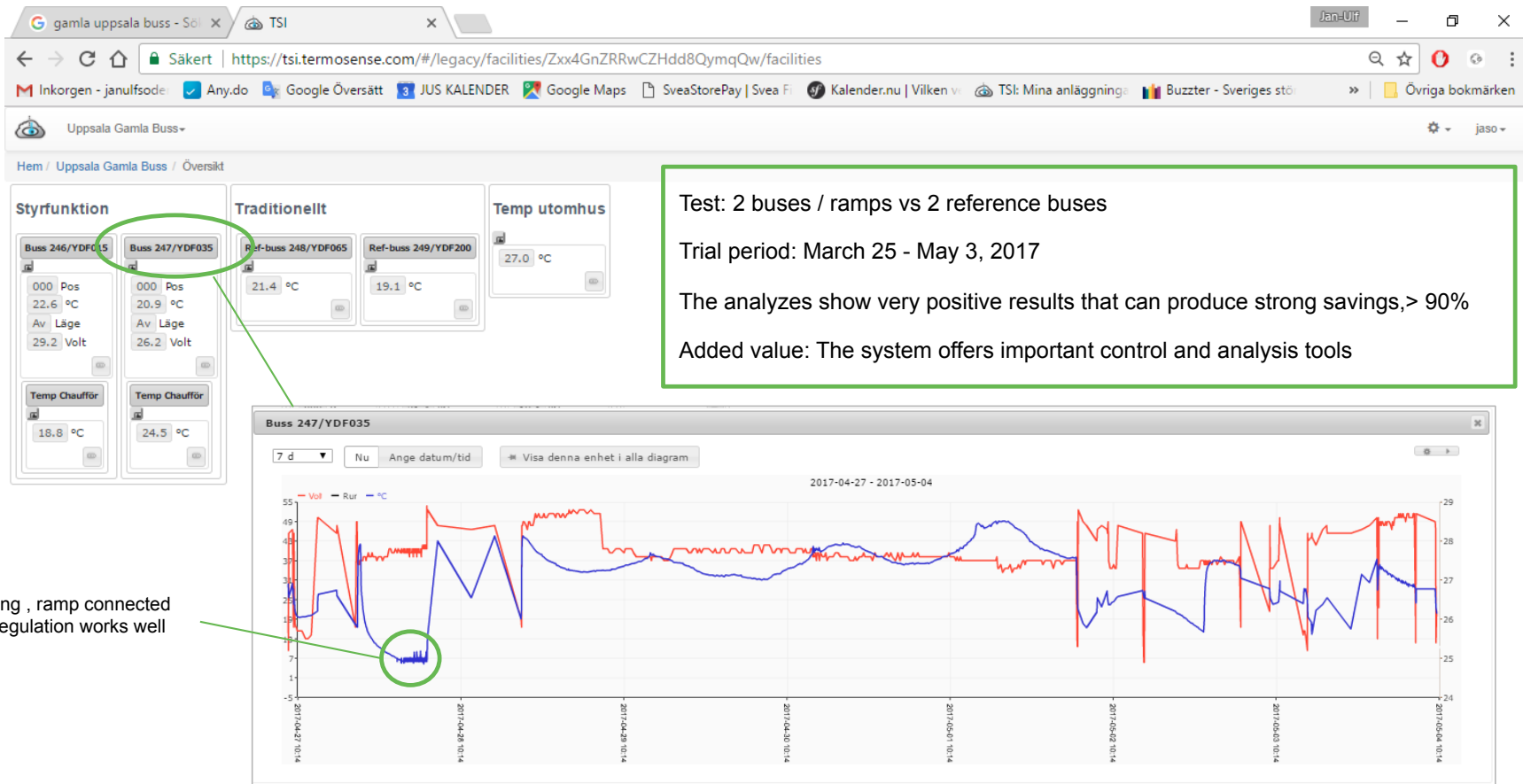


TermoSense



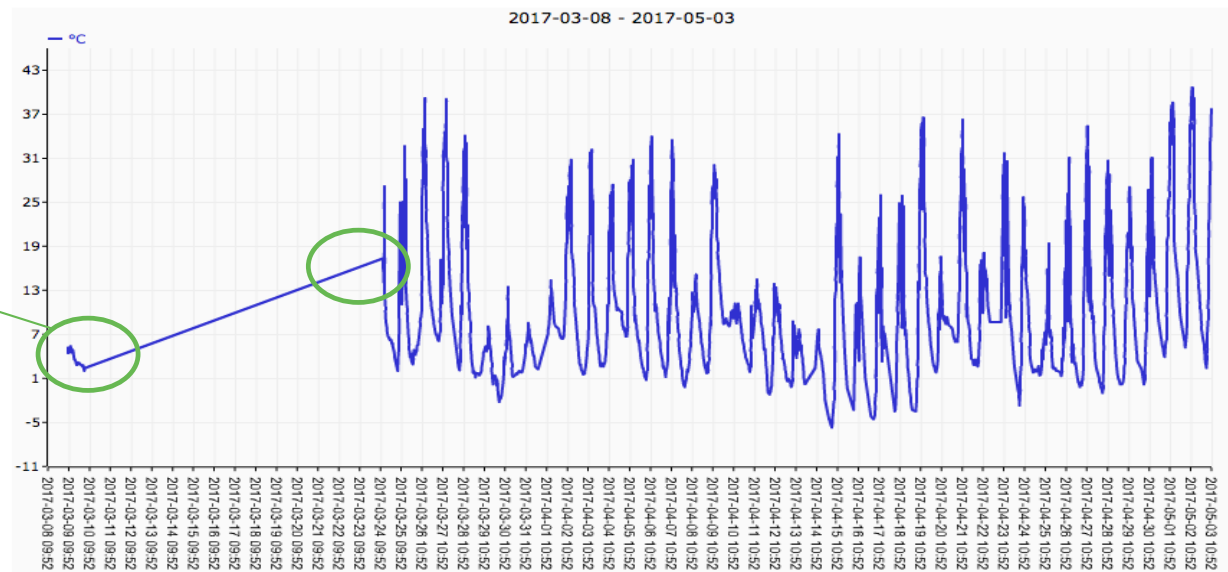
The bus company ----- Test 2 x 2 showing strong > 90% saving potential



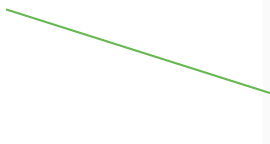
Period during which the base station recorded data: 25 March - 3 May
 The installation was done on March 9.

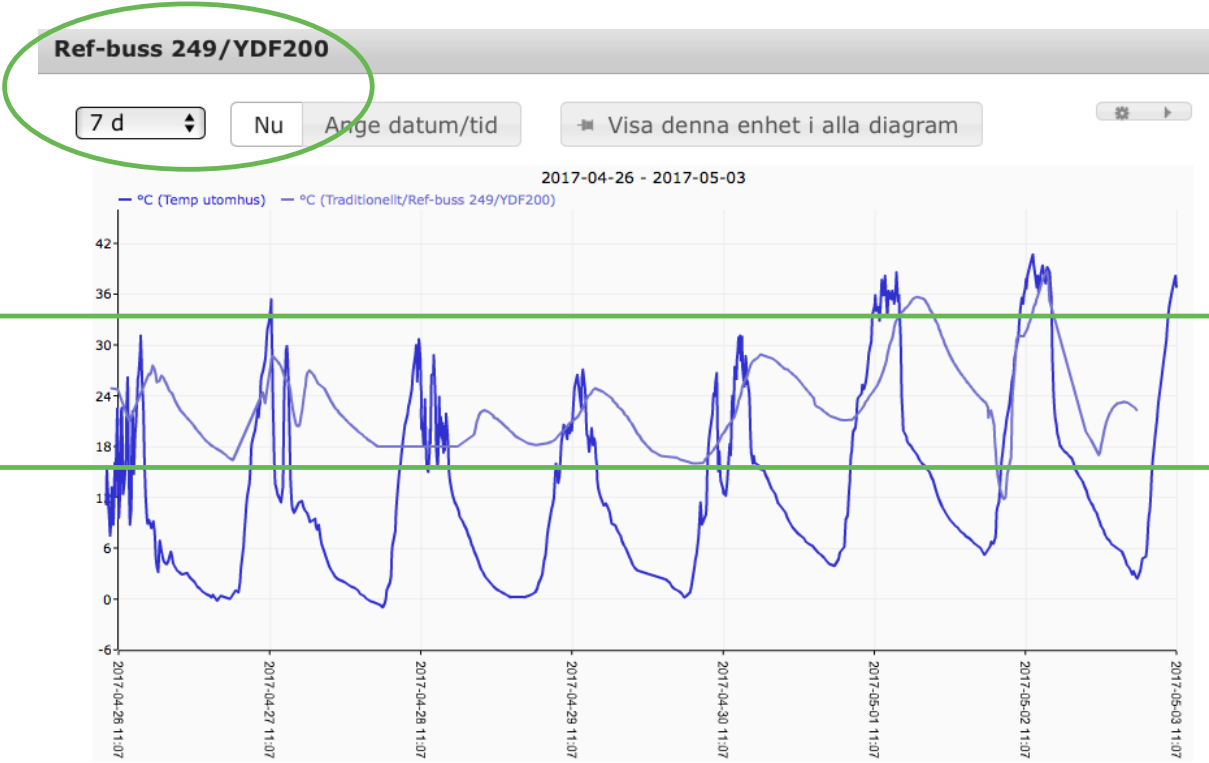
Temp utomhus

8 w Nu Ange datum/tid Visa denna enhet i alla diagram



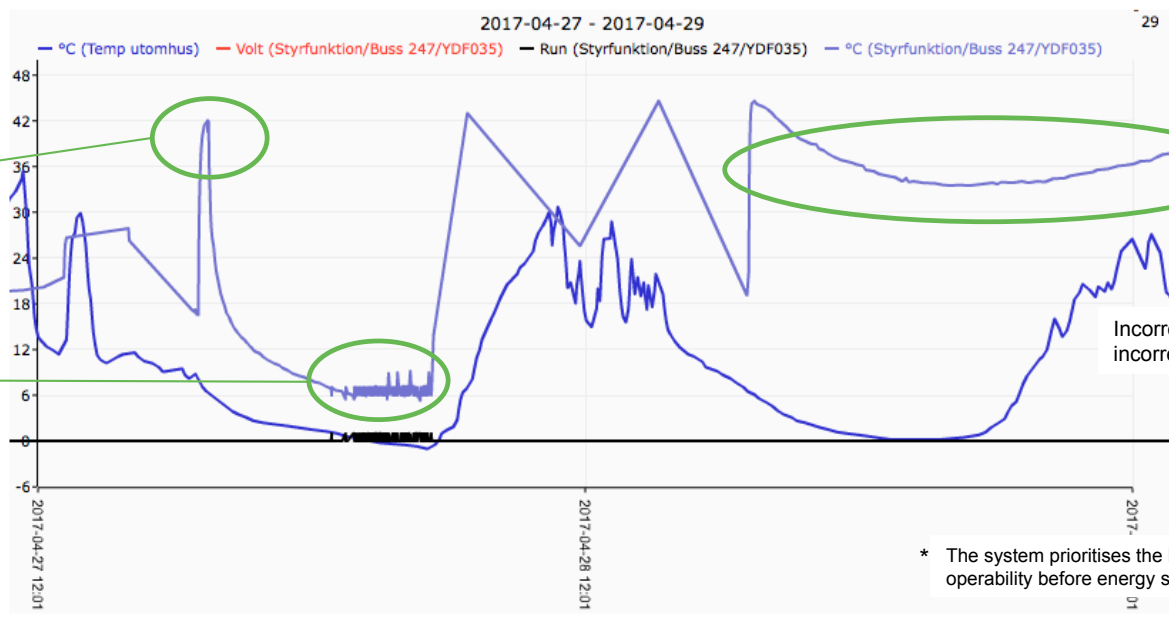
The base station started to read information, but became without internet connection at the start of the test period





A week of "energy wasting"
Far too high "lowest-degrees" all night

Buss 247/YDF035



The bus arrives

Perfect energy control

Incorrectly parked bus * or it is incorrectly connected to your system

* The system prioritises the bus's operability before energy savings

The difference between controlled and non-controlled bus heating

Buss 247/YDF035

2 d

Nu

Ange datum/tid

Visa denna enhet i alla diagram

2017-04-27 - 2017-04-29



19:30 the bus arrives

Then it browns on the bus's heat and its half-life ("Time constant / K value") = bus's brain does not ask for heat

01:30 turns on the heat

The "load" / switch-on average is 6%, ie, when it works, 9.6 kWh is used 6% of the time.

19: 30-01: 30 = 6 hours = 100% saving
01: 30-05.17 (bus departs) = 3.8 hours

$3.8 \text{ hours} \times 0.6 \times 9.6 \text{ kWh} = 2.19 \text{ kWh} \times 0.95 \text{ SEK / hour} =$
2.08 SEK

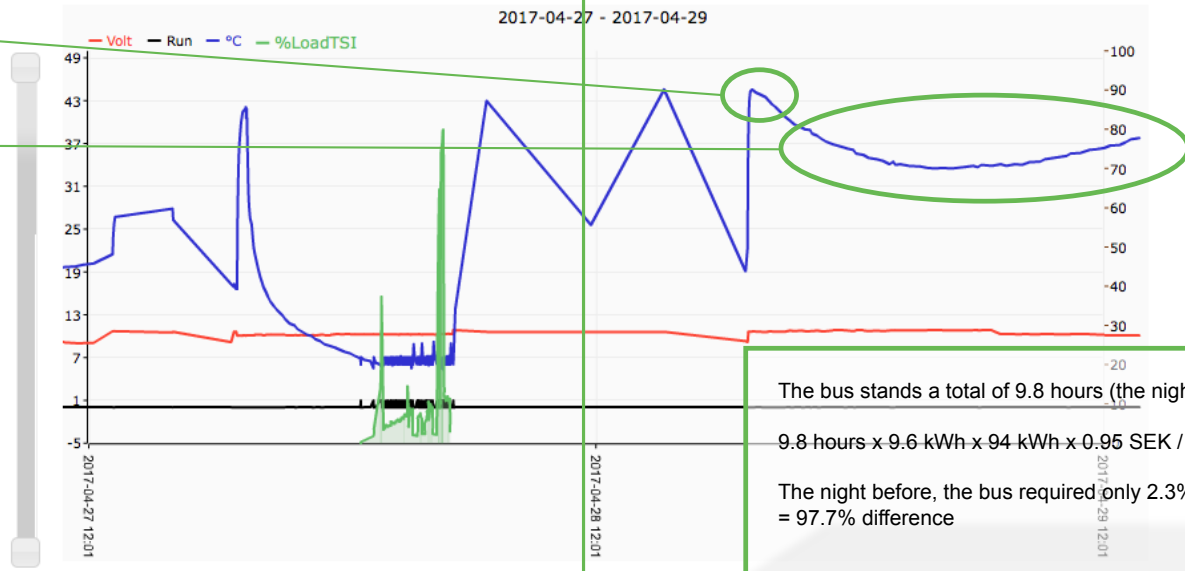
The difference between controlled and non-controlled bus heating

Buss 247/YDF035

2 d Nu Ange datum/tid Visa denna enhet i alla diagram

Around 19:30 the bus arrives

Then it does not surf on the bus's heat = The energy supply is a constant 9.6 kWh



The bus stands a total of 9.8 hours (the night before, 9.6 hours)

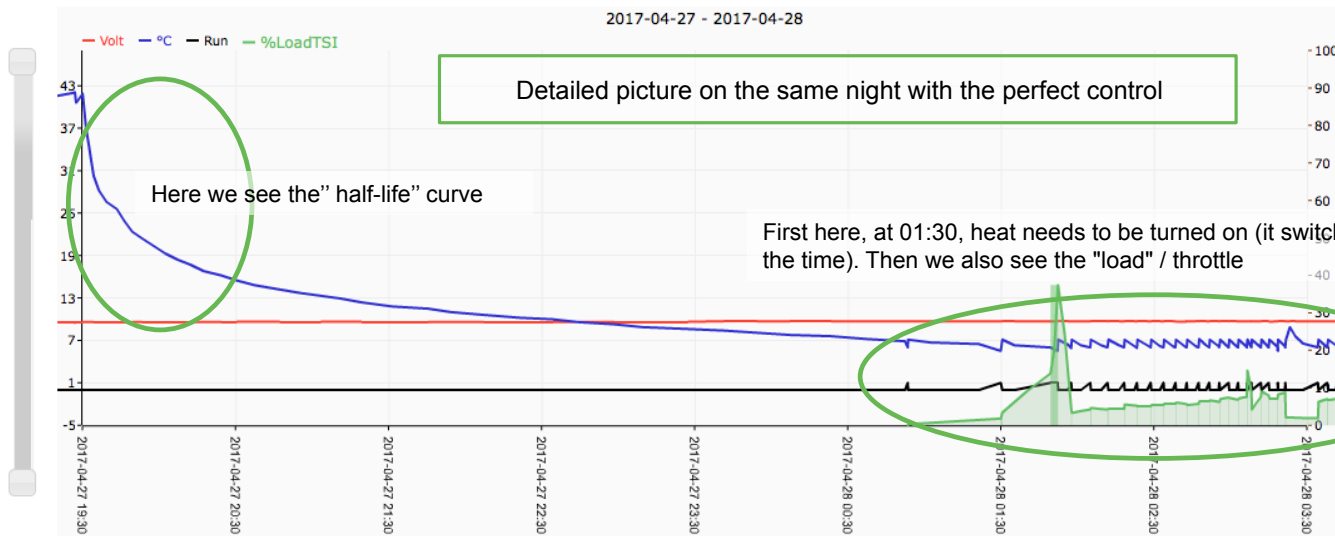
$9.8 \text{ hours} \times 9.6 \text{ kWh} \times 94 \text{ kWh} \times 0.95 \text{ SEK / hour} = 89.38 \text{ SEK}$

The night before, the bus required only 2.3% of the heat supply = 97.7% difference

Buss 247/YDF035

8 h Nu Ange datum/tid Början Mitten Slut 2017-04-27 19 30

Visa denna enhet i alla diagram



7 days - Easter week. Buses 248 and 249 have been parked for > 4 days and then started driving early on Tuesday, April 18.

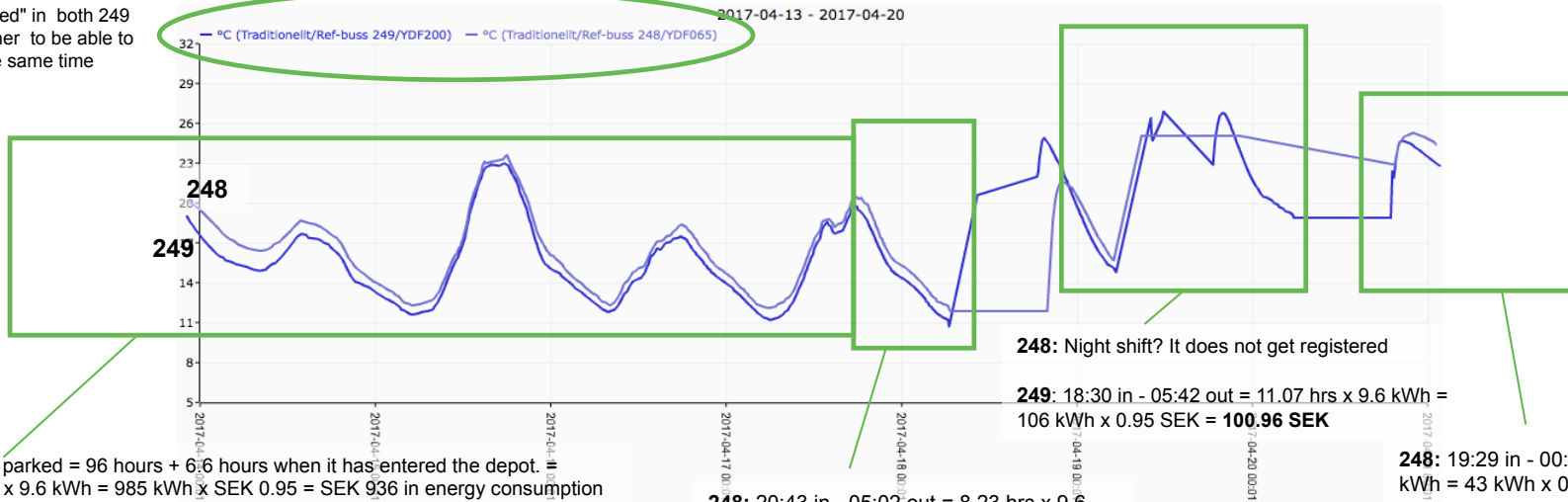
248: 1107 kWh = 1052 SEK

249: 1238,8 kWh = 1177 SEK

Ref-buss 248/YDF065

7 d Nu Ange datum/tid Början Mitten Slut 2017-04-14 00 01
 Visa denna enhet i alla diagram

We have "pinned" in both 249 and 248 together to be able to see both at the same time



248: 4 days parked = 96 hours + 6.6 hours when it has entered the depot.
 102.6 hours x 9.6 kWh = 985 kWh x SEK 0.95 = SEK 936 in energy consumption for bus 248

249: 4 days = 96 hours + 6.53 hours (before midnight) = 102.5 hours x 9.6 kWh = 984.3 hours x 0.95 = SEK 935.07 energy consumption for bus 249

248: 20:43 in - 05:02 out = 8.23 hrs x 9.6 kWh = 79 kWh x 0.95 SEK = 75.06 SEK.

249: 18:34 in - 05:21 out = 10.79 hrs x 9.6 kWh = 104 kWh x 0.95 SEK = **98.40 SEK.**

248: Night shift? It does not get registered

249: 18:30 in - 05:42 out = 11.07 hrs x 9.6 kWh = 106 kWh x 0.95 SEK = **100.96 SEK**

248: 19:29 in - 00:00 end = 4.5 hrs x 9.6 kWh = 43 kWh x 0.95 SEK = **41 SEK**

249: 19:22 in - 00:00 end = 4.64 hrs x 9.6 kWh = 44.5 kWh x 0.95 SEK = **42.32 SEK**

The same week with bus 246. It has also been parked. Right online all week
 The system has worked great. Good "worst case", fairly cold period and parked, and thus consumes energy

246: 170,4 kWh = 161,98 SEK
VS
248: 1107 kWh = 1052 SEK
84,6%
 saving

Buss 246/YDF015

7 d Nu Ange datum/tid Början Mitten Slut 2017-04-14 00 01

Visa denna enhet i alla diagram

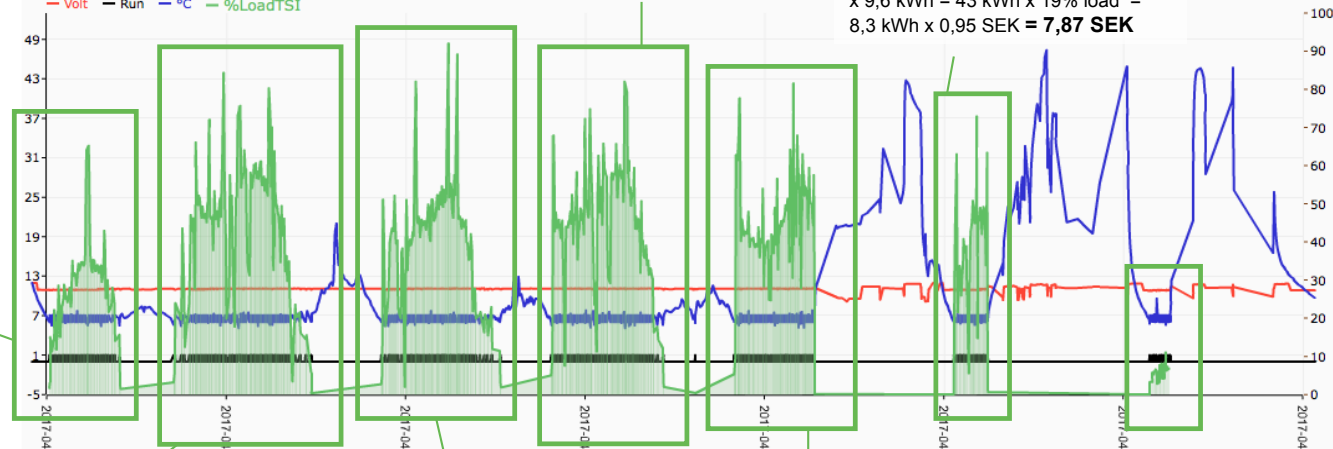
19:12 start - 10:30 off = 15.3 hours x 9.6 kWh = 146.9

kWh x 25% load = 36.7 kWh x 0.95 = 34.88 SEK - 2017-04-20

01:21 start - 05:54 bus out = 4,55 hrs

x 9,6 kWh = 43 kWh x 19% load =

8,3 kWh x 0,95 SEK = **7,87 SEK**



00:00 start - 09:48 switched off = 9.8 hours x 9.6 kWh = 94 kWh x 20% load = 18.8 kWh x 0.95 SEK = 17.88 SEK

17:04 start - 11:02 switched off = 18.14 hrs x 9.6 kWh = 174.14 kWh x 25% load = 43.5 kWh x 0.95 SEK = 41.36 SEK

20:46 start - 12:38 switched off = 15.85 hrs x 9.6 kWh = 152 kWh x 25% load = 38 kWh x 0.95 SEK = 36,14 SEK

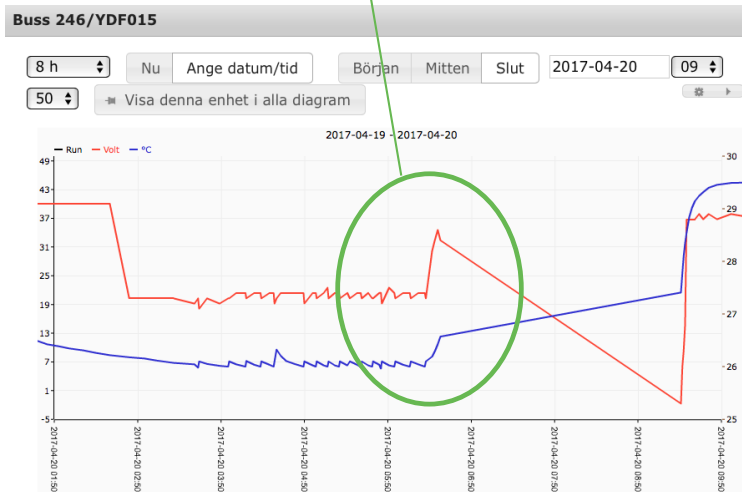
19:58 start - 06:43 buss out = 10,78 hrs x 9,6 kWh = 103,48 kWh x 23% load = 23,8 kWh x 0,95 SEK = **22,61 SEK**

03:33 start - 06:16 bus out = 2,71 hrs x 9,6 kWh = 26 kWh x 5% load = 1,3 kWh x 0,95 SEK = **1,24 SEK**

The system provides good control and analysis tools... some examples

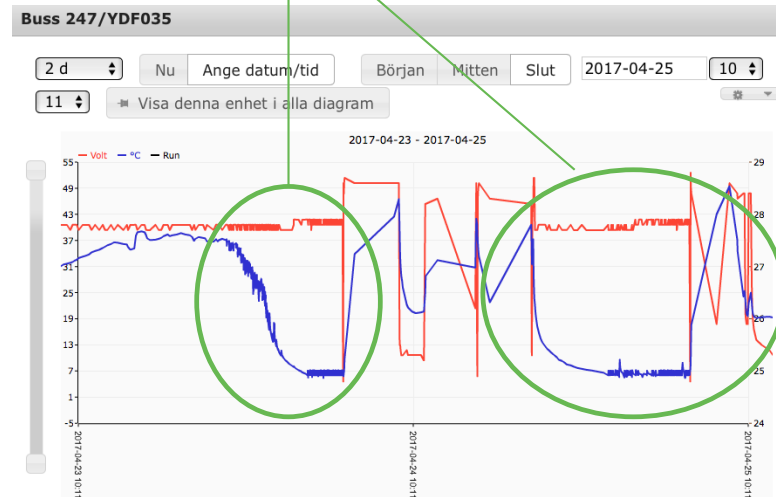
Idling

Here we see that 246 started the bus around 5-6 °C and then idled around 10 minutes to warm up the bus. Can be used to talk to staff in case of abuse. Or disprove / clarify with report during discussions.



Wrong-/oblique parking and proper parking

Here we see the first night where the bus does not get full contact with the ramp unit, but eventually they make contact. The second night, 247 is parked properly and it works properly.



The system provides good control and analysis tools... some examples

- The bus heating capacity and the "Time constant / K-value" of the cooling process gives great analysis values, eg.. a cheaper bus vs increased energy consumption. Where is the breaking limit for profitability? Or in price comparisons / negotiations.
- Heating by idling. This is not often seen with positive eyes from an environmental perspective. Risk of unnecessary badwill. The system guarantees full control of all bus temperatures around the clock, eliminating controversial situations where bus drivers are not allowed to drive / move on the bus.
- No need to worry about surprisingly sudden cold nights. The system fixes it. Should the bus still be skewed / fault-parked, the system prioritizes bus operability before energy savings. The system gives full control on which bus is parked where and the exact pattern of the bus, the bus's charging voltage and ability to receive charging.
- Text message alerts in the event of breakdowns and other errors, avoiding surprises and giving traffic time to replace the bus on time, thus avoiding the risk of a penalty.

The company's MAN Euro 6, Lion's City buses do not have very good "Time constant / K value", around 550 and the "half-life" we have seen is about 2 hours (other models about 2.67, which saves significantly more energy).