

Smart Habits Smart Savings

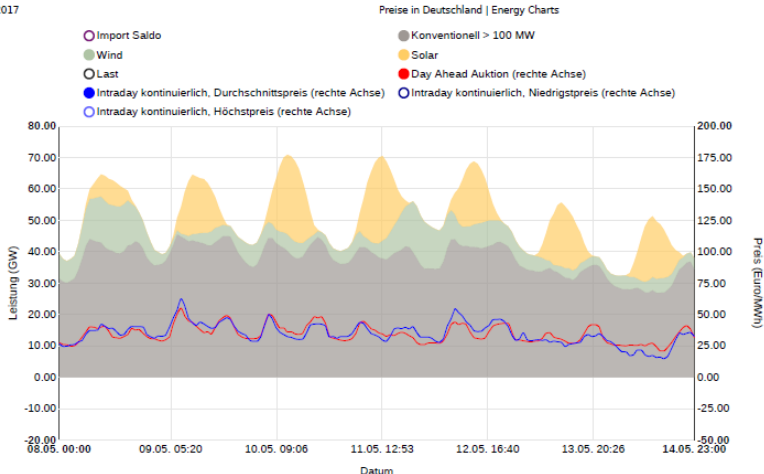
by Dorian Guzman and Nicolas Holland

Freiburg Hackathon

May 21, 2017

Energy Production Mix

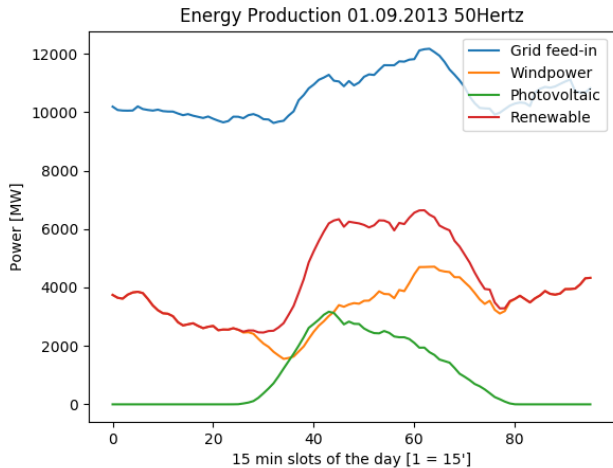
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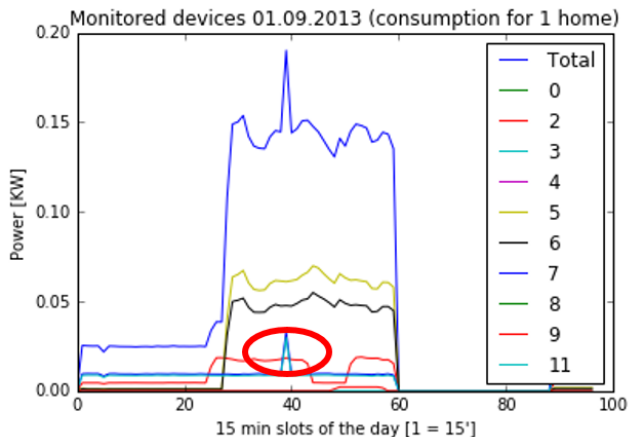
Datenquelle: 50 Hertz, Amprion, Tennet, TransnetBW, EEX, EPEX
letztes Update: 21 May 2017 00:17

- DEBS 2014 Grand Challenge: Smart homes
 - House id
 - Household id
 - Device id
 - Measurements per second
- www.50hertz.com/en/Grid-Data
 - Grid feed-in
 - Windpower
 - Photovoltaics
 - Measurements per 15 minutes

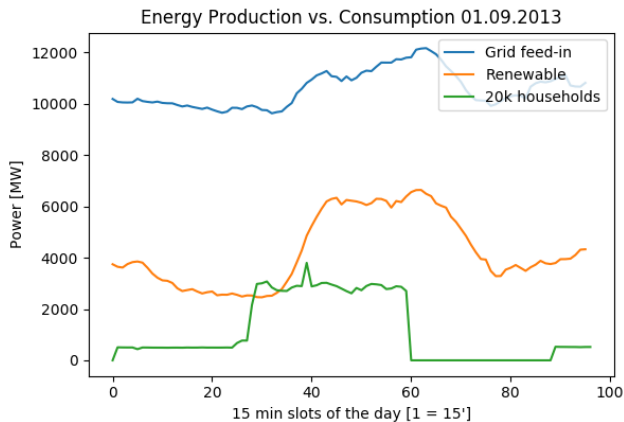
Crunching the Numbers



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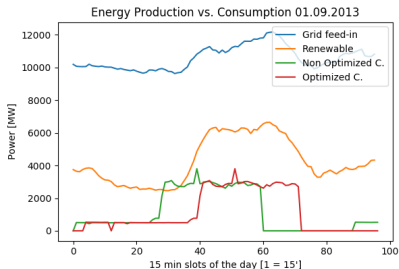


Optimizing the Consumption Habit

Let R be renewable energy production, C consumption habit, T total consumption over one day, D_i device consumption.

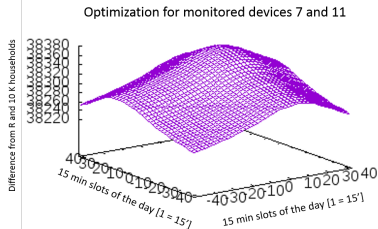
Total Consumption:

$$\begin{aligned} \min_C & \|R - C\| \\ \text{s.t.} & \|C\| = T \end{aligned}$$

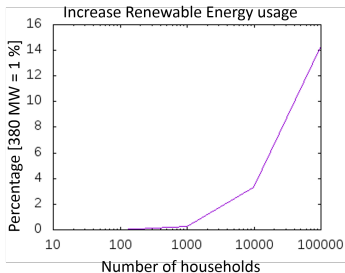


Device Specific Consumption:

$$\begin{aligned} \min_{D_i \in I} & \|R - D_i\| \\ \text{s.t.} & \left\| \sum_i D_i \right\| = T \end{aligned}$$



And how does this help us?



Name	Capacity MW	Type	CO2kg
Niederaussem Powerplant	3,680	Brown Coal	27,578,400,000
Gundremmingen Powerplant	2688	Nuclear	0
Neurath Powerplant	2065	Brown Coal	20,139,500,000
Schwarze Pumpe Powerplant	1,500	Hard Coal	10,795,500,000
Altbach Powerplant	1200	Heavy Fuel Oil, Hard Coal, Natural Gas, Residual Fuel Oil	5,881,330,000
Bexbach C Powerplant	773	Coal	3,680,450,000
Lünen Powerplant	500	Hard Coal	2,438,780,000
Elberfeld Powerplant	100	Coal	1,012,030,000
Dessau Powerplant	51	Fuel Oil, Brown Coal, Natural Gas	308,215,000
Heinsberg Landfill Powerplant	37	Natural Gas	389,182
Hattorf Mine Powerplant	35	Natural Gas	14,851,500
Lichtenberg Powerplant	34	Natural Gas	69,987,500
Zielitz Works Powerplant	23.3	Natural Gas	37,594,600
Bochum Powerplant	21	Natural Gas	49,257,400
BhkW Obere Viehweide Powerplant	12.7	Natural Gas	20,223,900
MhkW Kassel Powerplant	11.9	Natural Gas	9,242,400
Anklam Factory Powerplant	11.3	Fuel Oil	7,465,220
Eisenach Works Powerplant	9	Natural Gas	25,266,900
Grabe Powerplant	9	Natural Gas	18,634,500
Magdeburg Sm Powerplant	5	Natural Gas	27,562,100
Hermisdorf Powerplant	5	Natural Gas	0

Source: <http://enipedia.tuelft.nl/wiki/Germany/Powerplants>