

# Comparing WT10 Performance: Tower vs. Building Mounted

James Jarvis

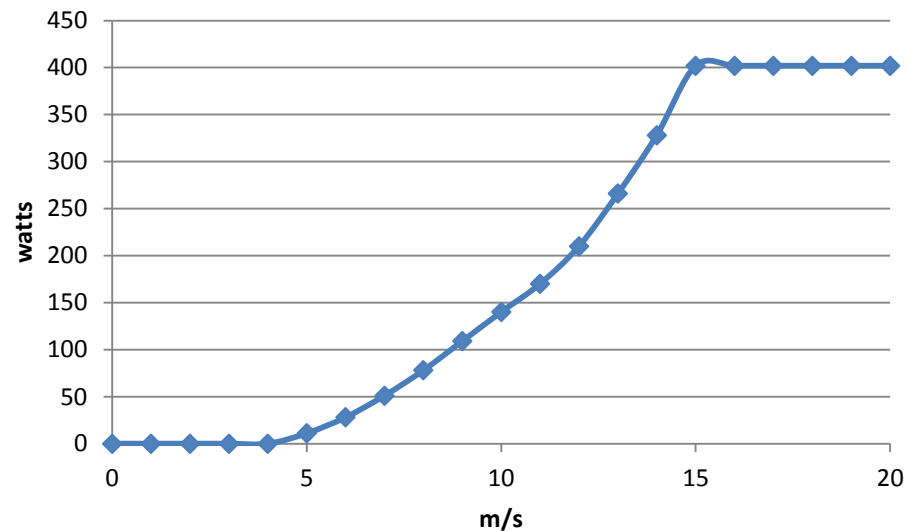
APRS World, LLC

[www.aprsworld.com](http://www.aprsworld.com)



# WTAPRS WT10

- 1 meter rotor diameter
- direct battery charging (12, 24, 48 volt models)
- Permanent magnet generator
- 3 $\emptyset$ , 10 pole (Variable frequency and voltage)
- Built for high wind and extreme sites
  - mountain tops
  - desert
  - arctic and Antarctic



**MORE TOWER, MORE POWER. YES!**

but will no tower work?

# Shipping Container Corner Mount

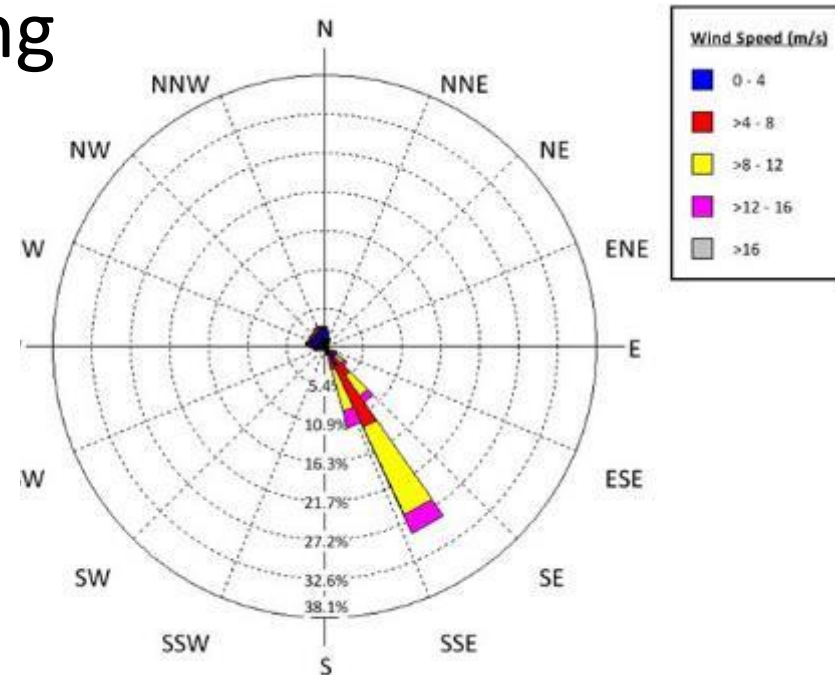
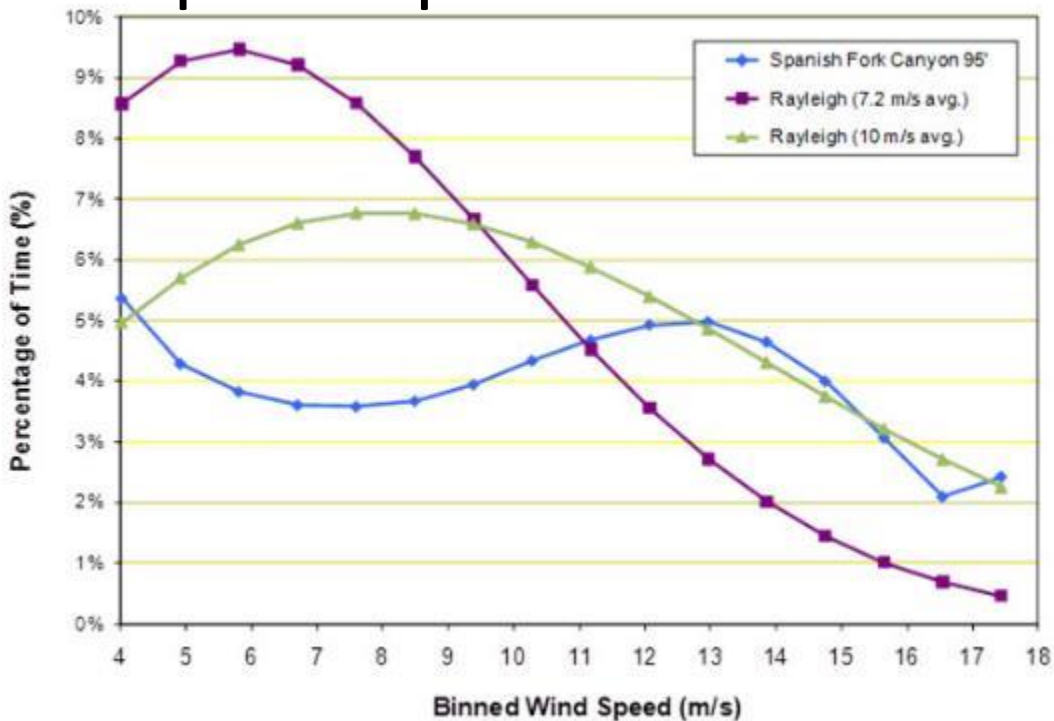


- Mounts turbine to corner fittings
- ~2 m hub height above top of container
- Originally designed for very high wind site in Greenland
- Rated for 65 m/s with WT10



# Test Site

- Windward Engineering at Spanish Fork, Utah
- Very uniform wind resource
- APRS World's (non-destructive) test site for power performance testing



# Test Setup

## Main Tower (26 m above ground)

- Main tower
  - WT10
  - Anemometers & wind vane
  - IP Camera

## Container Corner Mount (4.5 m above ground / 2 m above container)

- Container Mount
  - WT10
  - Anemometer
  - IP Camera
  - LED floodlight



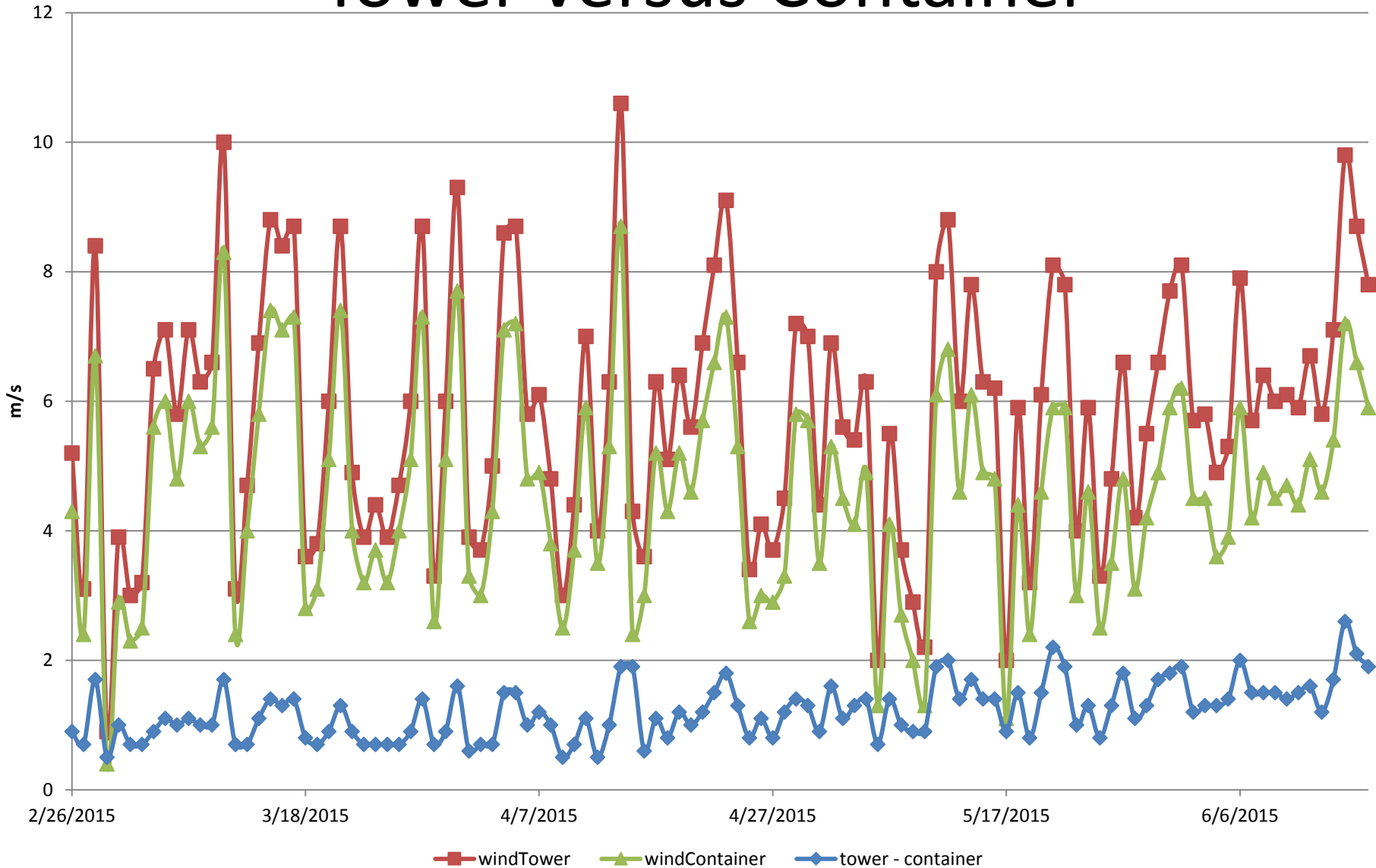
# Test Duration

- WT10 24V on 25 m tower for ~1 year
- Replaced with different test turbine
- Same WT10 24V moved to container mount and ~0.5 year data gathered





# Results – Wind Speed Tower versus Container



# Results – Maximum Daily Power Output

## 25 m Tower Mounted

- Count
  - 156 days between 2013-12-25 and 2014-06-16 where power output > 100 watts
- Average maximum power output
  - 402 watts
- Maximum
  - 543 watts

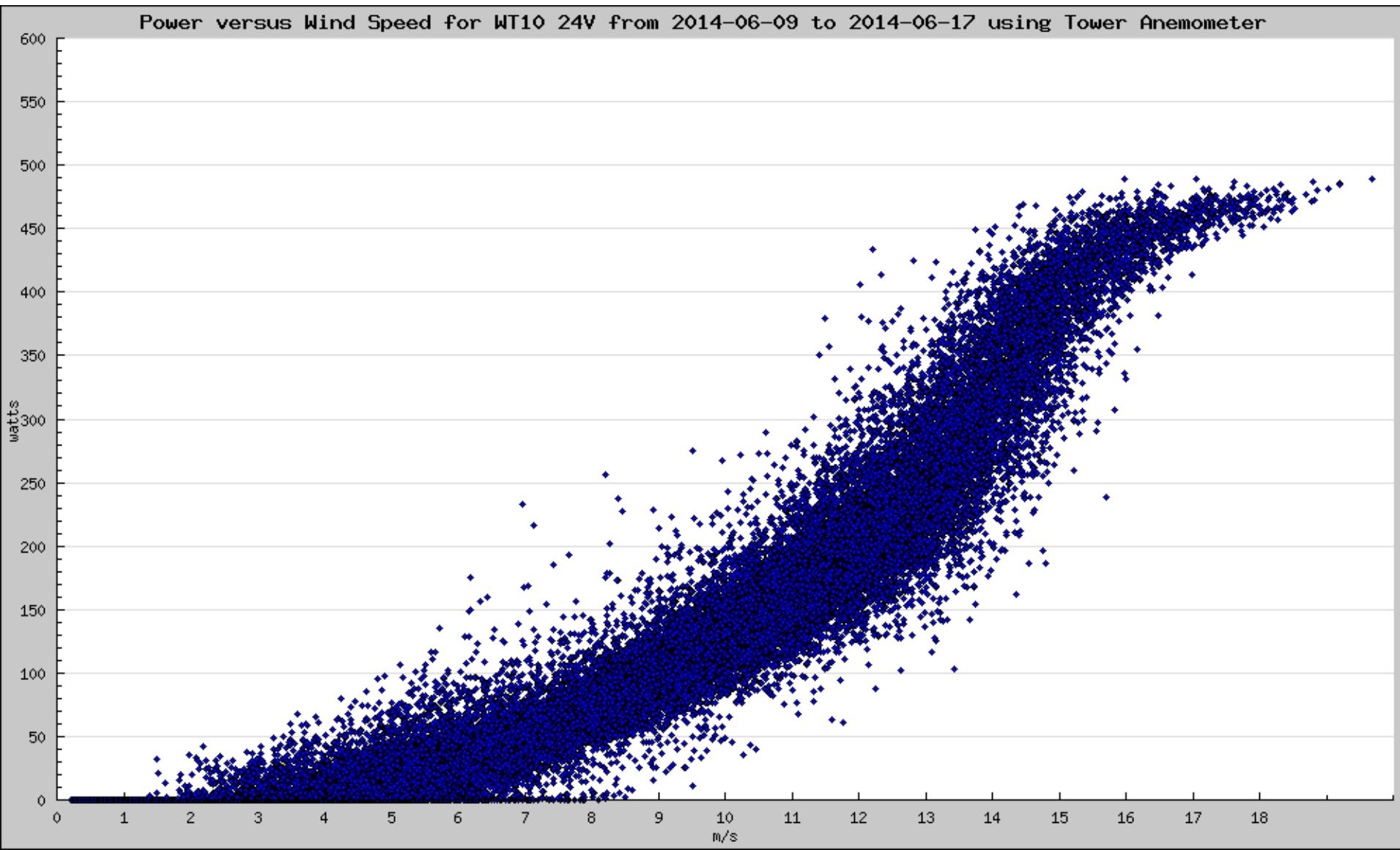
## Container Mounted

- Period
  - 158 days between 2014-12-19 and 2015-06-16 where power output > 100 watts
- Average maximum power output
  - 273 watts
- Maximum
  - 553 watts

**Conclusion: Peak power output remains the same**

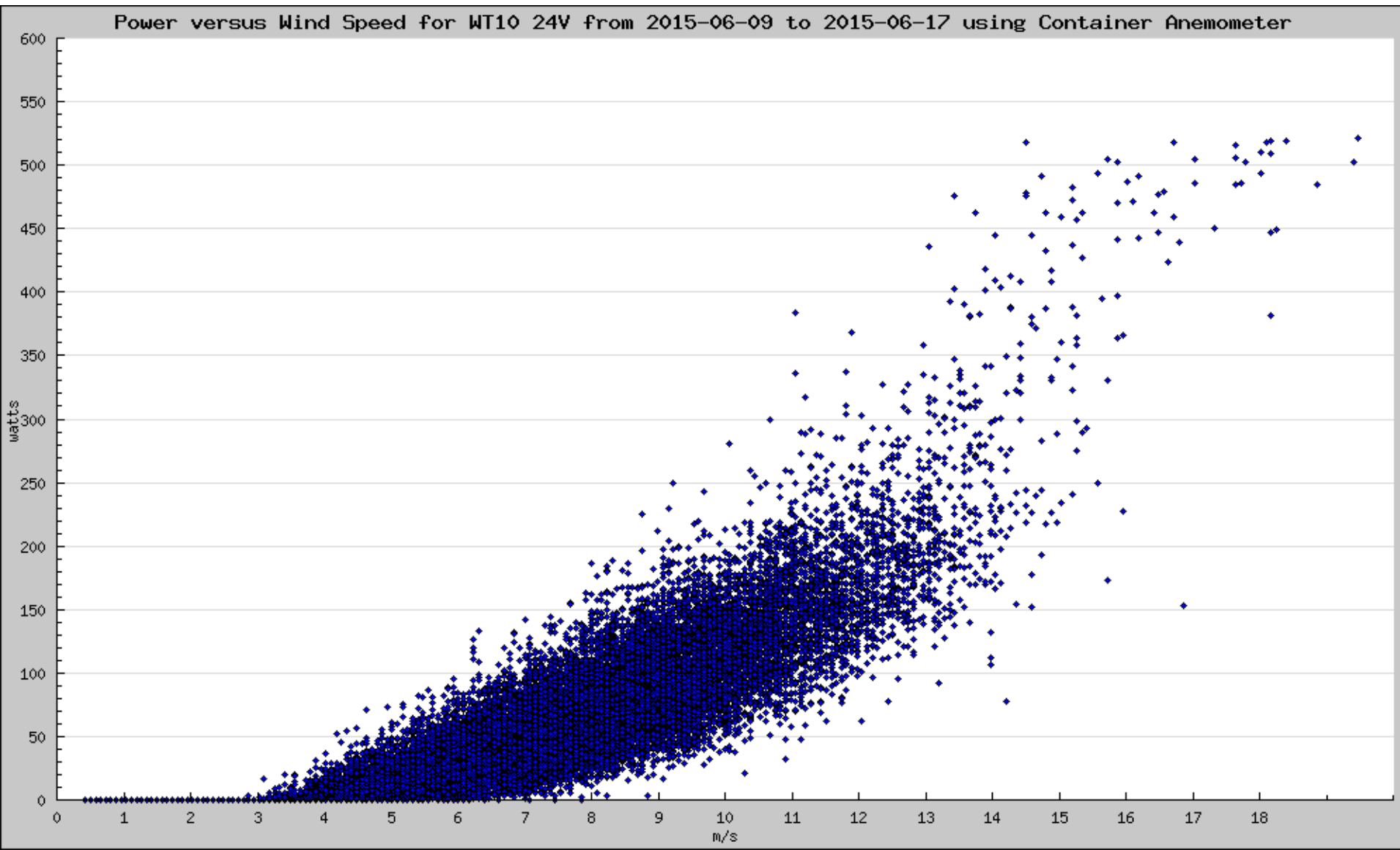
# Results - Power Output on Tower

6.5 m/s average speed this week



# Results - Power Output on Container

6.9 m/s (tower) 5.3 m/s (container) average speed this week



# Results – Average Power Output

## On Tower

- Wind Speed Average  
6.5 m/s
- Power Output Average

**77 watts**

- 2014-06-09 to 2014-06-17

## On Container

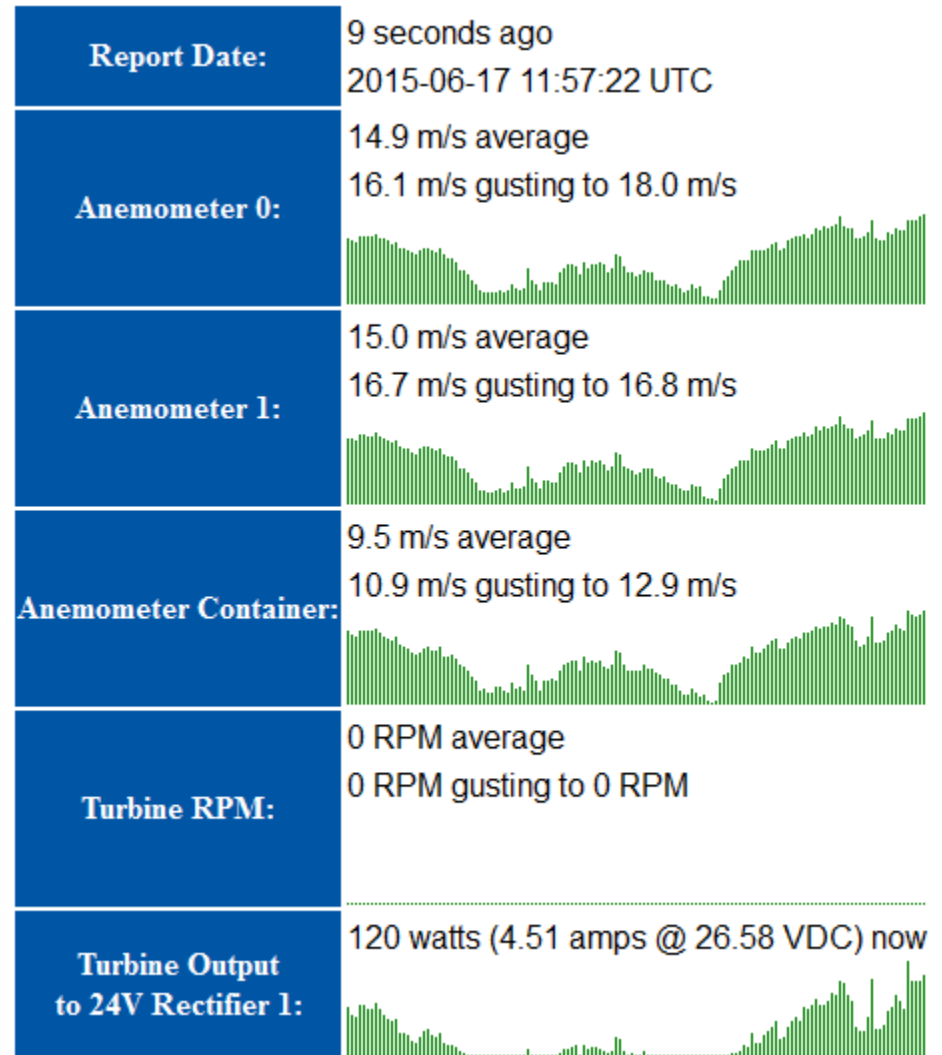
- Wind Speed Average (on container)  
5.3 m/s
- Wind Speed Average (on tower)  
6.9 m/s
- Power Output Average

**33 watts**

- 2015-06-09 to 2015-06-17

# Conclusions

- More tower, more power
- But with (this) micro wind turbine (at this site), there is still power available 4.5 meters off the ground / 2 meters off the top of the container
- Put two on the container?



# Questions and Comments?



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