



**W Hotel**  
**Alltemp-M Test**  
**10.15.16**





kWh & Temperature

# **GENERAL CONDITIONS**

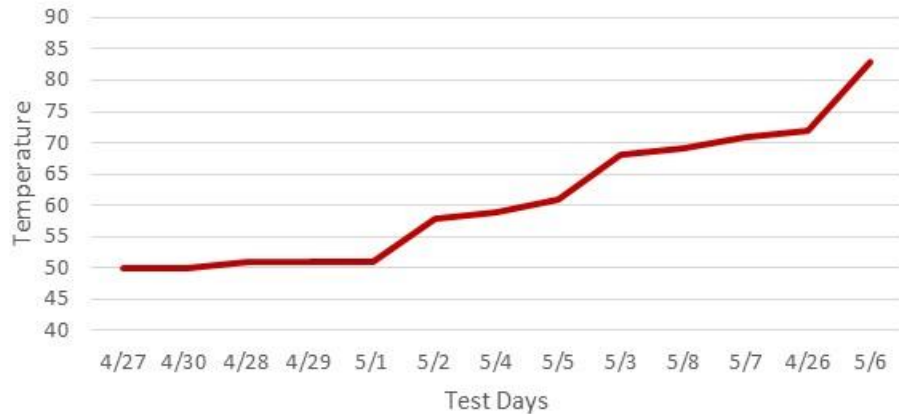


# Testing Overview

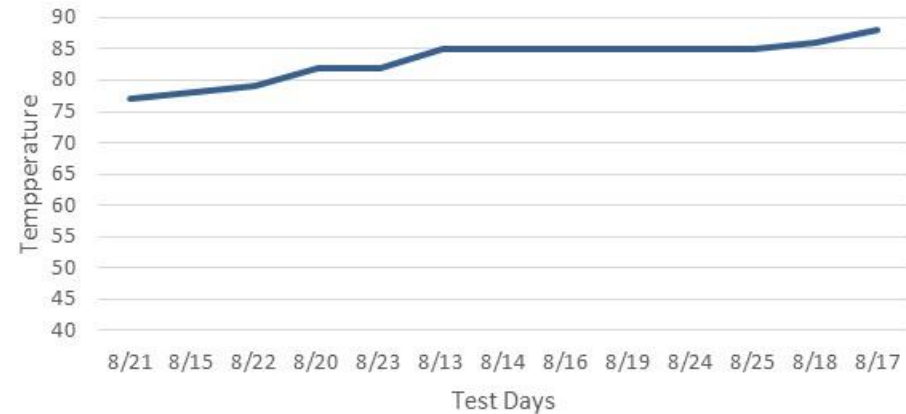
- Compare R404a to Alltemp-M
- R404a observed from 4/26/16 through 5/8/16
- Alltemp-M observed from 8/13/16 through 8/25/16
- Measurements taken hourly during test period
  - Consumption(kWh)
  - Max power

- Outside air temperatures were significantly higher for Alltemp-M's study time frame as compared to R404a's

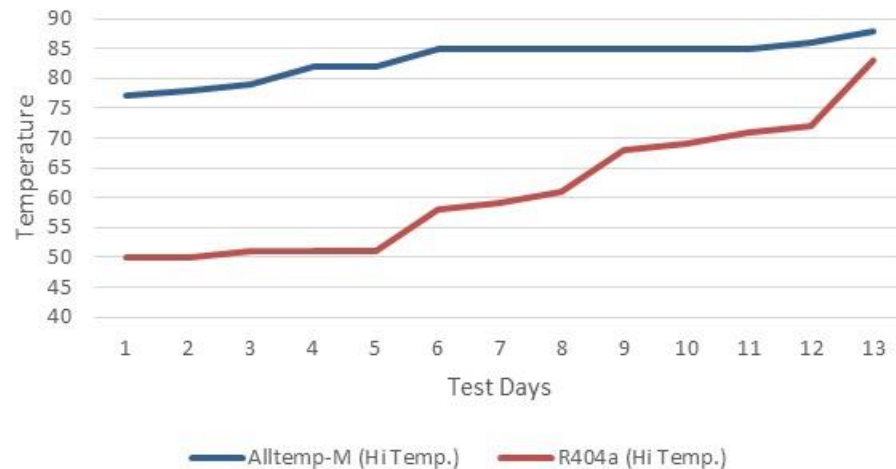
R404a Daily Hi Temperatures  
(ordered by temp.)



Alltemp-M Daily Hi Temperatures  
(ordered by temp.)



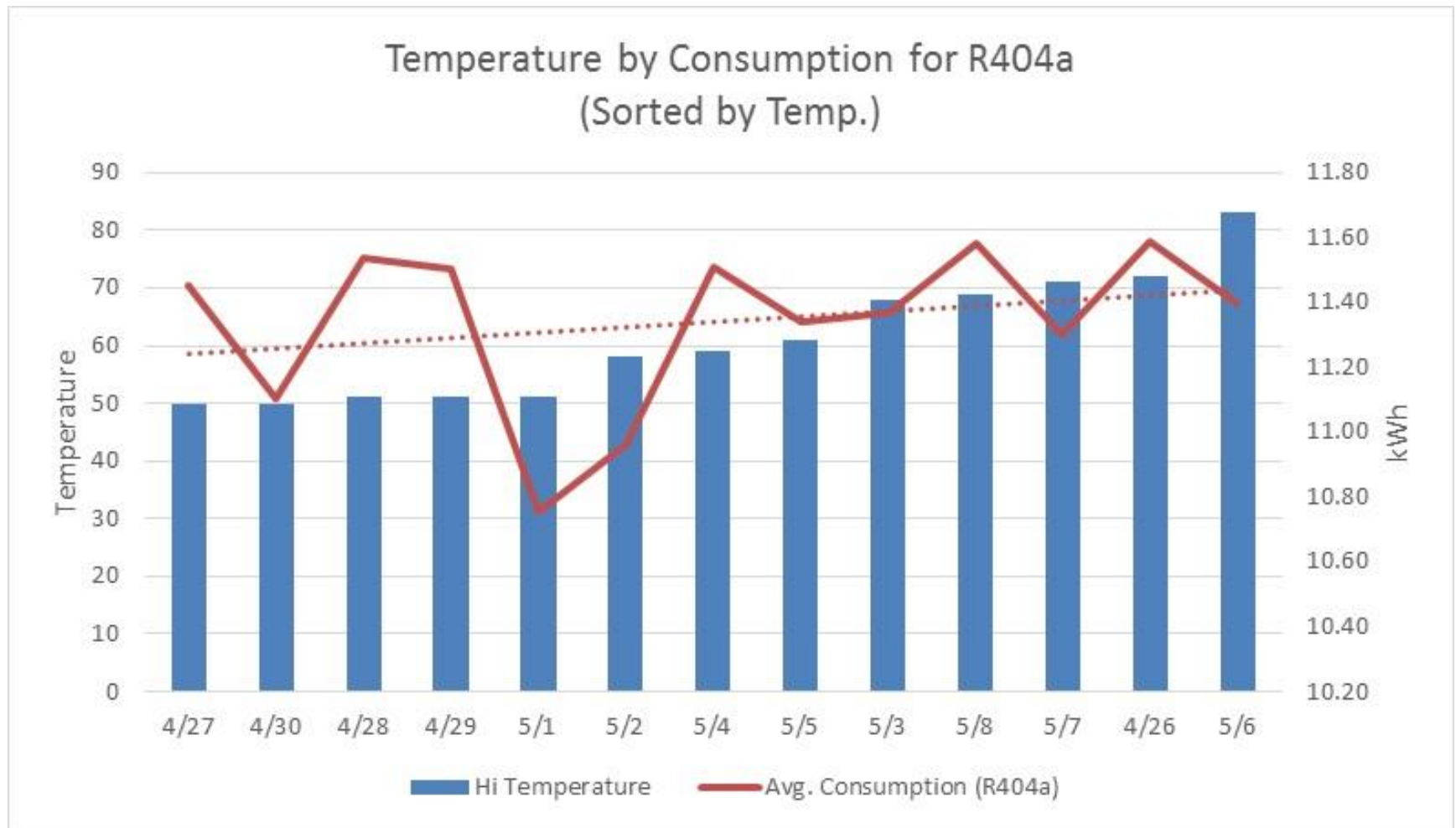
Temperature Comparison



	Avg. Temp.
Alltemp-M	83.2
R404a	<u>61.1</u>
Difference	22.1

On average, Alltemp-M's conditions were 22° hotter than R404a's

- As expected, R404a consumption increased as temperature increased





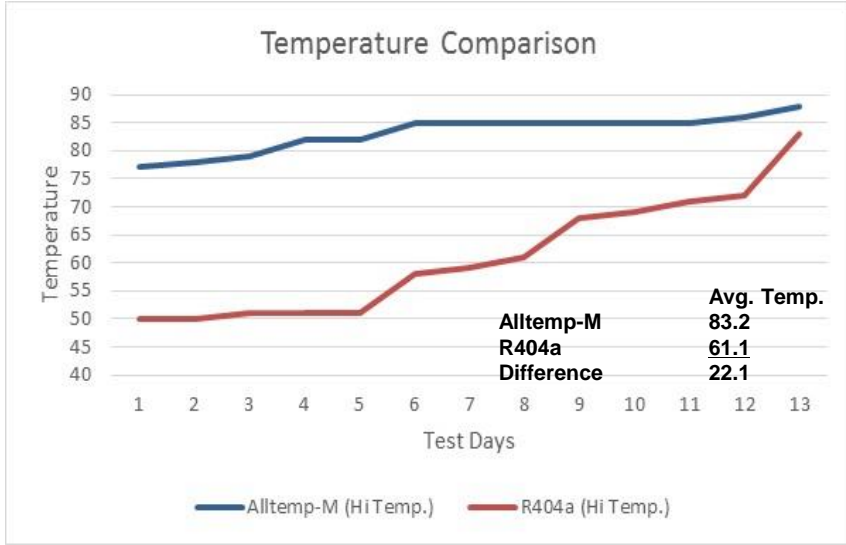
# FINDINGS

- Alltemp-M conservatively had a 56.13% savings in consumption over R404a
- However, this conservative savings does not include the impact increased temperature would have normally had on consumption and thus the true savings is larger than that 56.13%

	<b>Consumption(kWh)</b>	<b>Max power (kW)</b>
Alltemp-M	4.97	9.58
R404a	11.33	13.72
<b>% Difference</b>	<b>56.13%</b>	<b>30.17%</b>

- Using SCE’s estimate for increased energy usage as a result of higher ambient temperature, one would estimate Alltemp-M’s consumption savings is closer to 80%

- “Refrigerators can use 2.5 percent more energy for each 1° F over normal ambient room temperature (70° F). This means your refrigerator could use 22 percent to 25 percent more energy in an 80° F room, and 45 to 50 percent more in a 90° F room.”
- Other research specified a 2% increase in plug load per °C
- Alltemp-M’s temperature conditions were significantly higher than R404a’s because of seasonality
- One would have expected a sizable increase in consumption rather than a 56.13% decrease due to higher temp
- Previous regression research found that temperature was a bigger factor in the determinant of energy usage over number of times a door is opened



	<b>Alltemp-M</b>
Consumption (kWh) observed savings	56.13%
Additional savings as a result of higher temperatures	22-25%
<b>Total Estimated Savings</b>	<b>78-81%</b>





# APPENDIX



# Research Sources

- <http://fire.nist.gov/bfrlpubs/build96/PDF/b96070.pdf>
- <http://sce.tumblr.com/post/85354038796/9-ways-to-make-your-refrigerator-more-efficient>
- [http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/ulf\\_freezer\\_user\\_guide.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/ulf_freezer_user_guide.pdf)
- <http://michaelbluejay.com/electricity/refrigerators.html>
- <https://web.archive.org/web/20050427075353/http://hem.dis.anl.gov/eehem/93/930114.html#93011444>