CONTENTS

PCSG

1 | GENERAL RESULTS

1.1 Number of Entries

A total of 131 entries were recorded during September 2017 across all four zones (i.e. South, North, Meeting Room 1.1, Meeting Room 1.3) from 19 registered users.

Of those 131 entries, 25 were comfortable entries (19%) against 106 uncomfortable entries (81%). The chart in Figure 1 illustrates how those entries are distributed across time.

Contrary to previous month we can see that the number of entries remained quite stable throughout this period, we can also see that the ratio of uncomfortable entries has significantly increased in September – when we started in June uncomfortable entries accounted for 40% of total entries.

The peak number of entries (12) was reached on 10/09/17, we then observe a drop before number of total daily entries stabilise at around 7.

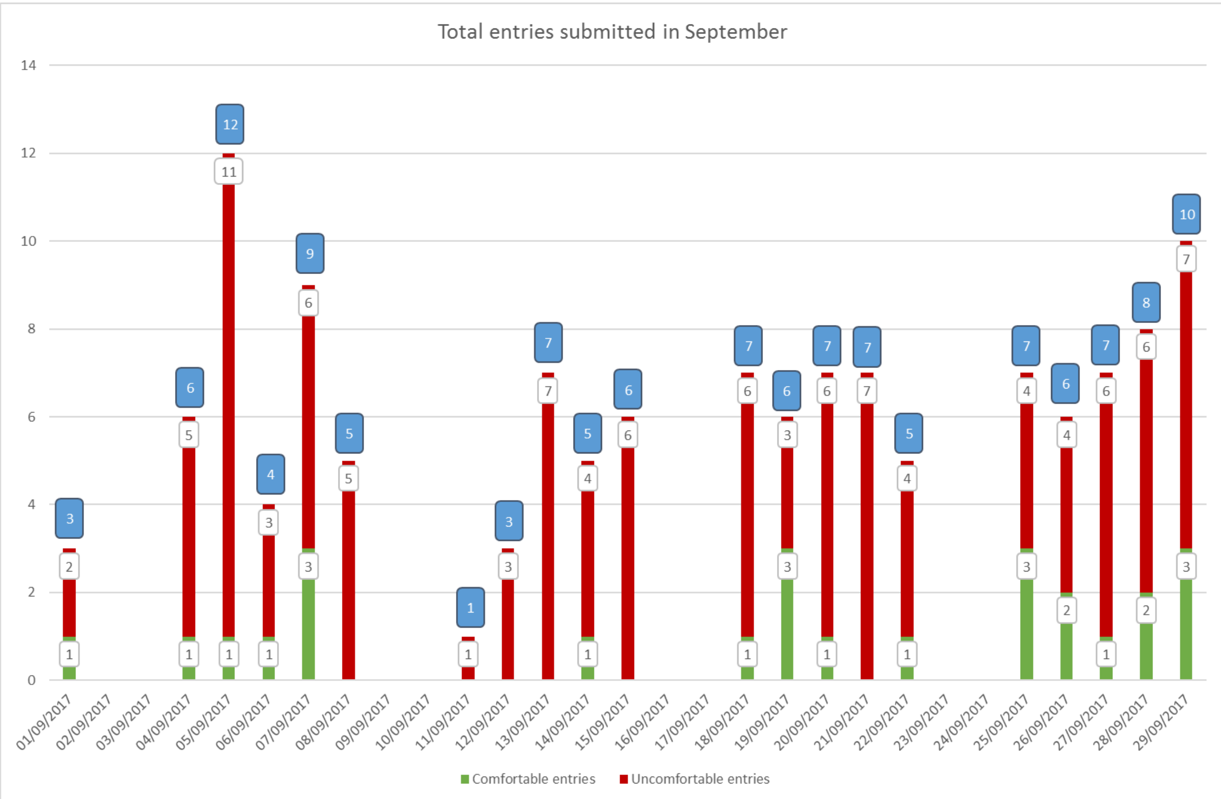

Figure 1: Daily ratio of comfortable and uncomfortable entries submitted in September

1.2 User Engagement

A new user registered this month bringing our total active users to 17, 9 of which made entries this month (Table 1). We can see that 4 users have increased their numbers of entries and that users who stopped submitting entries are the same ones that did not make any entries in August. One of our top users from the past did not make as many entries as previously (User 1); our second best shows a 16% increase. Evaluating the building's performance against comfort can only be achieved if all users submit entries on a regular basis: having only a few users contributing does not give a true representation of occupant's comfort. It is crucial to increase and maintain user engagement in the next couple of months.

Table 1: User Analysis

User	Comfortable entries	Uncomfortable entries	Total entries	Difference with August
User 1	0	8 (100%)	8	Decrease by 58%
User 2	0	82 (100%)	82	Increase by 16%
User 3	1 (100%)	0	1	Decrease by 98%
User 4	0	0	0	Decrease by 100%
User 5	0	0	0	Same
User 7	1 (50%)	1 (50%)	2	Increase by 100%
User 8	2 (67%)	1 (33%)	3	Decrease by 25%
User 9	9 (82%)	2 (18%)	11	Same
User 10	2 (50%)	2 (50%)	4	Increase by 300%
User 11	1 (100%)	0	1	Increase by 100%
User 12	0	0	0	Same
User 13	0	0	0	Same
User 14	0	0	0	Same
User 15	0	0	0	Same
User 16	0	0	0	Same
User 17	0	0	0	Same
User 19	9 (47%)	10 (53%)	19	New User

User 18 and User 6 changed floors and are therefore no longer be part of the pilot.

Figures 2 to 11 show daily entries submitted by each user in September.

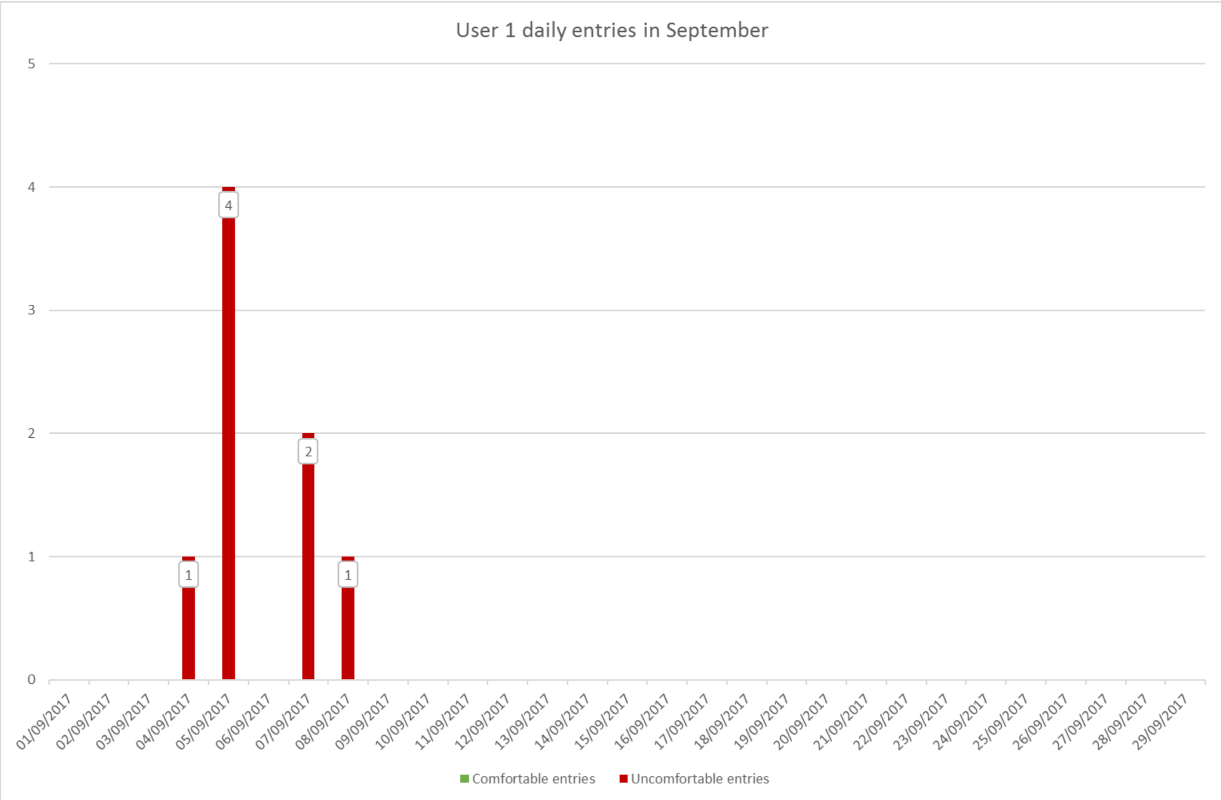

Figure 2: User 1 entries in September

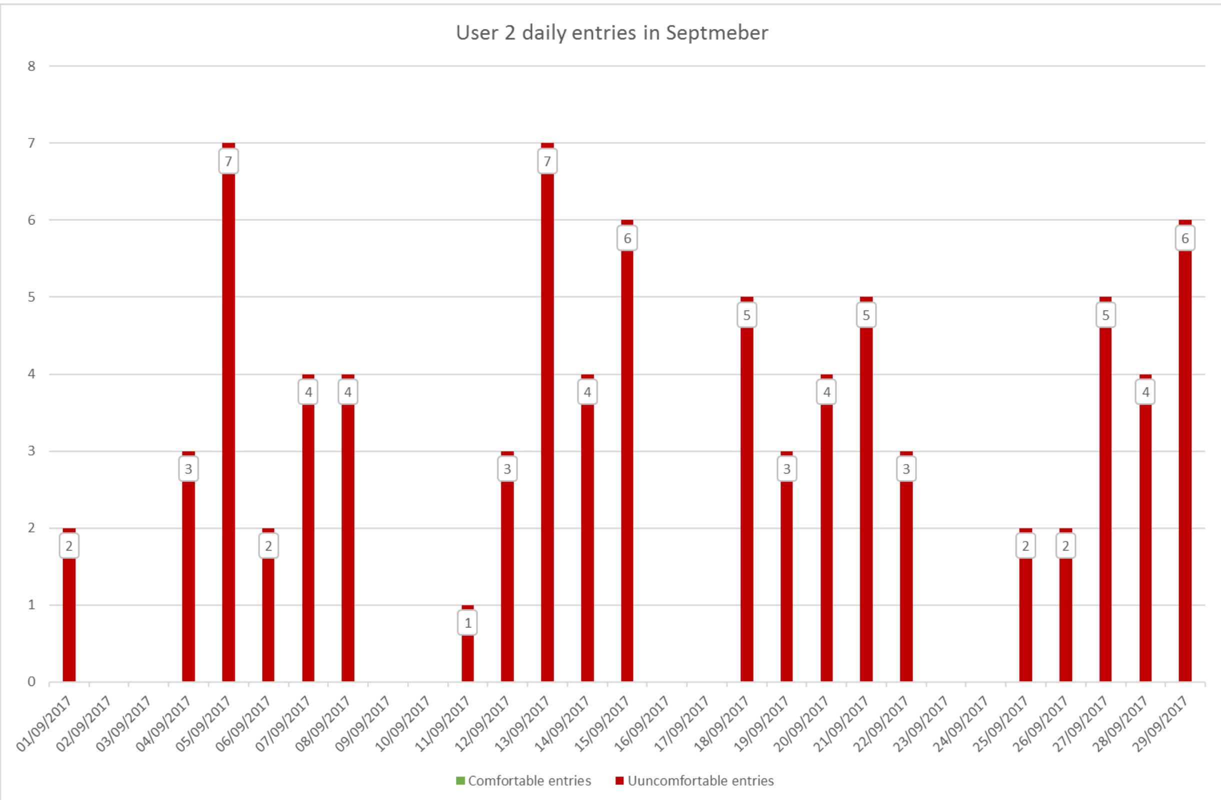

Figure 3: User 2 entries in September

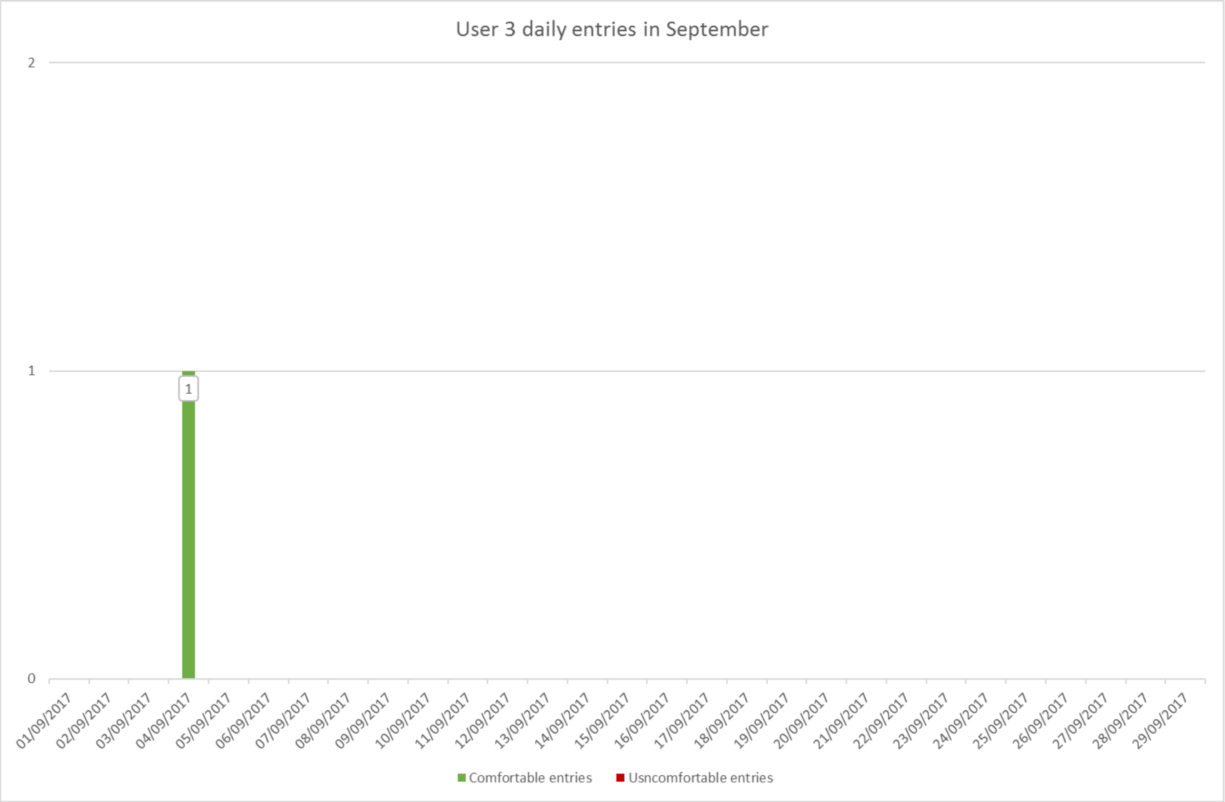

Figure 4: User 3 entries in September

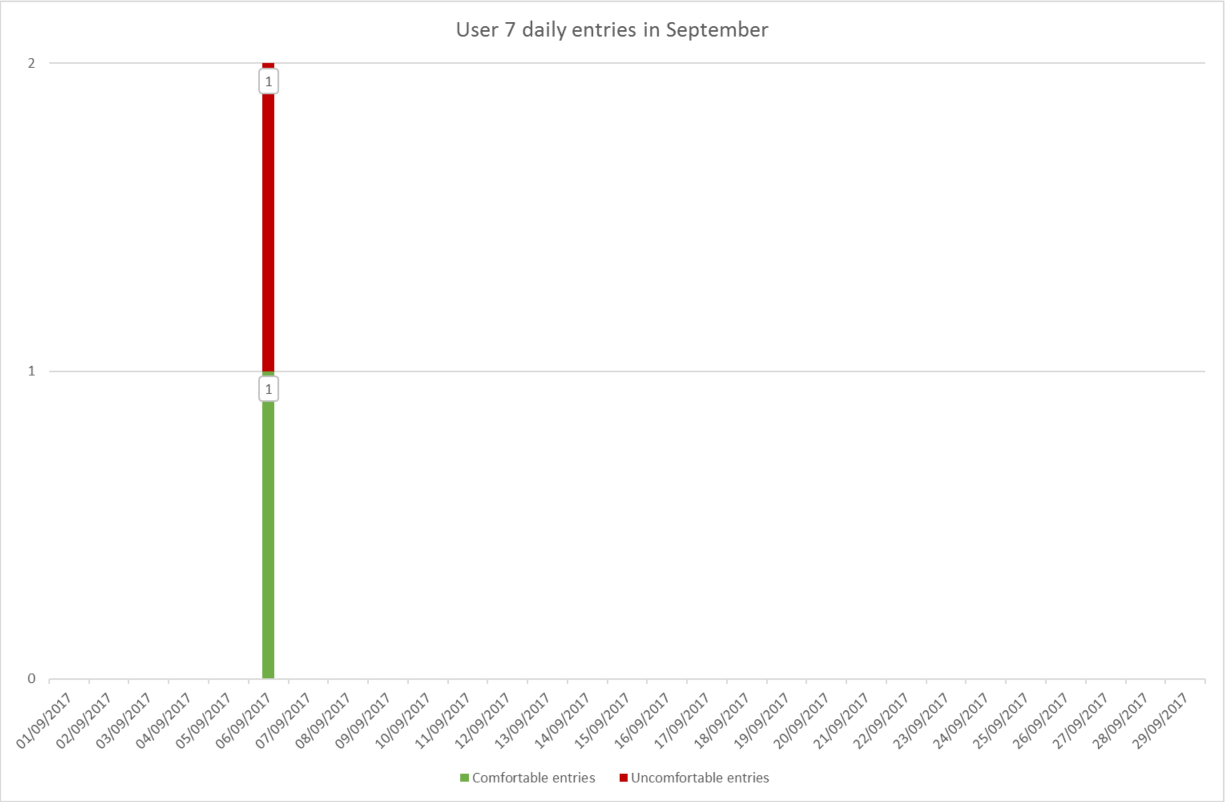

Figure 5: User 7 entries in September

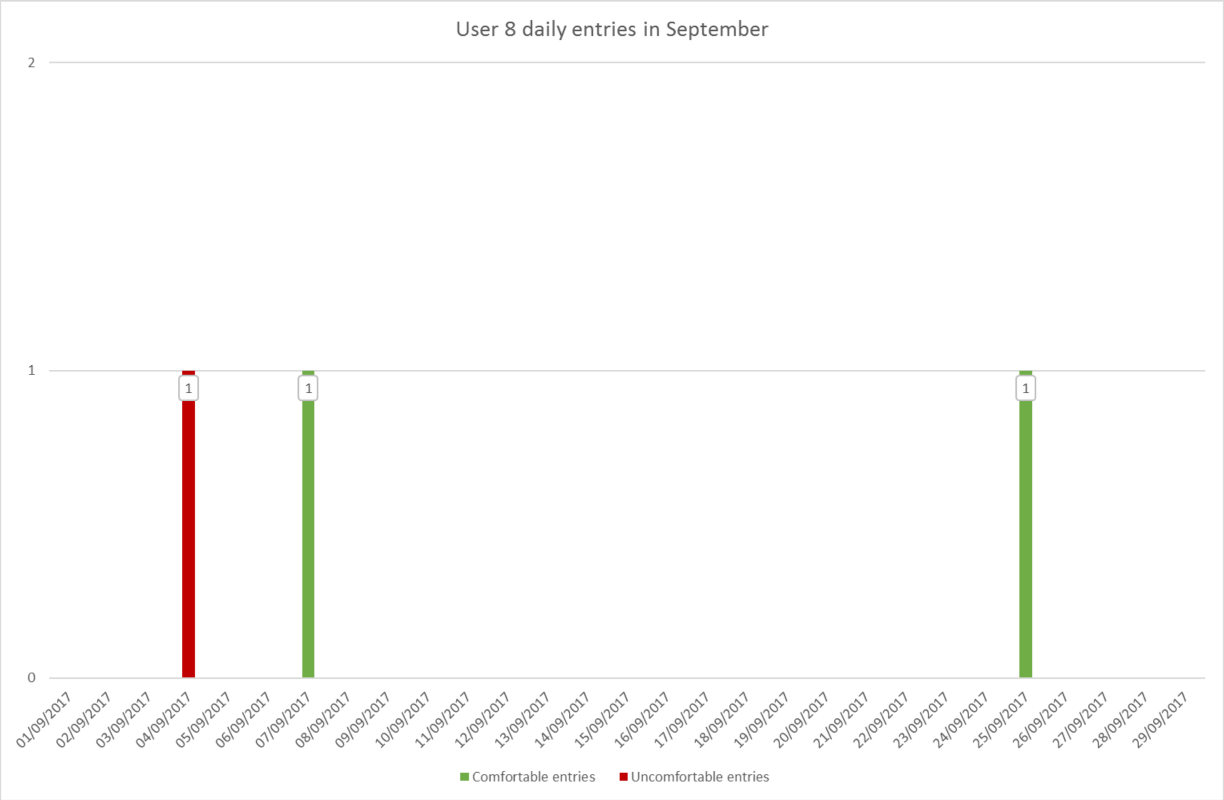

Figure 6: User 8 entries in September

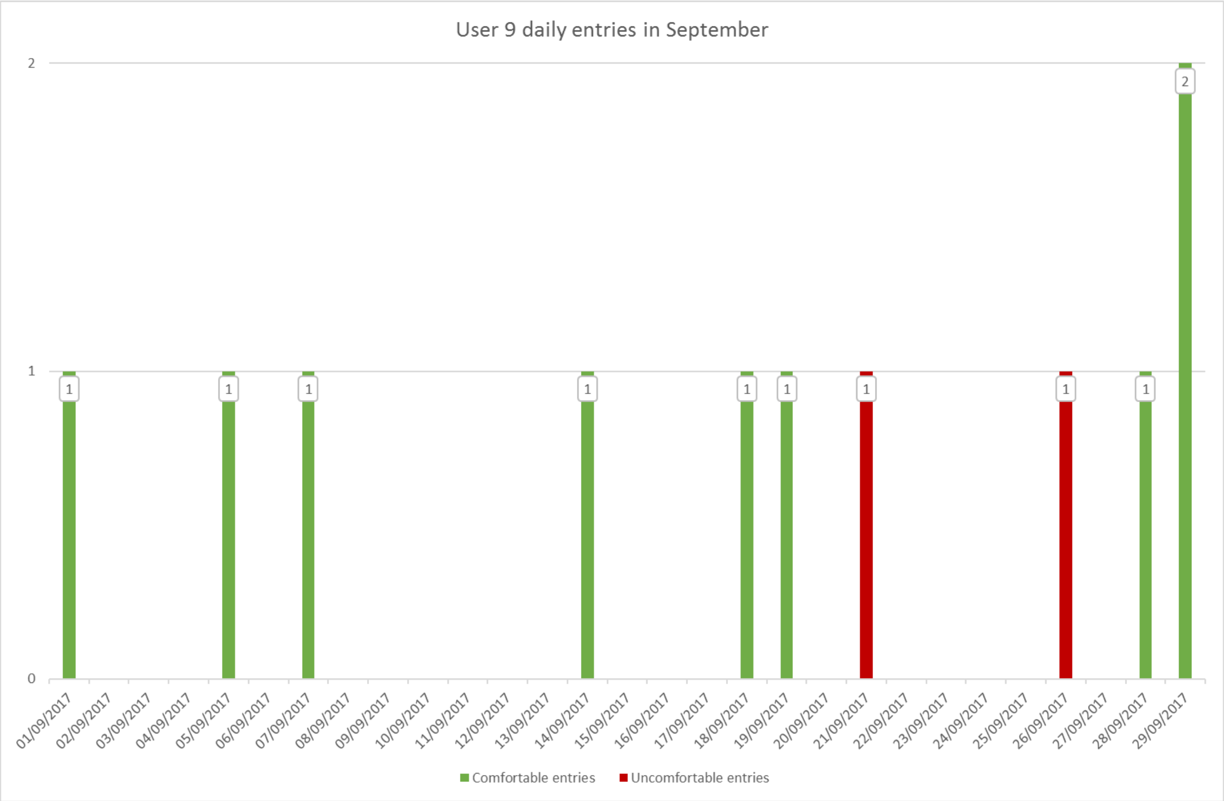

Figure 7: User 9 entries in September

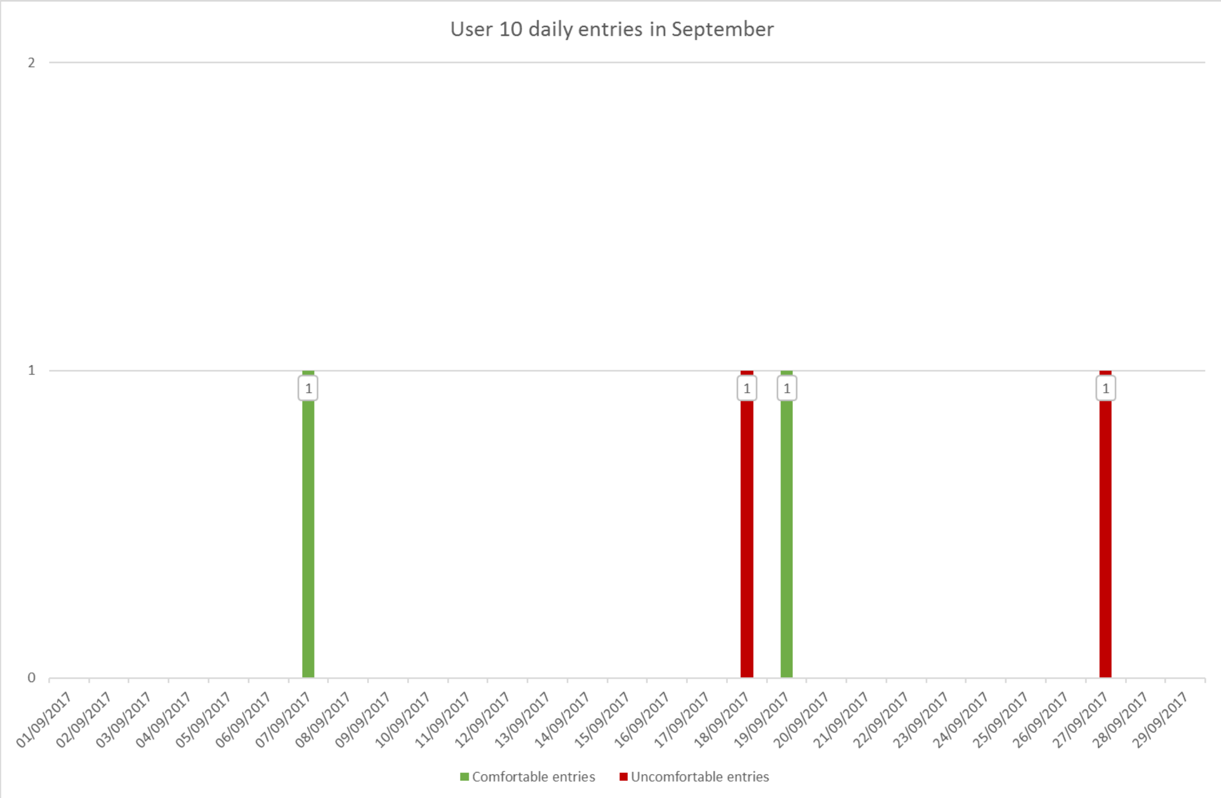

Figure 8: User 10 entries in September

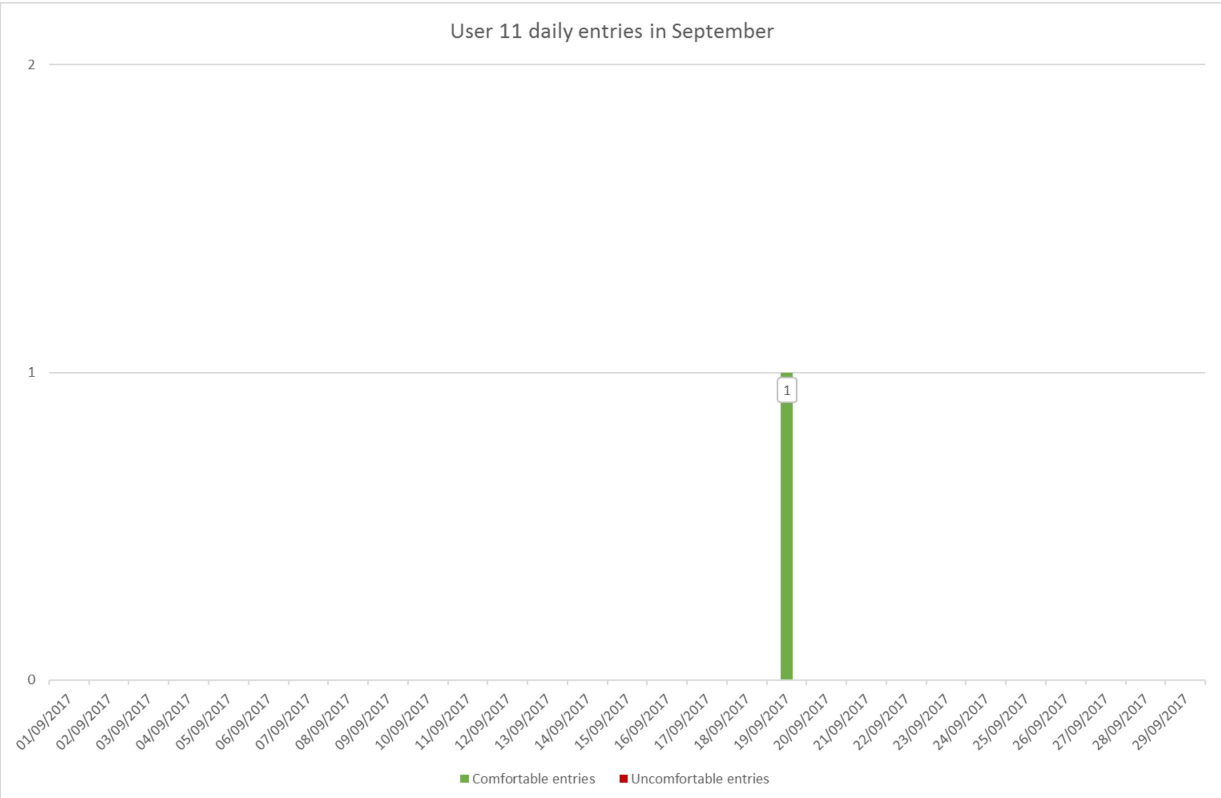

Figure 9: User 11 entries in September

Figure 10: User 12 entries in September

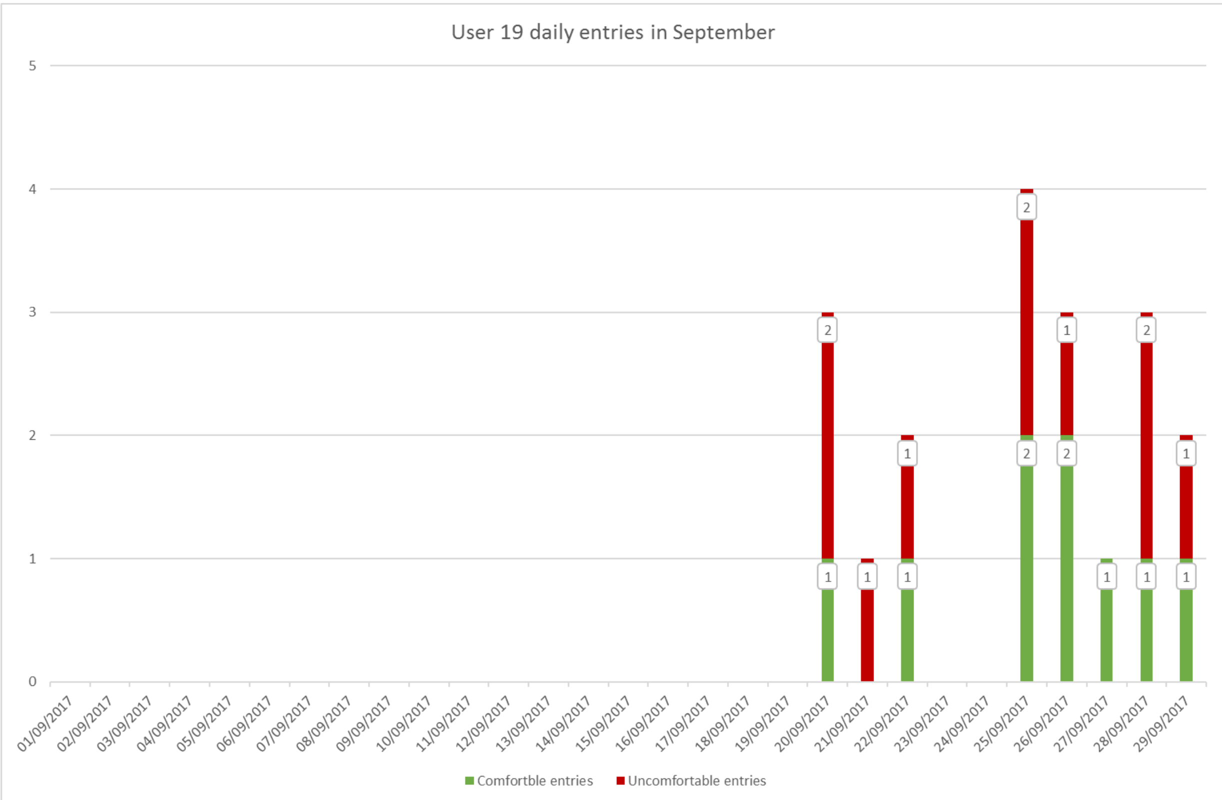

Figure 11: User 19 entries in September

2 | ZONE ANALYSIS

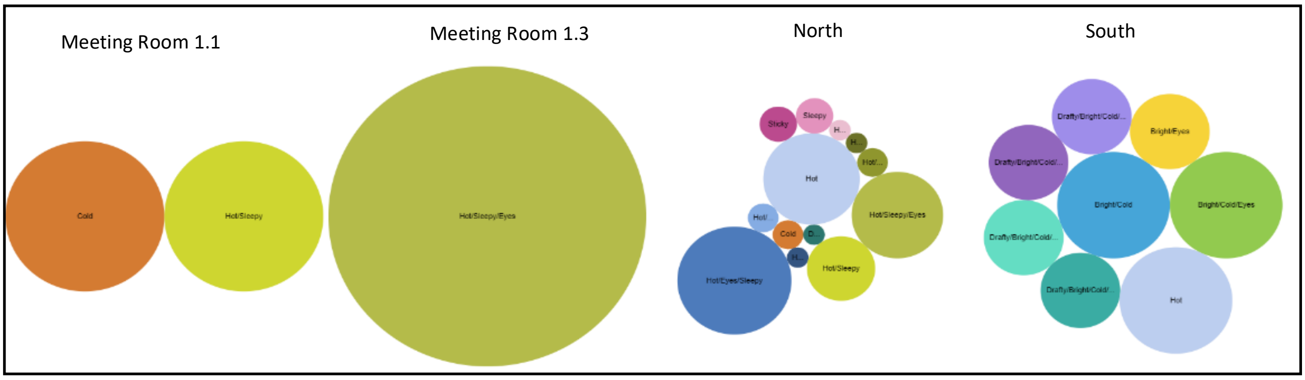

Figure 12: Reason of discomfort submitted for each zone

Each circle in Figure 12 represents a specific reason of discomfort, the bigger the circle the more often the reason was reported in the zone. We can see that entries containing hot as a reason are predominant in each zone suggesting that temperature is an issue. The South zone differs from the three others in that a more diverse number of reasons was reported without one being significantly more predominant than the other.

2.1 Meeting Room 1.1

All three entries from this meeting room were made on different days (see Figure 13) by different users (see Table2).

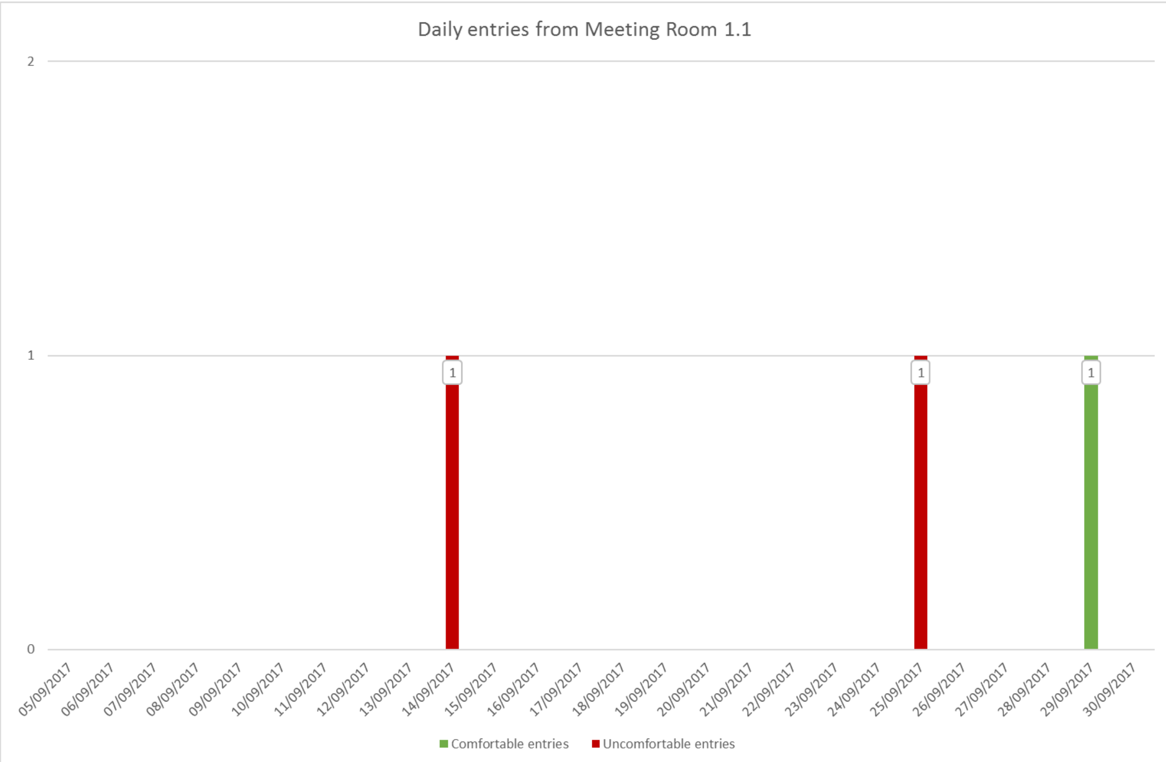

Figure 13: Daily entries submitted in Meeting Room 1.1

Table 2: Entry Analysis of Meeting Room 1.1.

Date	Time	User	Reasons	Action	Indoor Temp (ºC)	Indoor Hum (%)	Indoor CO_2 (ppm)	Outdoor Temp (ºC)	Outdoor Humidity (%)	Wind speed Direction
14/09/17	13:40:30	2	Hot/Sleepy	None	21	54	1607	15	59	15 mph NW - SE
25/09/17	10:34:58	9	Cold	Vent Close	18.8	64	703	15	88	6 mph W - E
29/09/17	10:23:33	19	Comfortable		20.1	60	1131	13	94	2 mph N – S

The first entry submitted, shown in Table 2, reported a user feeling too hot and sleepy – the sleepy is in accordance with the CO_2 level nearing the 2000ppm threshold at which headaches and loss of attention can be felt. This user also reported being too hot although the indoor temperature was only of 21ºC, 6ºC higher than the outdoor temperature; under such conditions we would not expect a hot entry being submitted however we have identified throughout the past months of this pilot that User 2 will specify being too hot at temperate indoor temperature suggesting this user's comfort depends of a low indoor temperature.

The second entry is also consistent with environmental parameters registered at that time; both indoor and outdoor temperature were low which would explain the cold entry submitted by User 9. The low level of CO_2 meant that closing the vent was indeed the best option to keep the warmth in without compromising the air quality.

The last entry made in this zone is unexpected considering the indoor parameters and especially the levels; the user submitted a comfortable entry when CO_2 levels were at 1131ppm, above the 1000ppm threshold were humans can start feeling drowsiness. We can see however, from Figure 14, that the CO_2 levels did not go above the 2000ppm threshold when ill effects (such as headaches or loss of attention) can be perceived which might explain why the user felt comfortable. It was noted that the levels of CO_2 remained above the 1000ppm threshold for more than 2 hours. We can see a significant dip occurring at 11:33am (marked with an arrow) which can either be explained by people leaving the room (for a break) or a door/vent was opened, or a combination of both.

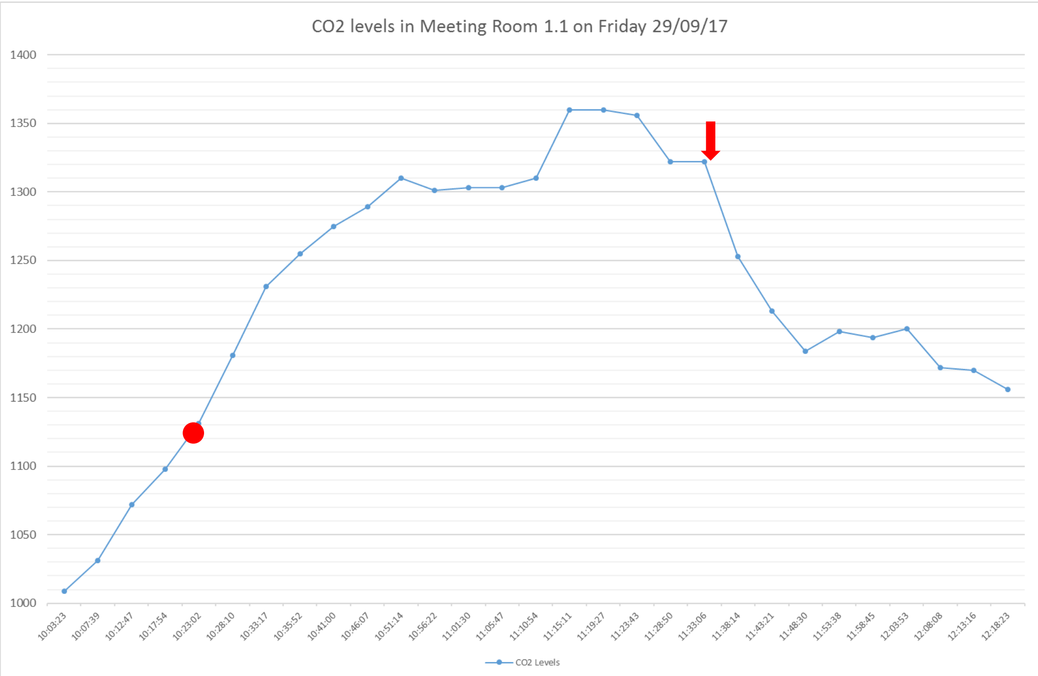

Figure 14: CO_2 levels in Meeting room 1.1 on 29/09/2017 (refers to User 19's entry)

2.2 Meeting Room 1.3

With only one entry submitted in Meeting Room 1.3 on 14/09/17, it is difficult to come to any conclusion with regards to this zone's performance this month.

Date	Time	User	Reasons	Action	Indoor Temp (°C)	Indoor Hum (%)	Indoor CO_2 (ppm)	Outdoor Temp (°C)	Outdoor Hum (%)	Wind speed Direction
14/09/17	15:48:44	2	Hot/Sleepy/Sore Eyes	None	23.5	50	1982	15	63	20 mph W – E

Although one entry is not sufficient enough to come to any general conclusion with regards to this zone in September we can see that the user reported 2 uncomfortable reasons that could be linked to CO_2 levels. This user reported feeling sleepy and having sore eyes at the time CO_2 reached 1982ppm, just below the level at which ill effects can be perceived.

Mapped on Figure 15 is the evolution of CO_2 levels one hour before and one hour after the submission as well as the different CO_2 threshold and associated effects.

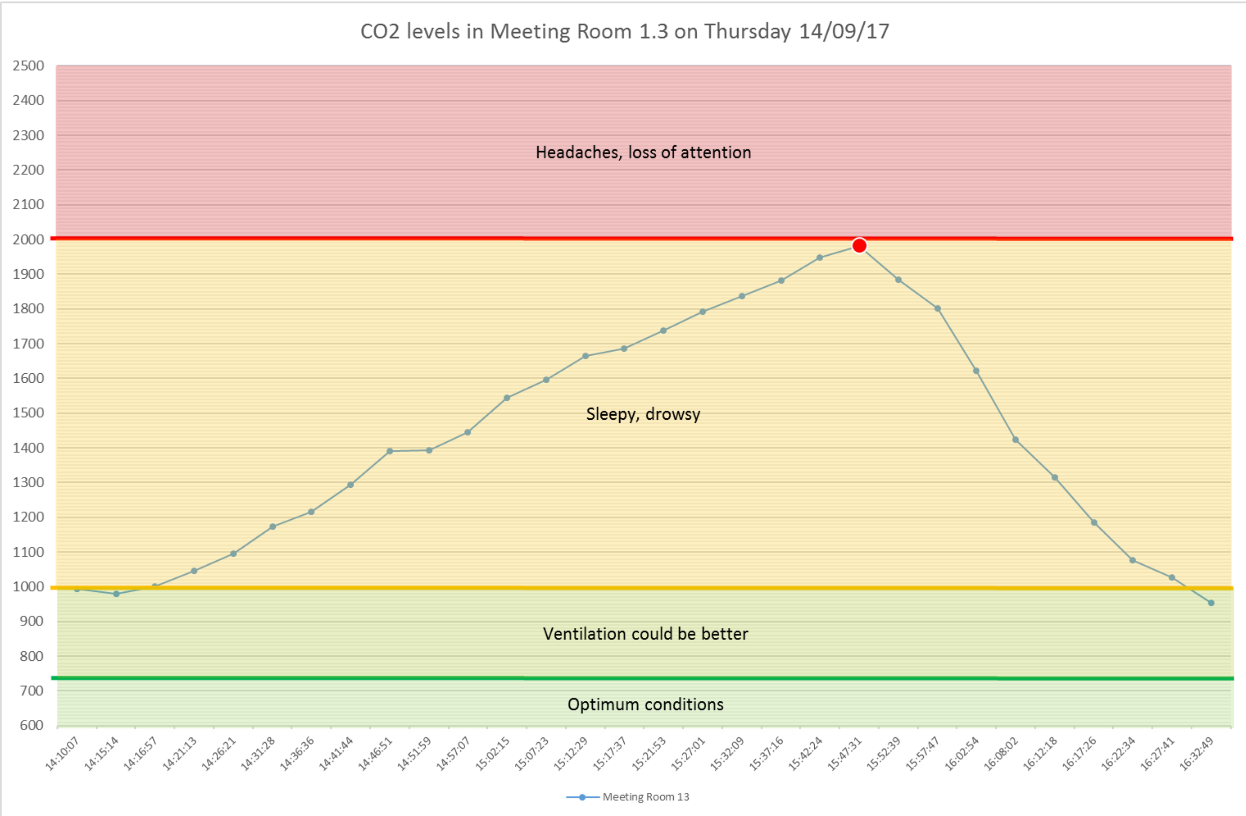

Figure 15: CO_2 levels in Meeting Room 1.3 when entry was submitted (mapped on the chart are the different CO_2 thresholds with corresponding adverse effects, the red circle indicates the uncomfortable entry)

We can see that during those 2 hours (i.e. one hour before the entry and one hour after) the CO_2 levels were constantly between 1000ppm and 2000ppm – which shows that most of the meeting was held when air quality was far from being optimum when it comes to maintaining a sharp and concentrated mind to the matter discussed. The high temperature (23.5°C) would have exacerbated the discomfort felt by users contributing to a stuffy environment.

2.3 North

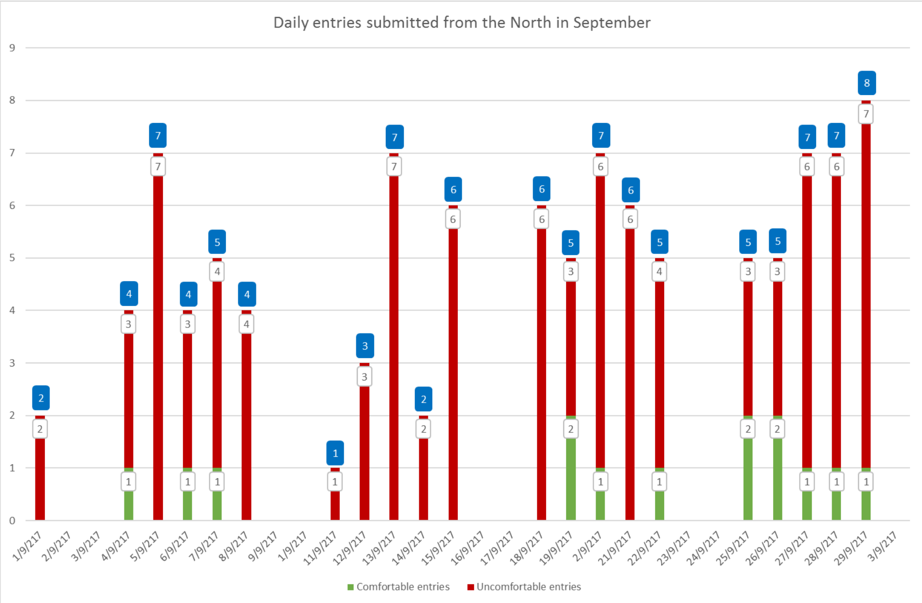

Figure 16: Daily entries submitted from the North

A total number of 106 entries (13% comfortable compared to 87% uncomfortable entries) were made in the North zone (Figure 16); this differs drastically with findings from previous months when the ratios were approximately half. for each type of entries.

The main reason of discomfort for this zone is linked to temperature, with 40% of entries reporting at least it being too hot, followed by sleepy (30%), and eye soreness (24%), we can also see from Figure 17 that cold, draft and sticky entries were other reasons of discomfort (respectively representing 3%, 2% and 1% of total uncomfortable entries submitted).

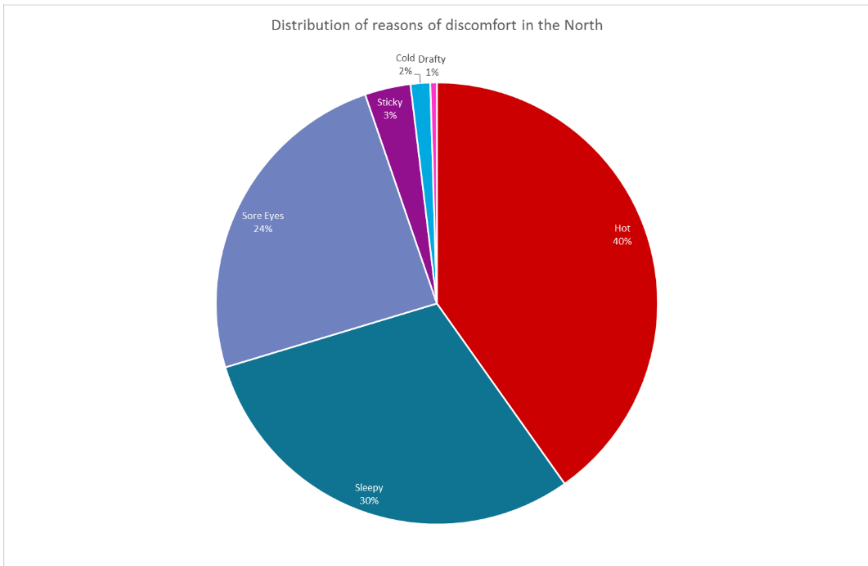

Figure 17: Reasons of discomfort in the North

Out of the 92 uncomfortable entries submitted in September in that zone, 47 of them were submitted to report the following discomfort combination of reasons: Hot/Sore Eyes/Sleepy.

Figure 18 highlights the distribution of entries submitted from the North in September. We can see that entries relating to Hot/Sleepy/Sore eyes were submitted between 12/09/17 and 21/09/17 only; so, we will focus the analysis on those days. We can also see from Figure 18 that no comfortable entries were submitted between 08/09/17 and 18/09/17, some comfortable entries were then submitted on the following days when the main reason of discomfort was still as mentioned above. Although it will be difficult to make any definite correlations, it is clear that environmental conditions changed between those few days enough for users to stop submitting comfortable entries altogether.

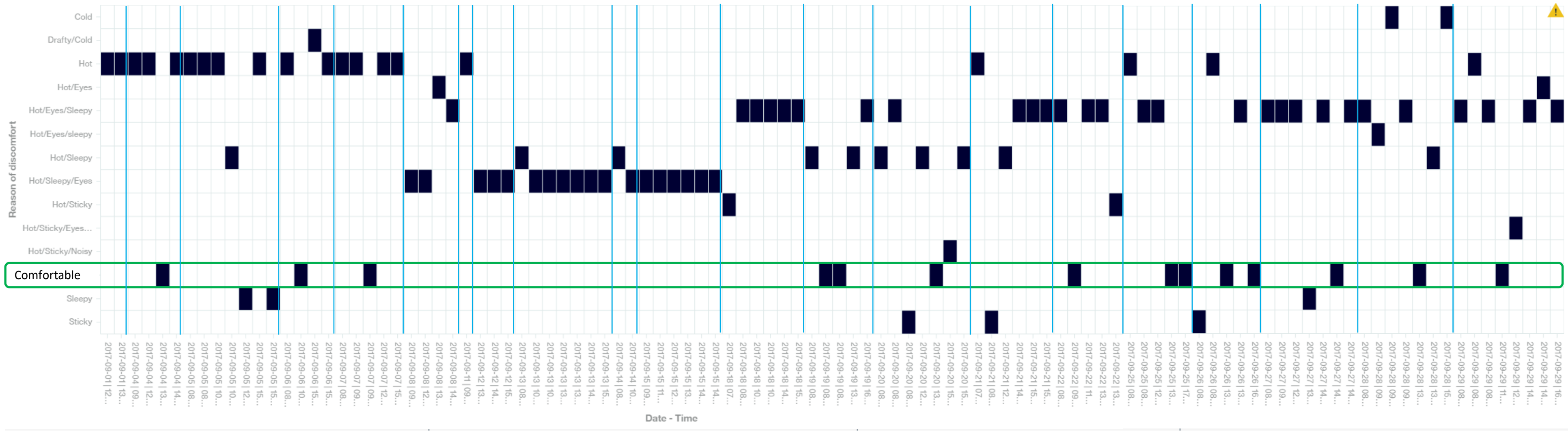

Figure 18: Entries submitted from the North with timestamp (the entries within the green box are comfortable entries while each blue line marks the delimitation of each day)

In the figures within the following sections, comfortable entries were highlighted using green boxes.

2.3.1 September 6 to September 7

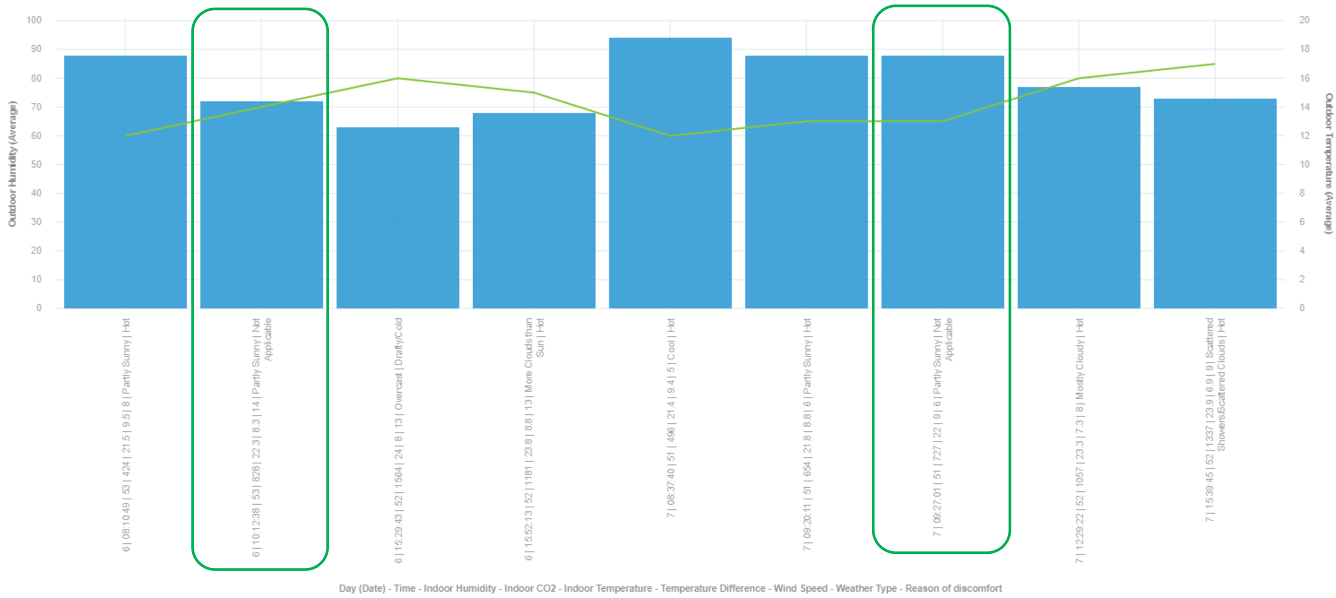

Figure 19: Entries submitted on 06/09/17 and 07/09/17

Nine entries were submitted in the North Zone on 06/09/17 and 07/09/17 as depicted in Figure 19. Entries were submitted across the whole day (from 8am to 3pm) and one comfortable entry was made on each day in the morning (at 10:12am on the 06/09/17 and 9:27am on the 07/09/17).

Entries made on 06/09/17 were submitted by:

- User 2: only uncomfortable entries
- User 7: one comfortable and one uncomfortable entry

Entries made on 07/09/17 were submitted by:

- User 2: all uncomfortable entries
- User 11: the comfortable entry

The uncomfortable entry User 7 made on 06/09/17 (3:29pm) relates to feeling cold and drafty, while indoor temperature recorded at that time was 24^{o}C. This user is most likely being put at discomfort because of an underlying draft which the physiological response is feeling cold (blowing air on a humid skin will make the feel like temperature drop) rather than being affected by the actual temperature of the zone.

It appears that User 7 and User 2 should not be seated in the same area: indeed 20 minutes after User 7's uncomfortable entry, User 2 also submitted an entry to notify feeling hot. In the past User 2 has happily turned on a fan to try and cool off which suggests that being in the way of a breeze is not a source of discomfort for this user. It is important to note that the North Zone is continuing to show indoor temperatures 3^{o}C higher than the 21^{o}C set by the BMS.

Figure 19 also shows that the main reason of discomfort that was submitted on those days was users feeling too hot, and although the main contributor is User 2 we can see that the temperature difference between indoor and outdoor is significant (on average indoor temperature was 8^{o}C hotter than outdoor temperature). The source of discomfort felt by users linked to temperature might be linked to that temperature differential – it might be a better option to set the BMS to regulate temperature based on outdoor/indoor temperature difference instead of a set temperature as a target.

2.3.2 September 8 to September 20

As evidenced from Figure 18, we can suspect that indoor conditions between the 08/09/17 and 20/09/17 were different enough to prevent users submitting comfortable entries. Indeed a few comfortable entries were submitted before the 08/09/17 and none until the 20/09/17.

Table 3 indicates the types of entries submitted within that period and we have highlighted in green the comfortable entries. Coming to any definitive conclusion is not possible as only a few users submitted entries in that period, the main contributor being User 2 (who did not make any comfortable entries and therefore cannot confirm any comfort threshold), however the few comfortable entries made by the other users can still provide insight as to what should be optimum conditions.

Table 3: Entries made between 08/09/17 and 20/09/17 in the North Zone

Date	Time	User	Action	Reason	Indoor Temp (ºC)	Indoor Hum (%)	Indoor CO_2 (ppm)	Outdoor Temp (ºC)	Outdoor Hum (%)	Wind Speed Direction
08/09/17	09:17:50	2	Fan On	Hot/Sleepy/Eyes	22.3	55	707	12	94	6 mph SSW-NNE
08/09/17	12:53:10	2	Fan On	Hot/Sleepy/Eyes	23.3	53	1003	16	72	15 mph W-E
08/09/17	13:40:19	2	Fan On	Hot/Eyes	23.4	52	993	16	63	16 mph W-E
08/09/17	14:38:20	2	Fan On	Hot/Eyes/Sleepy	23.6	52	1030	17	59	20 mph W-E
11/09/17	09:45:17	2	Fan On	Hot	21.4	53	774	14	88	15 mph WSW-ENE
12/09/17	13:08:23	2	Fan On	Hot/Sleepy/Eyes	22.9	51	1070	15	68	12 mph W-E
12/09/17	14:00:39	2	Fan On	Hot/Sleepy/Eyes	23	50	1124	15	68	13 mph WSW-ENE
12/09/17	15:23:13	2	Fan On	Hot/Sleepy/Eyes	23.4	50	1333	15	63	13 mph W-E
13/09/17	08:52:46	2	Fan On	Hot/Sleepy	21.2	50	475	11	88	20 mph WSW-ENE
13/09/17	10:37:14	2	Fan On	Hot/Sleepy/Eyes	22.2	50	1039	12	82	16 mph WSW-ENE
13/09/17	10:56:23	2	Fan On	Hot/Sleepy/Eyes	22.4	50	1130	11	88	14 mph W-E
13/09/17	13:40:03	2	Fan On	Hot/Sleepy/Eyes	22.9	50	1247	14	77	18 mph W-E
13/09/17	13:52:49	2	Fan On	Hot/Sleepy/Eyes	23	50	1239	14	77	18 mph W-E
13/09/17	14:52:57	2	Fan On	Hot/Sleepy/Eyes	23.3	50	1375	15	68	15 mph W-E
13/09/17	15:11:14	2	Fan On	Hot/Sleepy/Eyes	23.3	50	1384	12	72	14 mph W-E
14/09/17	08:48:37	2	Fan On	Hot/Sleepy	21.4	47	476	11	88	7 mph W-E
14/09/17	10:56:13	2	Fan On	Hot/Sleepy/Eyes	22.6	48	1126	14	67	12 mph WNW-ENE
15/09/17	09:21:07	2	Fan On	Hot/Sleepy/Eyes	21.4	46	667	10	94	3 mph N-S
15/09/17	11:11:52	2	Fan On	Hot/Sleepy/Eyes	22.1	46	814	13	77	3 mph N-S
15/09/17	12:36:00	2	Fan On	Hot/Sleepy/Eyes	22.6	46	1077	14	67	7 mph NNW-SSE
15/09/17	13:35:39	2	Fan On	Hot/Sleepy/Eyes	22.9	46	1081	14	63	9 mph NW-SE

15/09/17	14:06:12	2	Fan On	Hot/Sleepy/Eyes	23	46	1045	15	59	6 mph N-S
15/09/17	14:55:26	2	Fan On	Hot/Sleepy/Eyes	23.2	45	1110	16	55	10 mph NW-SE
18/09/17	07:35:22	10	Vent Open	Hot/Sticky	20.8	48	442	11	88	5 mph NW-SE
18/09/17	08:06:50	2	Fan On	Hot/Eyes/Sleepy	21.5	48	489	11	88	5 mph NW-SE
18/09/17	10:05:11	2	Fan On	Hot/Eyes/Sleepy	22.2	47	806	12	82	6 mph NW-SE
18/09/17	10:31:49	2	Fan On	Hot/Eyes/Sleepy	22.3	47	927	13	77	3 mph NW-SE
18/09/17	14:08:51	2	Fan On	Hot/Eyes/Sleepy	23	48	1494	15	63	9 mph WNW-ESE
18/09/17	15:42:00	2	Fan On	Hot/Eyes/Sleepy	23	48	1660	12	88	6 mph N-S
19/09/17	08:11:35	2	Fan On	Hot/Sleepy	21	47	494	7	100	2 mph N-S
19/09/17	08:12:36	10	Not Applicable	Not Applicable	21	47	494	7	100	2 mph N-S
19/09/17	08:49:39	11	Not Applicable	Not Applicable	21.1	47	603	7	100	2 mph N-S
19/09/17	13:48:25	2	Fan On	Hot/Sleepy	22.9	48	1477	15	68	6 mph WSW-ENE
19/09/17	16:07:21	2	Fan On	Hot/Eyes/Sleepy	23.6	48	1913	15	63	5 mph NNW-SSE
20/09/17	08:04:52	2	Fan On	Hot/Sleepy	21.1	48	474	12	88	5 mph S-N
20/09/17	08:31:23	2	Fan On	Hot/Eyes/Sleepy	21.2	48	518	13	88	5 mph S-N
20/09/17	08:52:42	2	Clothing Remove/Vent Open	Sticky	21.4	49	586	14	82	9 mph S-N
20/09/17	12:34:49	2	Fan On	Hot/Sleepy	23.3	51	1361	17	73	9 mph S-N
20/09/17	13:29:16	19	Not Applicable	Not Applicable	23.5	51	1379	17	73	8 mph S-N
20/09/17	15:13:05	19	Moved/Clothing Remove/Vent Open	Hot/Sticky/Noisy	23.8	51	1498	17	73	9 mph S-N
20/09/17	15:36:28	2	Fan On	Hot/Sleepy	23.9	51	1509	17	73	9 mph S-N

We can see that the main reason of discomfort for this period was a combination of hot, sleepy and sore eyes. From the table above we can see that indoor temperature and CO_2 levels were the two main indoor factors that were out of their standard comfort zone (above 21°C for temperature and above 1000ppm for CO_2 levels) which would explain the combination of reasons selected by the users.

We can note, however, that User 19 made an unexpected comfortable entry on 20/09/17, when indoor conditions were not comfortable. That is, we would have predicted that a high temperature, high CO_2 level, and a high temperature difference with the outdoor should have resulted in an uncomfortable entry. However, it is possible that User 19 was outside prior to making that entry (timestamp would suggest getting lunch outside) and felt more comfortable once back at their desk. This comfort did not last as 2 hours later the same User reported feeling hot, sticky and suffering from the noise level, which were at 51db at the time (the only sensor we have that records noise level is located in the South zone which is part of the open space just like the North zone so we are assuming noise levels were roughly the same level in the North). Between those two entries the indoor temperature had risen by 0.3°C and the CO_2 levels by 119ppm, and although the human body is quite a proactive sensor, it is most likely that User 19 felt comfortable after changing environment (from a cold environment to a hot environment) but quickly became overwhelmed by the new indoor conditions.

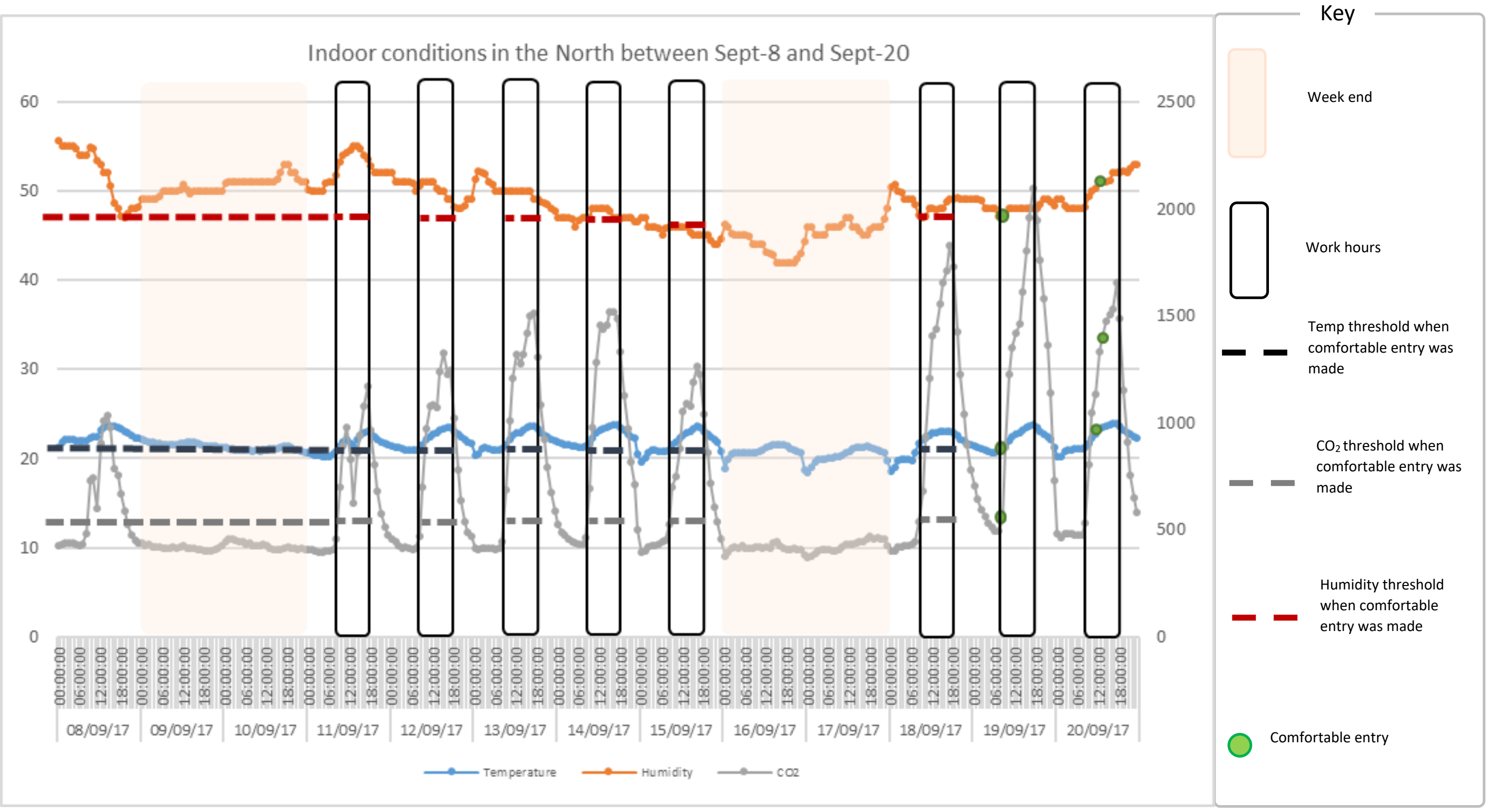

Figure 20: Indoor conditions in the North between Sept-8 and Sept-20

In Figure 20 we have looked at how the indoor factors have evolved between 08/09/17 and 20/09/17 We can see that the comfort levels (based on the comfort entries made on the 19th) for each factor (temperature, CO_2 and humidity) are only reached during the very first few hours of the days after which they are always above the identified thresholds.

We have used the 19/09/17 as a point of reference as two different comfortable entries were made by two different users close together suggesting that those conditions were the most representative.

2.3.3 General conclusions

Users from the North have mainly felt uncomfortable either in the morning or in the afternoon, we can also see that sleep-based entries have mainly been submitted either early in the morning, at lunch time or in the afternoon. Comfortable entries have been submitted either in the morning or at lunch time; this latter observation further points out that the indoor conditions are only optimum in the morning or when users come back in from outside or a different zone of the building that might be cooler.

2.4 South

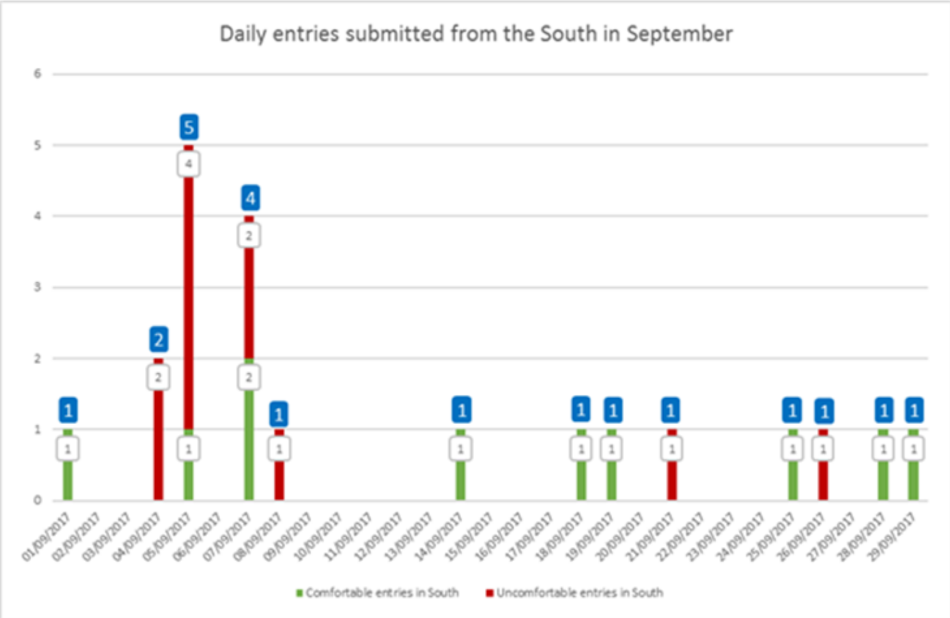

Figure 21: Daily entries submitted from the South in September

Figure 21 shows all 21 entries (47% comfortable compared to 53% uncomfortable entries) that were made in the South zone. Compared to last month's data (where 34% were comfortable and 66% were uncomfortable) this is an increase in comfort levels of 13%. Although it is too early to tell, this might be the reason for less entries being submitted, since people feel comfortable, they feel compelled to report it.

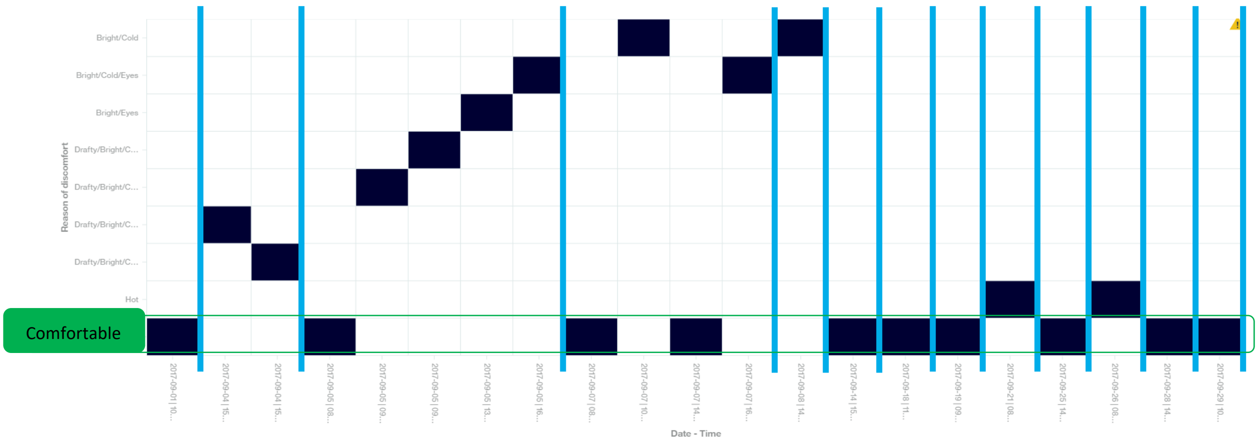

Figure 22: Date & Time vs. Reason of discomfort

According to Figure 22, the office day that showed the most entries was the 05/09, where it correlated to the day (between 08:00 and 17:00hrs) where the conditions had:

- a CO_2 range of 459ppm across the day, starting at 455ppm at 08:00 before peaking at 914ppm by 10:36, and decreasing to 729ppm by 17:00
- a temperature range of 1.2^{oC}, starting at 22^{oC} before reaching 23.2^{oC} by 10:41, and decreasing to 22.3^{oC} before COP at 17:00
- a humidity range of 7%, starting at 70% at 08:00, before reaching 72% by 11:16, and plummeting to 65% by COP at 17:00

User 9 makes the comfortable entry on 05/09/17 which is not the same user that makes the next four uncomfortable entries that day. User 1 makes entries at 09:02, 09:28, 13:52, and 16:02. Apart from the 13:52 entry, the other entries all state that User 1 is Cold in some way. It is therefore not possible to state whether the decrease in temperature and humidity after 10:41 and 11:16 (respectively) have resulted in User 1 sending information, as they had already sent data at 09:02 stating they were uncomfortable.
The data shows that there was a significant increase in comfortable entries towards the end of the month, with particular focus on the period between the 14/09/2017 and 29/09/17, with 6 entries given in 8 days. User 9 is responsible for 5 of those comfortable entries, and User 8 is responsible for one comfortable entry on the 25/09. The main reason of discomfort for this zone was the temperature being too cold (42%), followed by users reporting it being too bright (22%) or sore eyes (17%) as evidenced in the chart (Figure 23). The fourth reason of discomfort is it being drafty (10%).

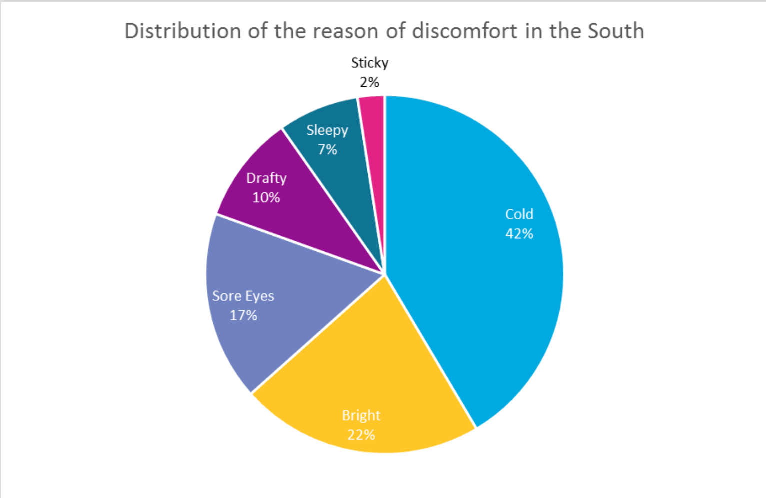

Figure 23: Distribution of the reason of discomfort in the South

General conclusions

Analysis, displayed in Figure 24, does not show any correlation between time of day and comfortable entries (i.e. "Not Applicable" circle) since those entries were recorded at any given time of a day. We can see, however, that entries including Bright as a reason of discomfort were mainly submitted in the afternoon (from 2pm to 4pm). We can also note that brightness was typically associated with Sore Eyes issues. This can be further refined as Drafty/Bright/Cold/Sore Eyes(/Sleepy) were typically submitted in the morning (at around 9am) while Drafty/Bright/Cold/Sore Eyes/Sleepy were typically submitted in the afternoon at (around 3pm).

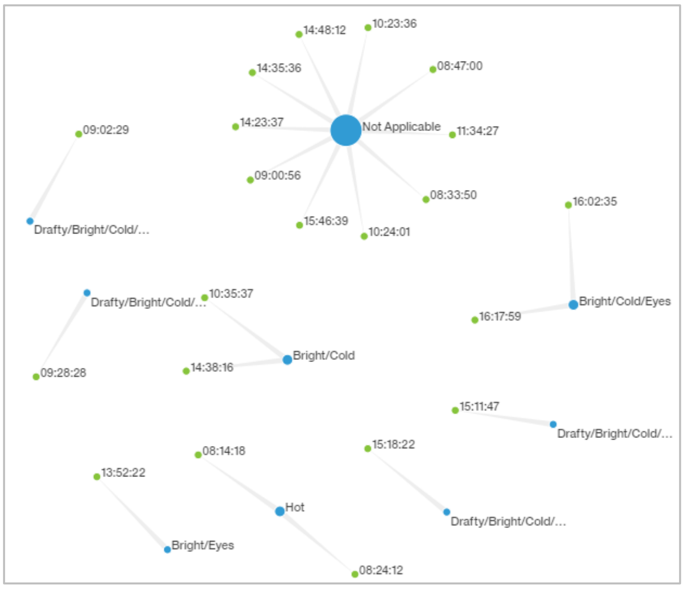

Figure 24: Time of entry vs. entry comparison graphic

The one major marker of Figure 25 shows that comfortable entries were made at an average of 22.7^{oC}. One anomaly that stands out is that Hot is reported between 21.65 °C, when it would typically be expected for Hot entry to be made at a greater temperature.

Figure 25: Bubble chart graph of amount of entries, vs. Outdoor temperature, vs. Indoor Temperature

Figure 26 highlights that the top 5 entries all contain the word Hot, suggesting that people are most uncomfortable due to the heat levels that can be experienced in the work environment.

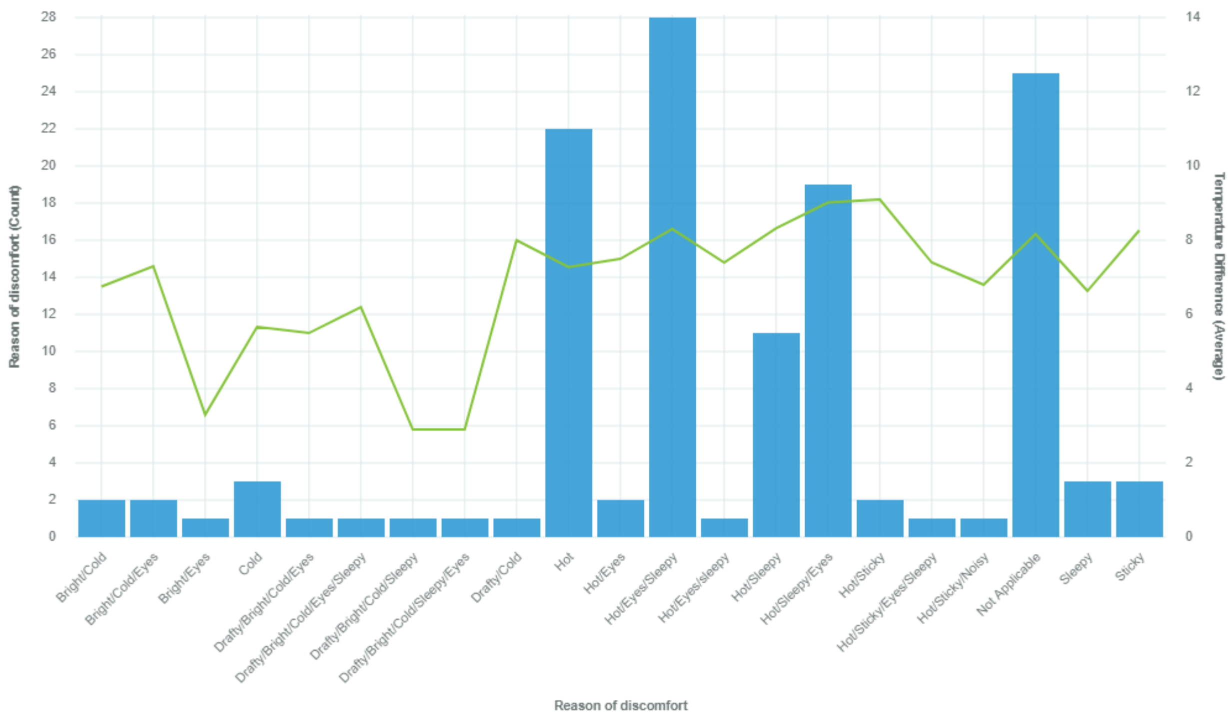

Figure 26: Reason of discomfort, vs. Reason of discomfort (count), vs. Temperature difference (average) graph

3 | PREDICTIVE MODELS

3.1 Comfort vs Discomfort Predictive Model

Figure 27: Predictive tree analysis of comfortable entries

The tree in Figure 27 is entirely different from the same analysis in August, in part due to the decreasing amount of entries made. This mean that the decision tree might not be as representative of the office as August's decision tree, hence location is not as important as it previously was.

Variables that have changed values in the decision tree include:

- Indoor humidity: <51% for users to be comfortable (as oppose to <50%)
- Indoor temperature: >23°C and <24°C for users to be comfortable (as oppose to <23°C)

Overall, it can be recognised that users are most likely to be comfortable when the Indoor Humidity is <51%, Wind direction is East to West etc., Indoor Temperature is between 23°C and 24°C, and the Temperature Difference is <5.2°C.

Figure 28: Predictive tree analysis of uncomfortable entries

As with Figure 27 the tree in Figure 28 is entirely different from the one reported in August, and, as stated previously, it is believed that this is largely due to the decreasing amount of entries made.

Variables that have changed values in the decision tree include:

- Indoor humidity: >51% for users to be uncomfortable (as oppose to >50%)
- Indoor temperature: >24°C are now needed for users to be uncomfortable (as oppose to >23°C)

Overall, it can be recognised that users are most likely to be uncomfortable when the Indoor Humidity is >51%, Temperature difference is <1.6°C, and Indoor Temperature is <23°C.

3.2 User 1 Predictive Model

The predictive model of User 1 (Figure 29) shows that, according to the data collected in September, they are most likely to report they are uncomfortable when they are sitting in the south zone of the office and are experiencing weather conditions that are associated to broken clouds.

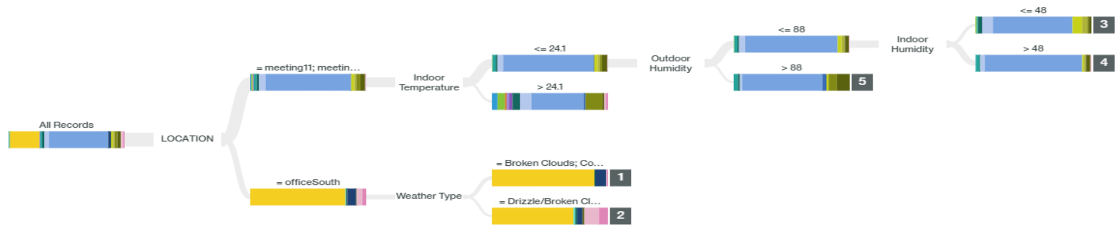

Figure 29: Predictive tree analysis of User 1 in September

3.3 User 2 Predictive Model

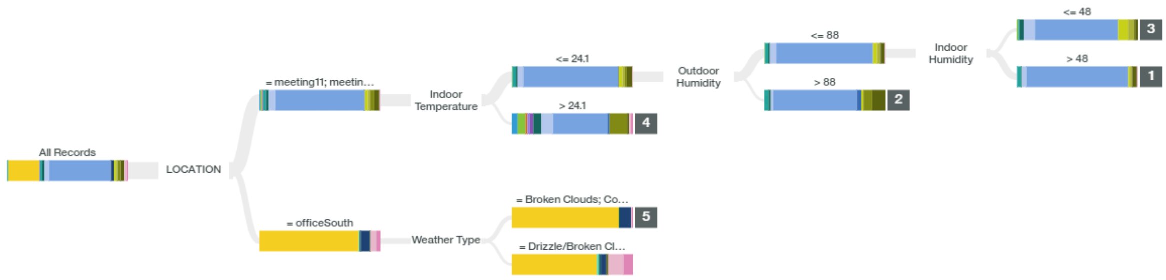

Figure 30: Predictive tree analysis of User 2 in September

The predictive model of User 2 (Figure 30) shows that, according to the data collected in September, they are most likely to report they are uncomfortable when they are sitting in either of the meeting rooms, when the indoor temperature is less than 24.1 °C, when the outdoor humidity is <88%, and indoor humidity is >48%.

3.4 User 3 Predictive Model

As with User 2, the predictive model of User 3 (Figure 31) shows that, according to the data collected in September, they are most likely to report they are uncomfortable when they are sitting in either of the meeting rooms, when the indoor temperature is >24.1 °C, when the outdoor humidity is less than 88%, and indoor humidity is less than 48%.

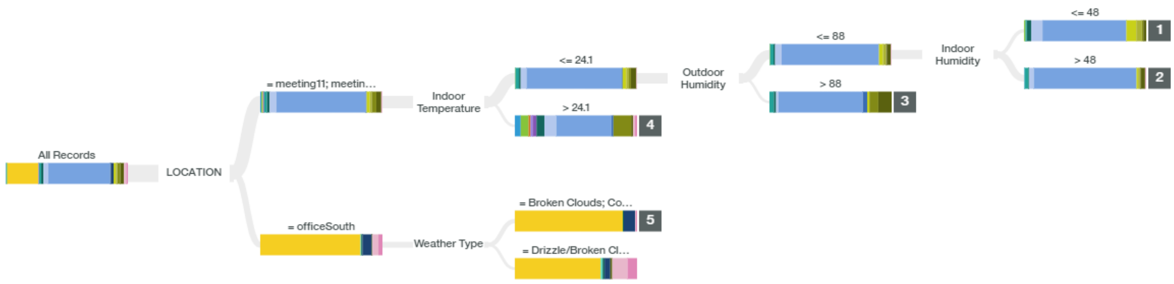

Figure 31: Predictive tree analysis of User 3 in September

4 | THE SNUDGE EFFECT

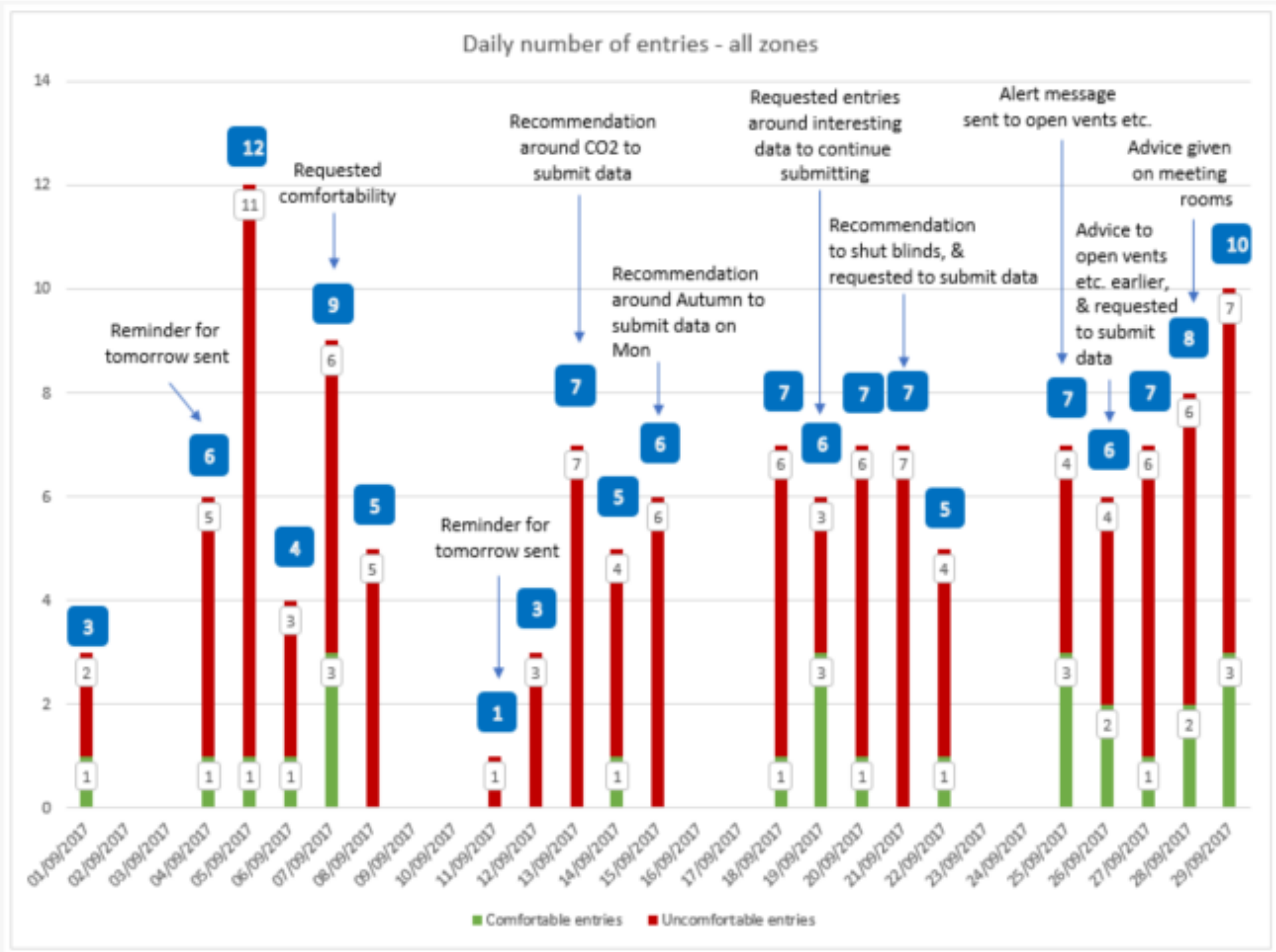

Figure 32: Snudge effect bar chart

The Snudges sent to effect behavioural change the following day, but also serve as a reminder for people to submit entries, seem to have increased entries for that following day in all three instances (i.e. 04/09/17 for the 05/09/17, the 11/09/17 for the 12/09/17, and the 15/09/17 for the 18/09/17) (Figure 32).

When comparing the two weeks that most Snudges were sent in September, w/c 11/09/17 and w/c 25/09/17, it can be seen that there were more comfortable entries submitted in the latter. What is worth noting is that in the former, all Snudges did were to ask for entries, while in the latter Snudges recommended actions. It remains to be proven but, using this comparison, it would appear that proactive Snudges prompting an action have a positive effect on users.

5 | ENERGY CONSUMPTION

The energy consumption chart (Figure 33) show electricity consumption during September for the first floor where the pilot is underway. Total electricity consumed in September was 2,878 kWh, compared to the August (for the first floor) which was 2,998kWh. This shows a 4% decrease, and we can see that consumption is generally at its peak on Tuesdays and Wednesdays. Further analysis and input data are needed to understand whether this is an anomaly, or this is the start of a trend.

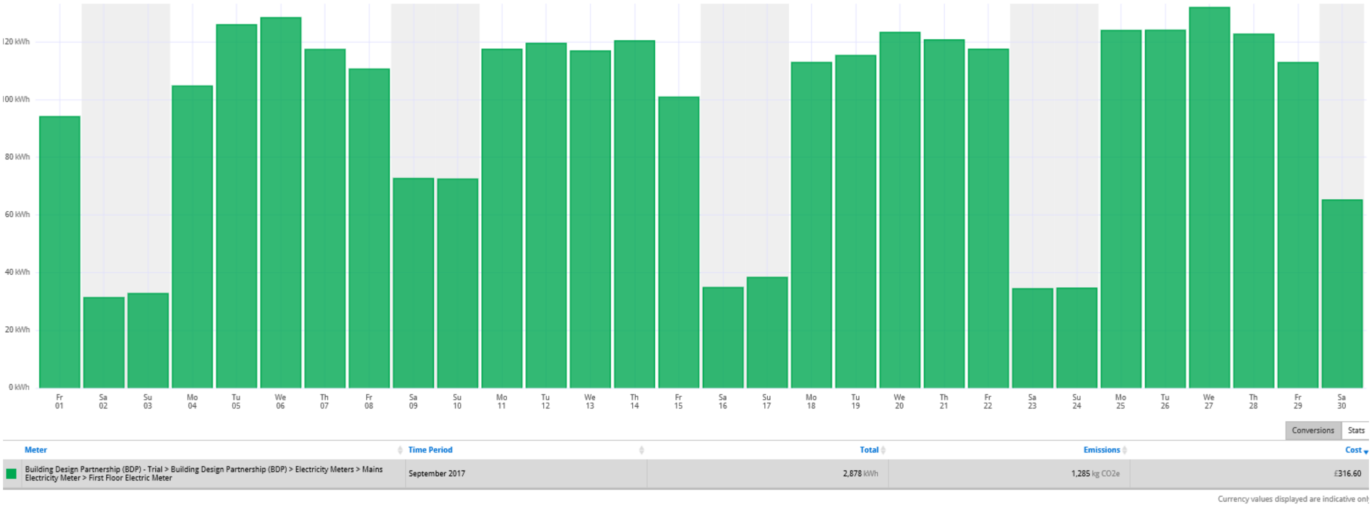

Figure 33: Energy Consumption for the First Floor