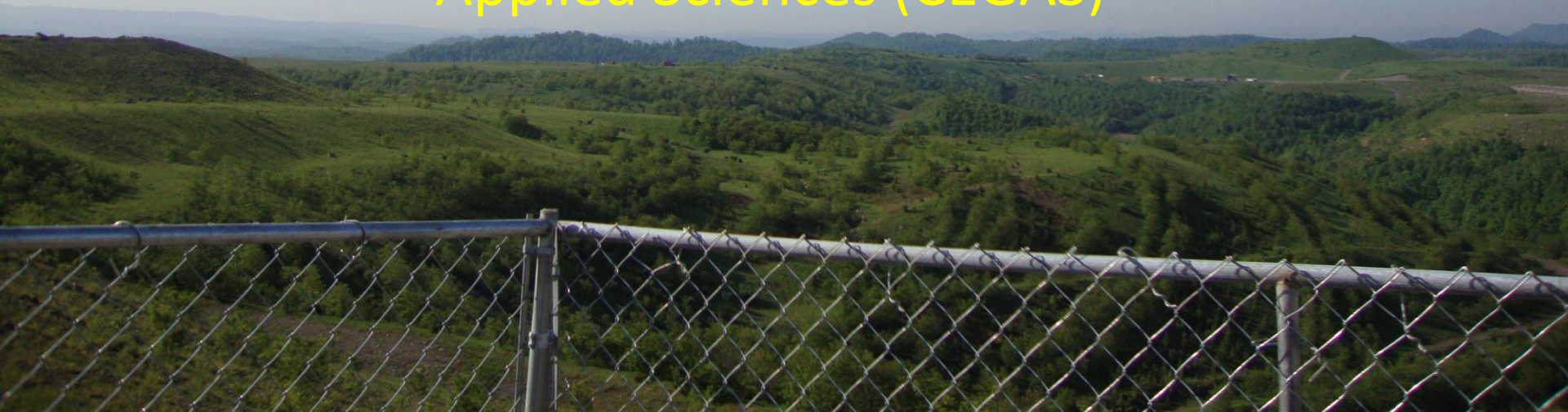




# A Season of Wind Assessment on Surface-Mined Land

Center for Business and Economic Research  
(CBER)

Center for Geotechnical, Environmental and  
Applied Sciences (CEGAS)





# Project Background

- Sponsors: WV Division of Energy and the Appalachian Regional Commission
- Technology: SoDAR (Sonic Detection And Ranging) – SecondWind’s Triton
- Partner: ICG Eastern, Birch River Operation
- Location: Webster County
- Date of Installation: May 2010
- Objective: To assessment wind development opportunities on former surface-mined lands.



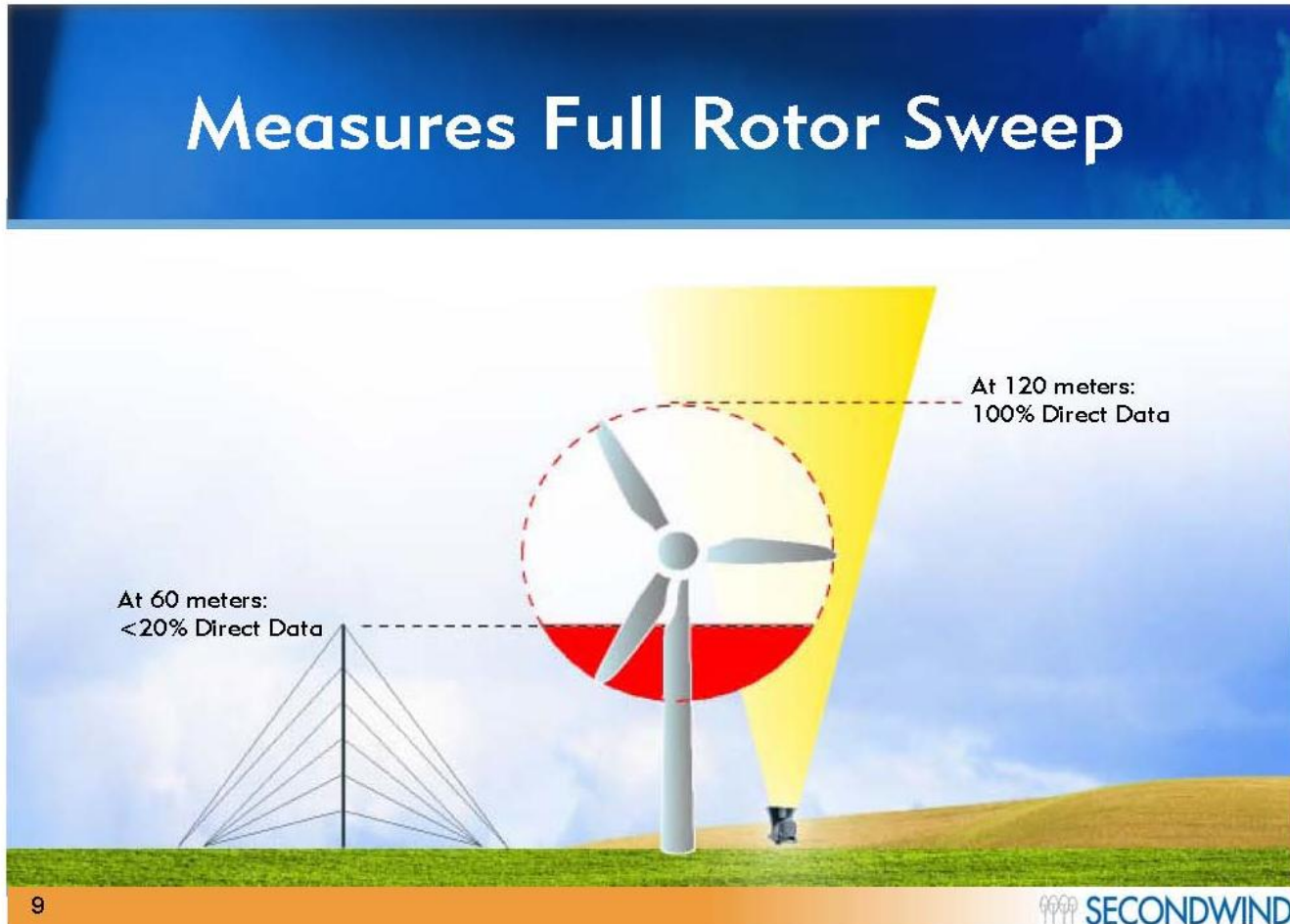
**SODAR**



**ICG Eastern Surface Mine  
Elevation: 819m (2,686 ft)**

# Sonic Detection and Ranging (SODAR)

## Measures Full Rotor Sweep



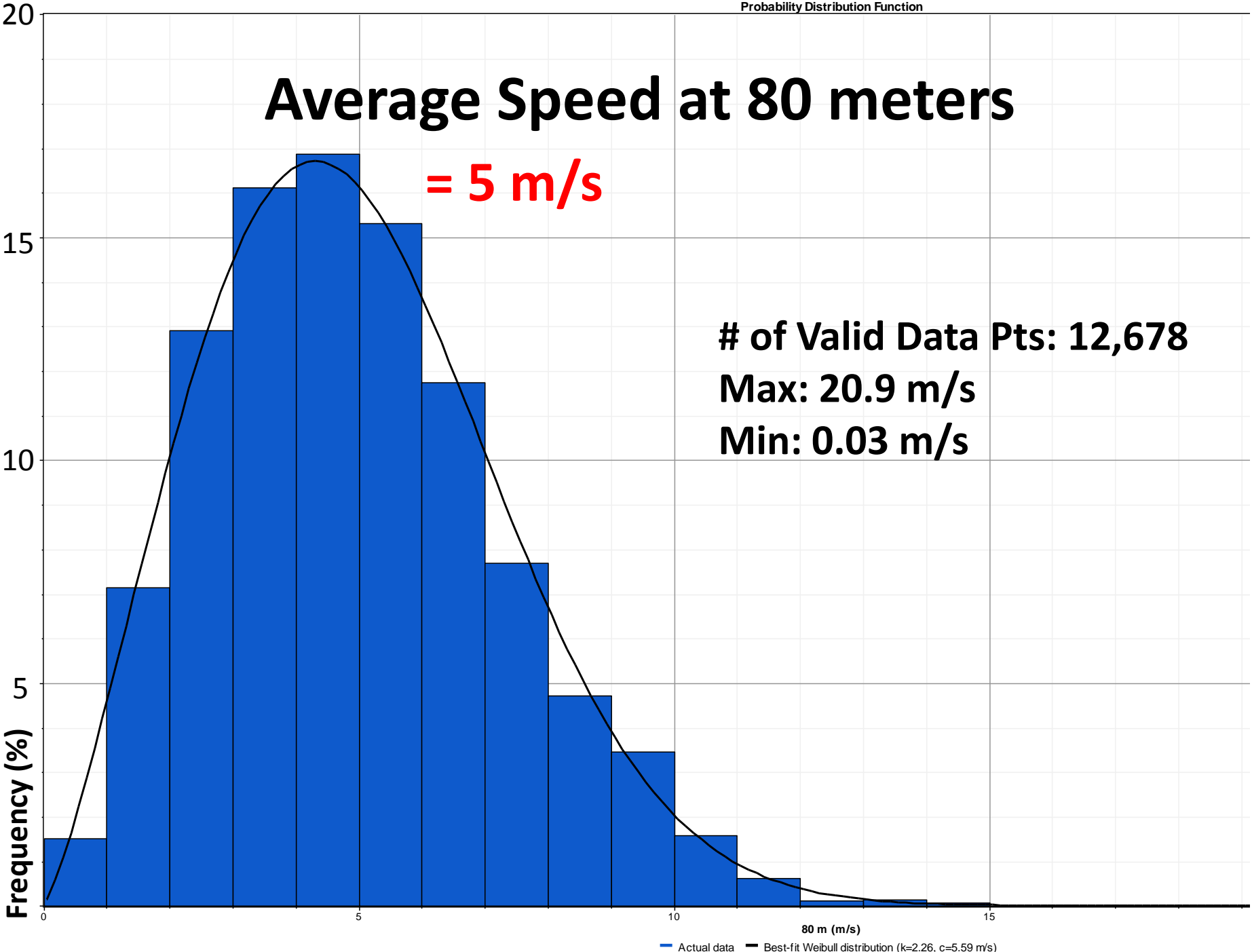
A solar-powered machine that collects wind speed, direction and related data at height intervals up to ~200 meters above the earth every 4 to 5 seconds and transmits aggregated data every ten minutes via satellite



# Average Speed at 80 meters

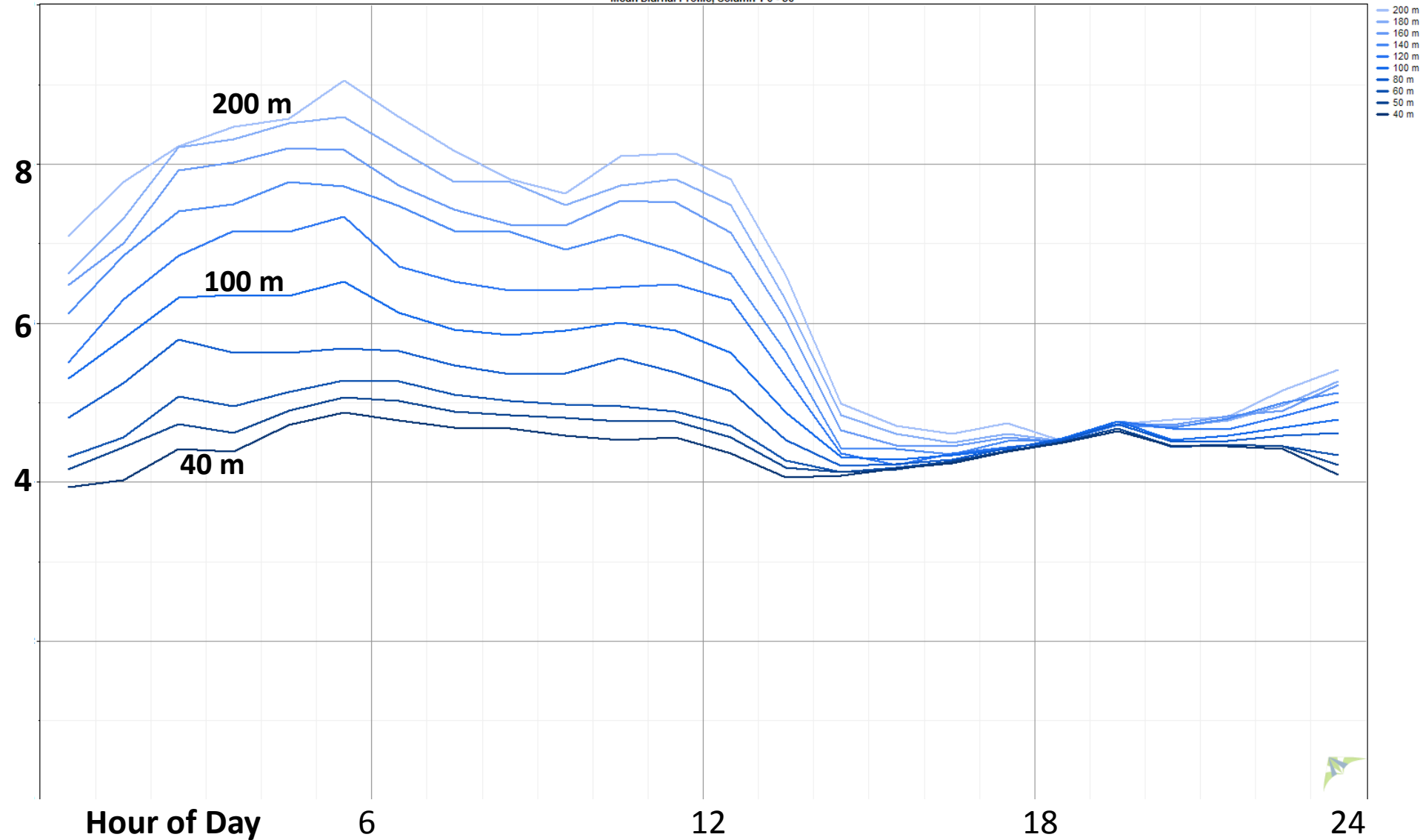
**= 5 m/s**

**# of Valid Data Pts: 12,678**  
**Max: 20.9 m/s**  
**Min: 0.03 m/s**

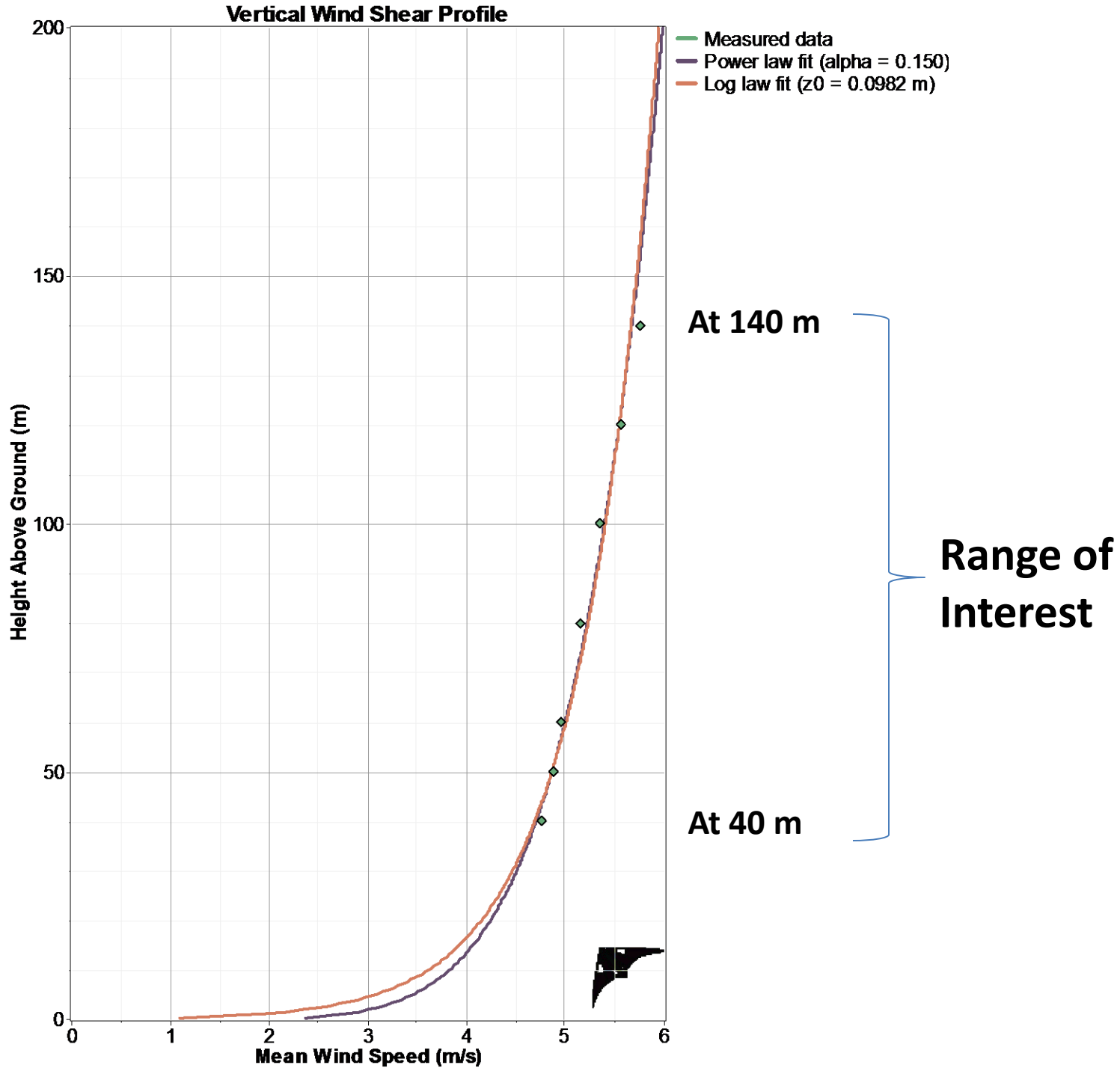


# Mean Diurnal Wind Speed (m/s)

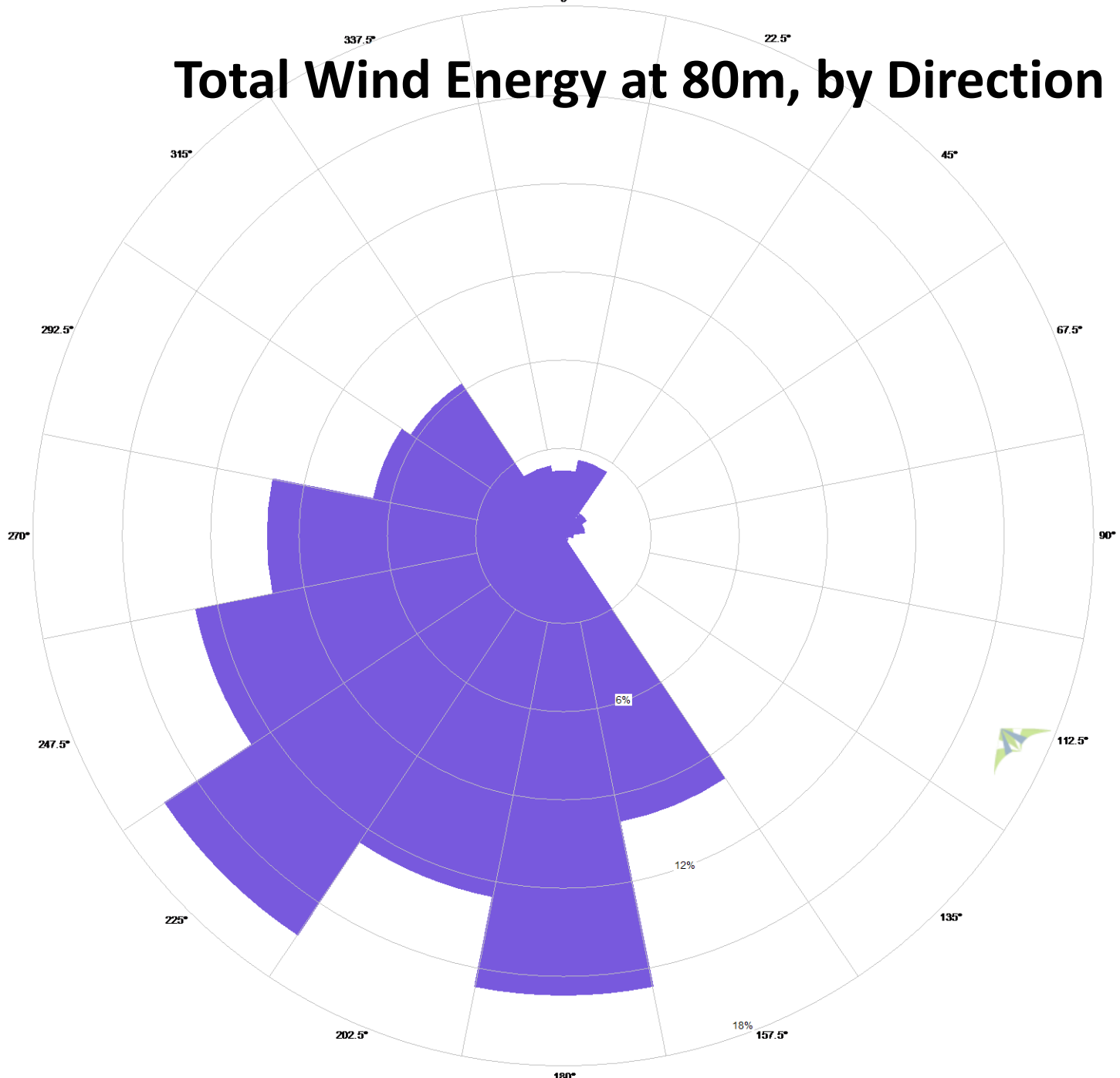
Mean Diurnal Profile, Column 10 - 50



S  
h  
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P  
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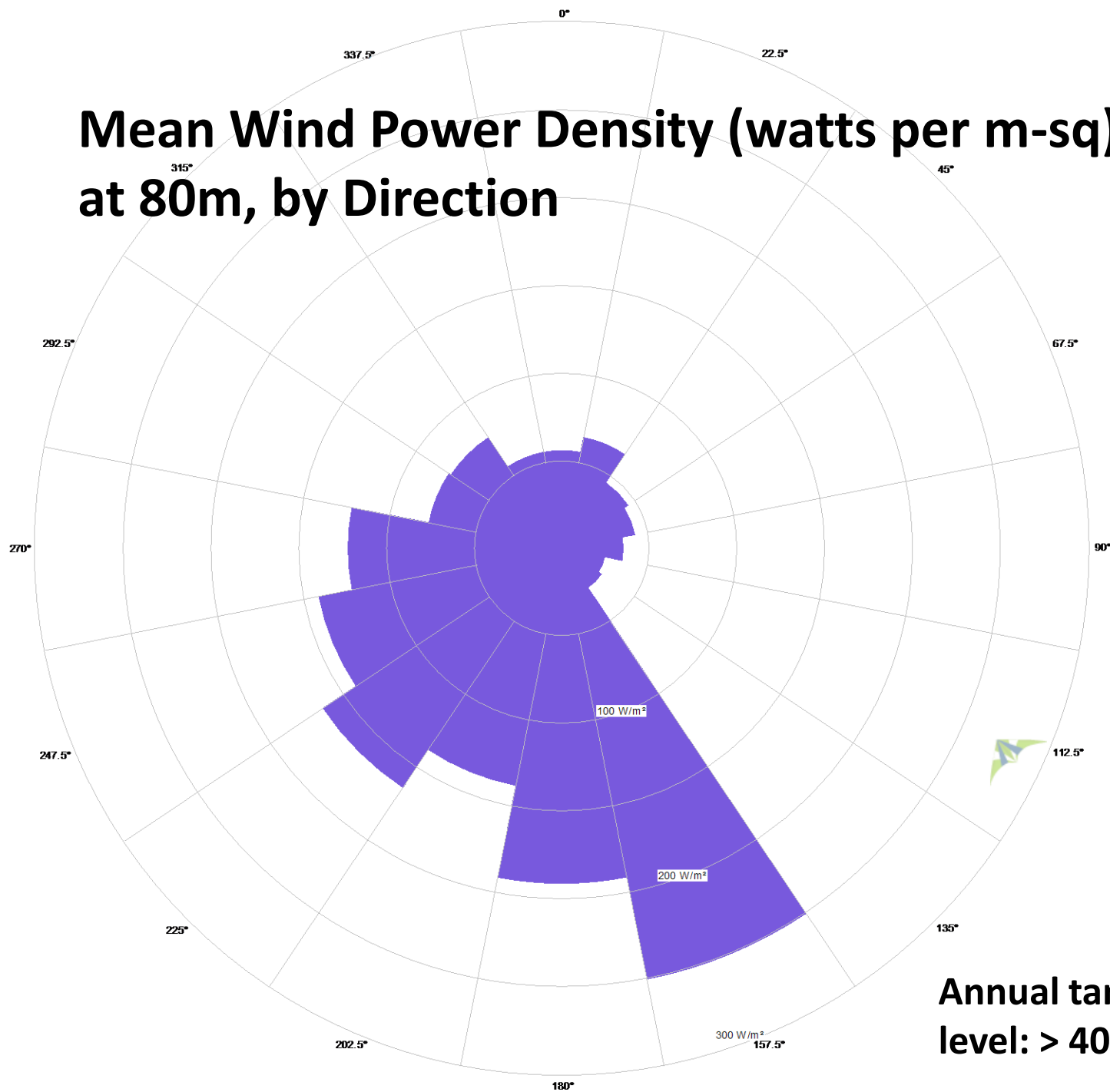


# Total Wind Energy at 80m, by Direction





# Mean Wind Power Density (watts per m-sq) at 80m, by Direction





# What Does This Mean?

- Wind speeds vary by:
  - Altitude (shear factor)
  - Direction (veer factor)
  - Time of day
  - Season
  - Terrain
- Assessed wind speeds are below implied seasonal class averages at operating wind facilities in WV and PA
- Data implies a capacity factor of about 8-11%, compared to a regional class average of 13% for the season
- Uncertainty remains due to seasonality, complex terrain, surface roughness (vegetation), application to a specific turbine type and year-to-year weather patterns



# Next Steps

- Unit Validation – Correlate the output of our sodar with a met tower
- Continue assessment of surface mined sites and rank available sites by opportunity:
  - Interested owner/operator partner
  - Estimated wind speeds (TruePower)
  - Transmission infrastructure in place
  - Road access
- Get southern WV on the map for assessment

# WV Wind Resources (watts/m<sup>2</sup>)

**Brown = 200-300**

**Orange = 300-400**

**Pink = 400-500**

**Purple = 500-600**

**Red = 600-800**

**Blue = > 800**

**If you want to know more...**

**WEST VIRGINIA WIND WORKING GROUP Meeting  
CANAAN VALLEY RESORT AND CONFERENCE CENTER  
OCTOBER 19, 2010**

Map by TrueWind Solutions, 2002



Thank You

