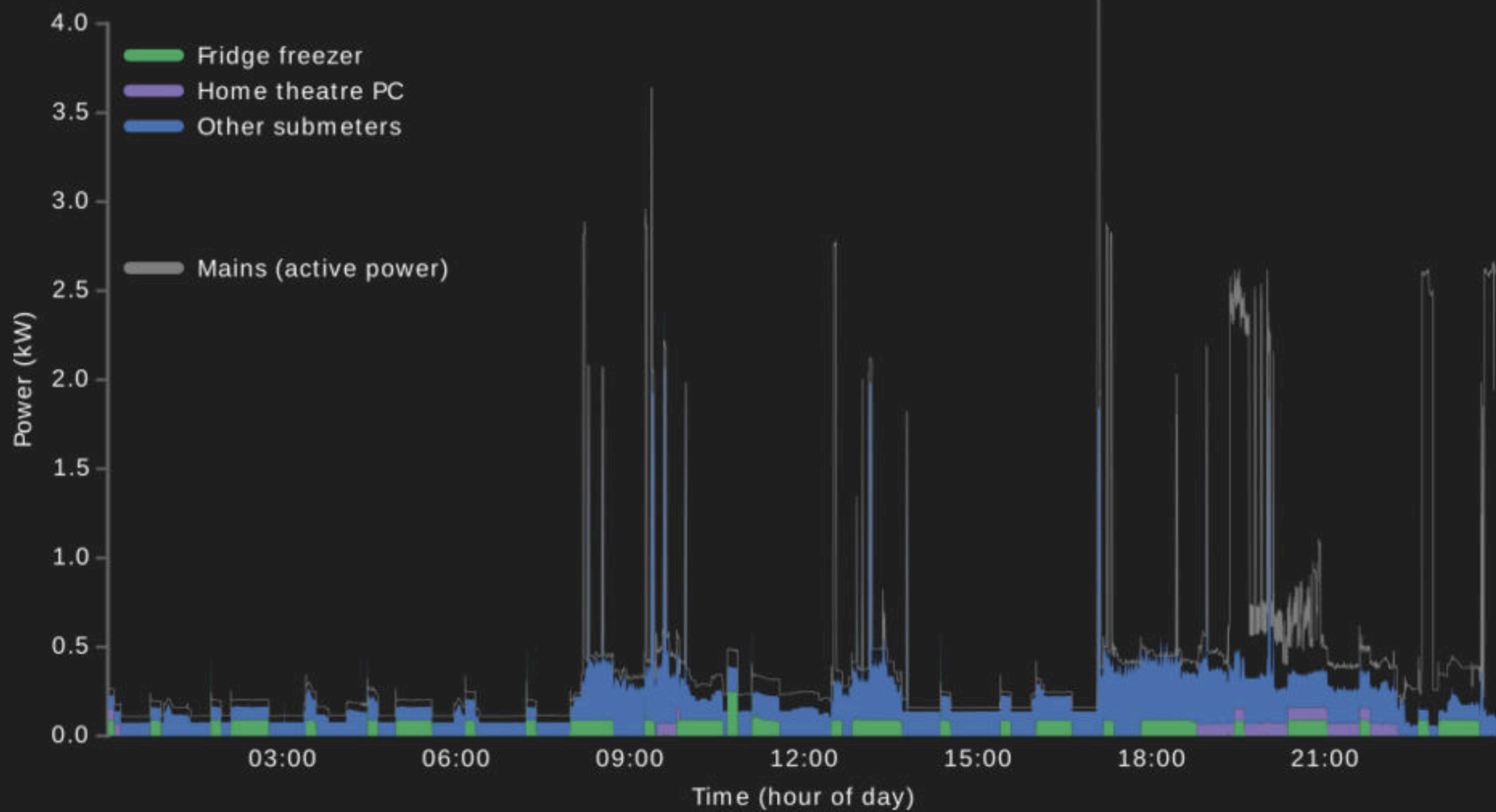
Itemised Energy Bill

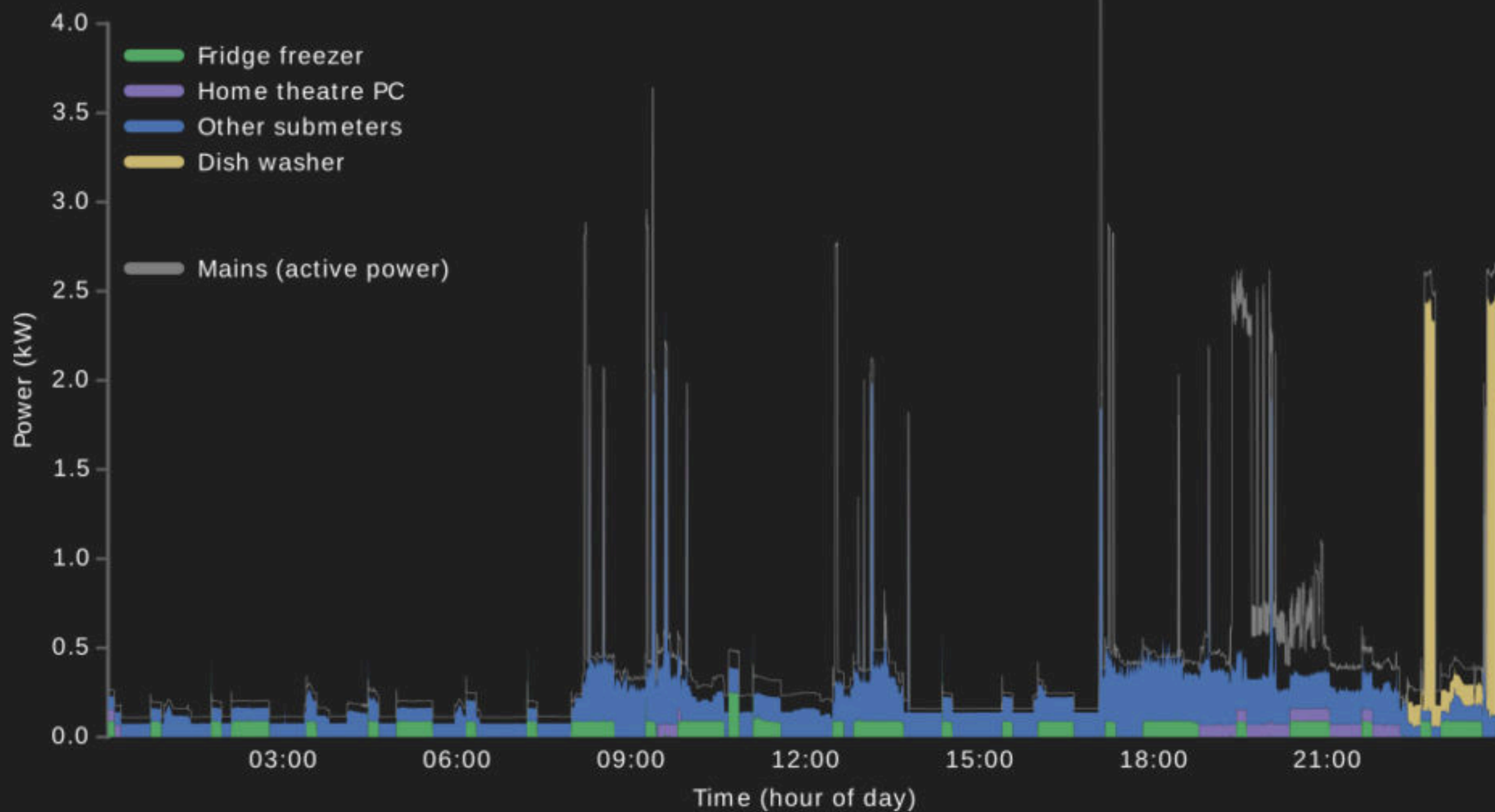


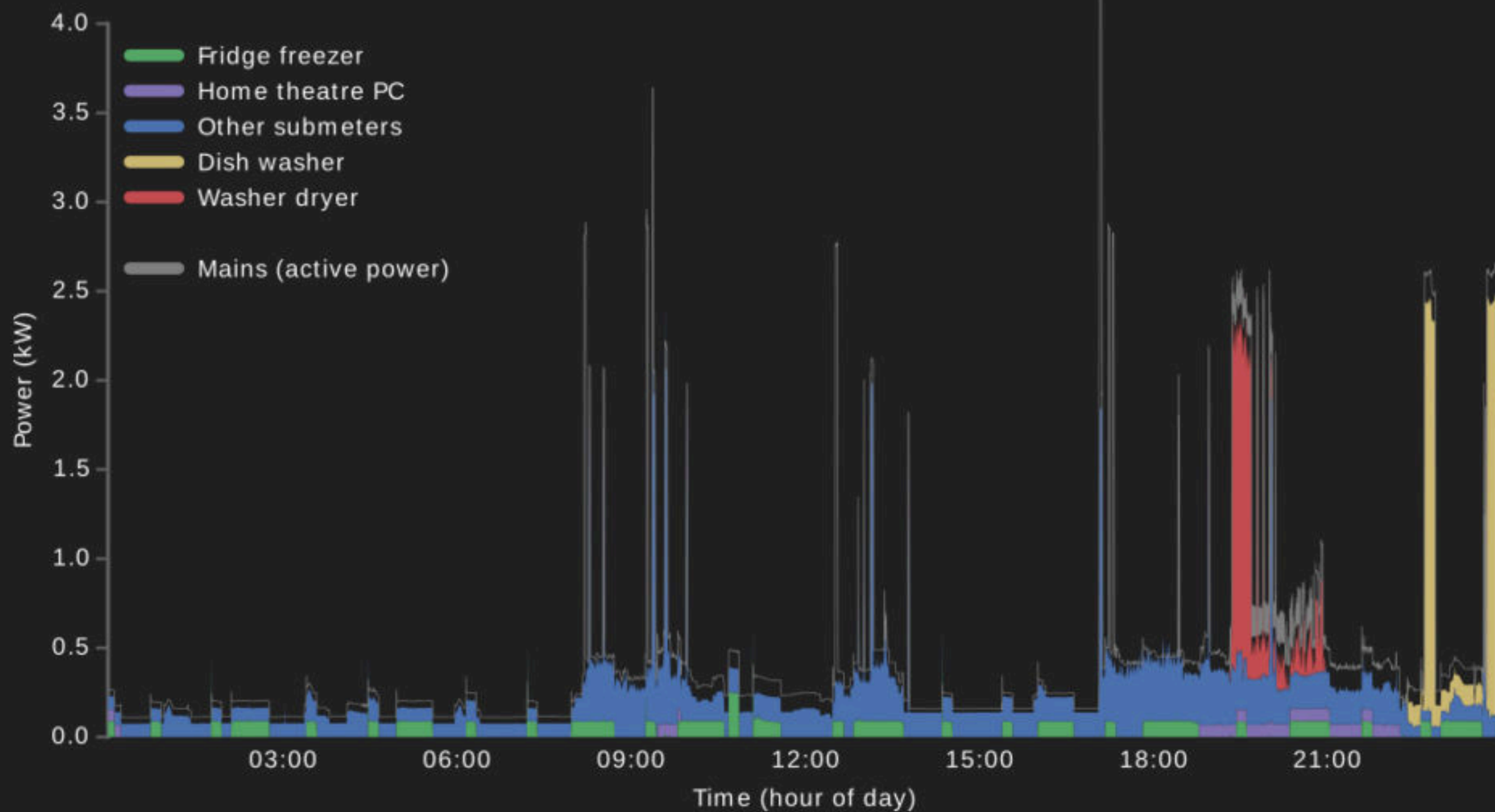


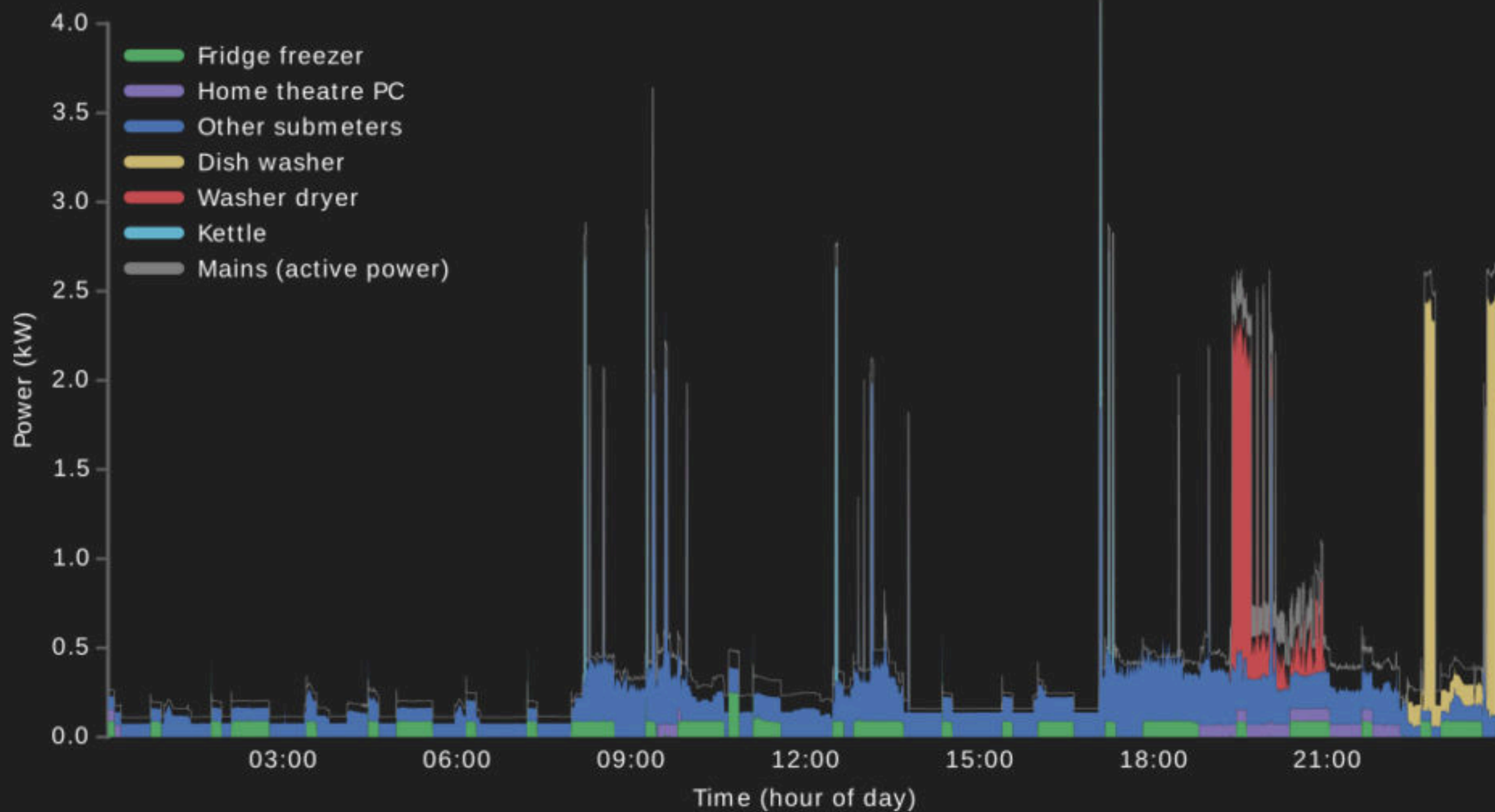












Why bother with disaggregation?

2 1 7 7 9 3

10,000 1,000 100 10 1 1/10

kWh



GEC
METERS
MADE IN UK

TYPE C11B2A-H

20-80 A 240V 50Hz

1PH 2W

BS5685 Cl. 2
200 rev/kWh



K94C43412

(1994)

PROPERTY OF SOUTHERN ELECTRIC plc

CERTIFIED
11
94

METERUS

T₂ E.T.2 00000467
L kWh



Display
Cycle



1000 Imp/kWh



1000 Imp/kWh



TYPE 83330-3IHA

EN 50470-3 Cl. B

3 x 230/400V

0,25-5(80)A

50Hz

IEC 62053-23 Cl. 2

-40 °C to +70 °C

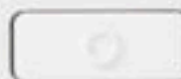
Uc = 230V Ic = 2A

Op. Res. = 10 Yrs

CE M07 0122 T10072



2007



LW00595428

Netwerk Energie Services
Verenigde Staten

GB Smart Meter Roll-out

- All homes to have a smart meter by 2020.
- The business case assumes that smart meters will drive savings of £4.6 billion due to reduced energy consumption (across both electricity and gas).
- Aggregate data alone unlikely to lead to such savings.
- Disaggregation has been demonstrated to drive savings more effectively than aggregate data alone.





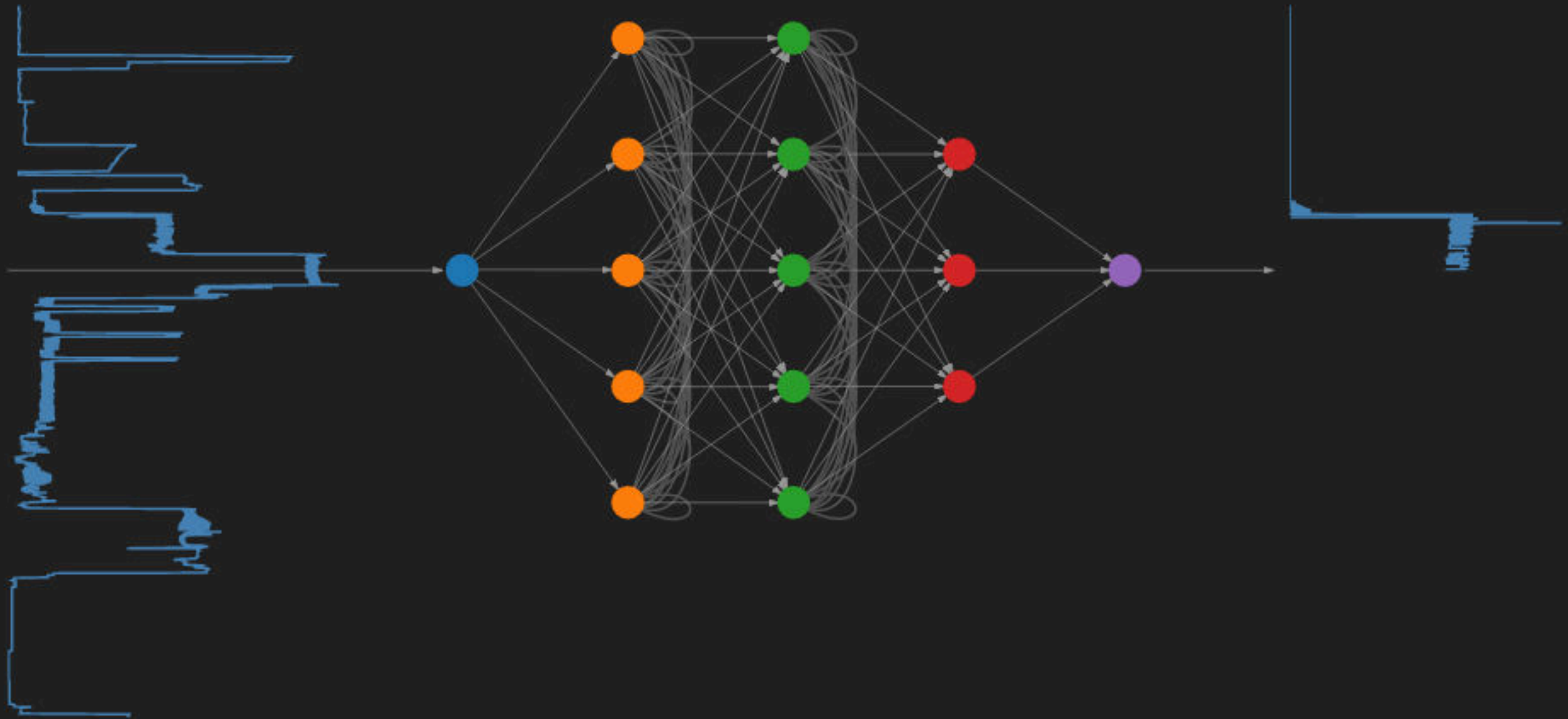
My Work

- First to apply deep neural nets to energy disaggregation

Recurrent Neural Nets

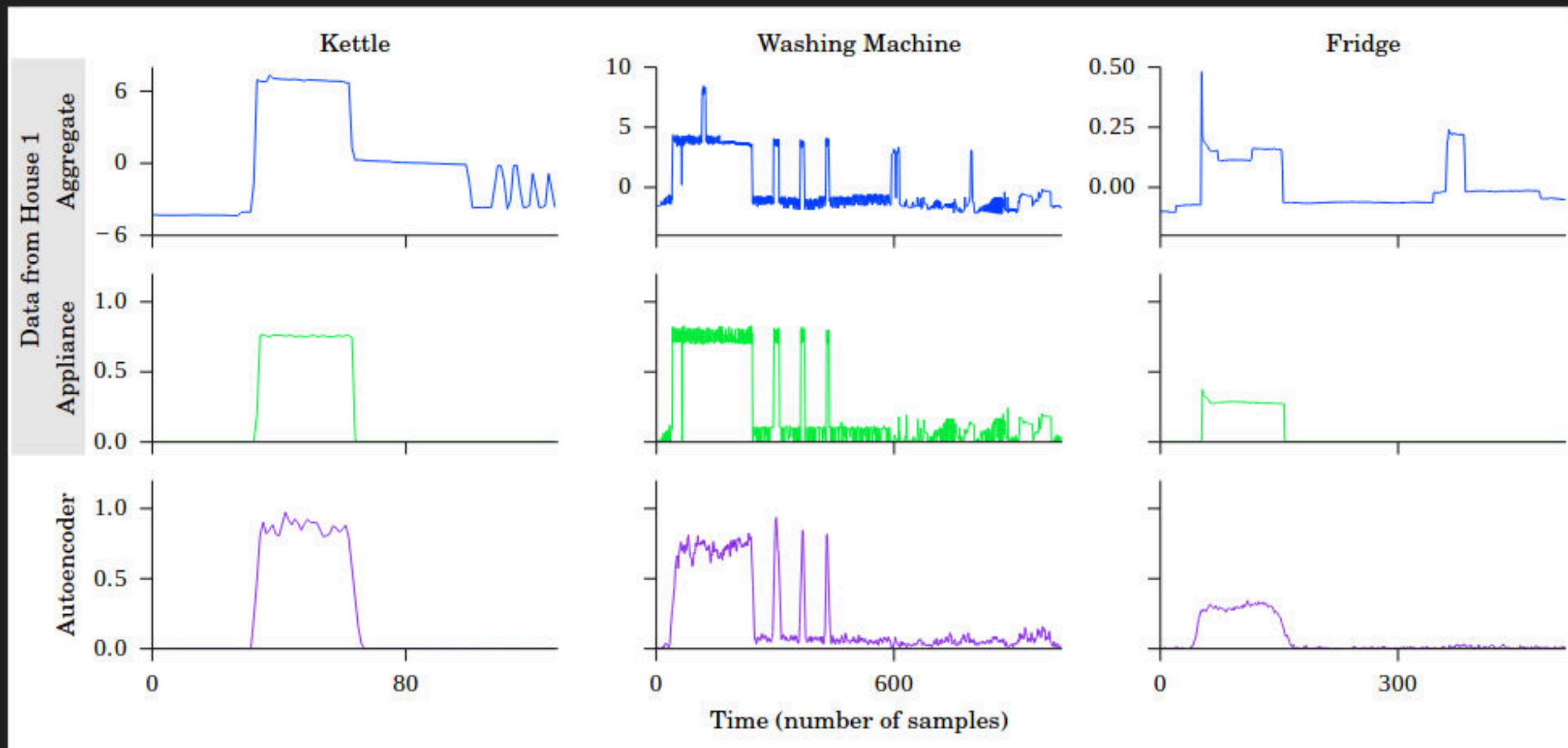
Aggregate input

Target output



Example Output from Deep Neural Net

Autoencoder



My Work

- First to apply deep neural nets to energy disaggregation
- Lead developer on open source disaggregation tool NILMTK
- Collected & released disaggregated energy dataset: UK-DALE
- NILM Metadata: metadata schema for energy data
 - Used by > 9 datasets

Questions?

jack.kelly@imperial.ac.uk