



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.

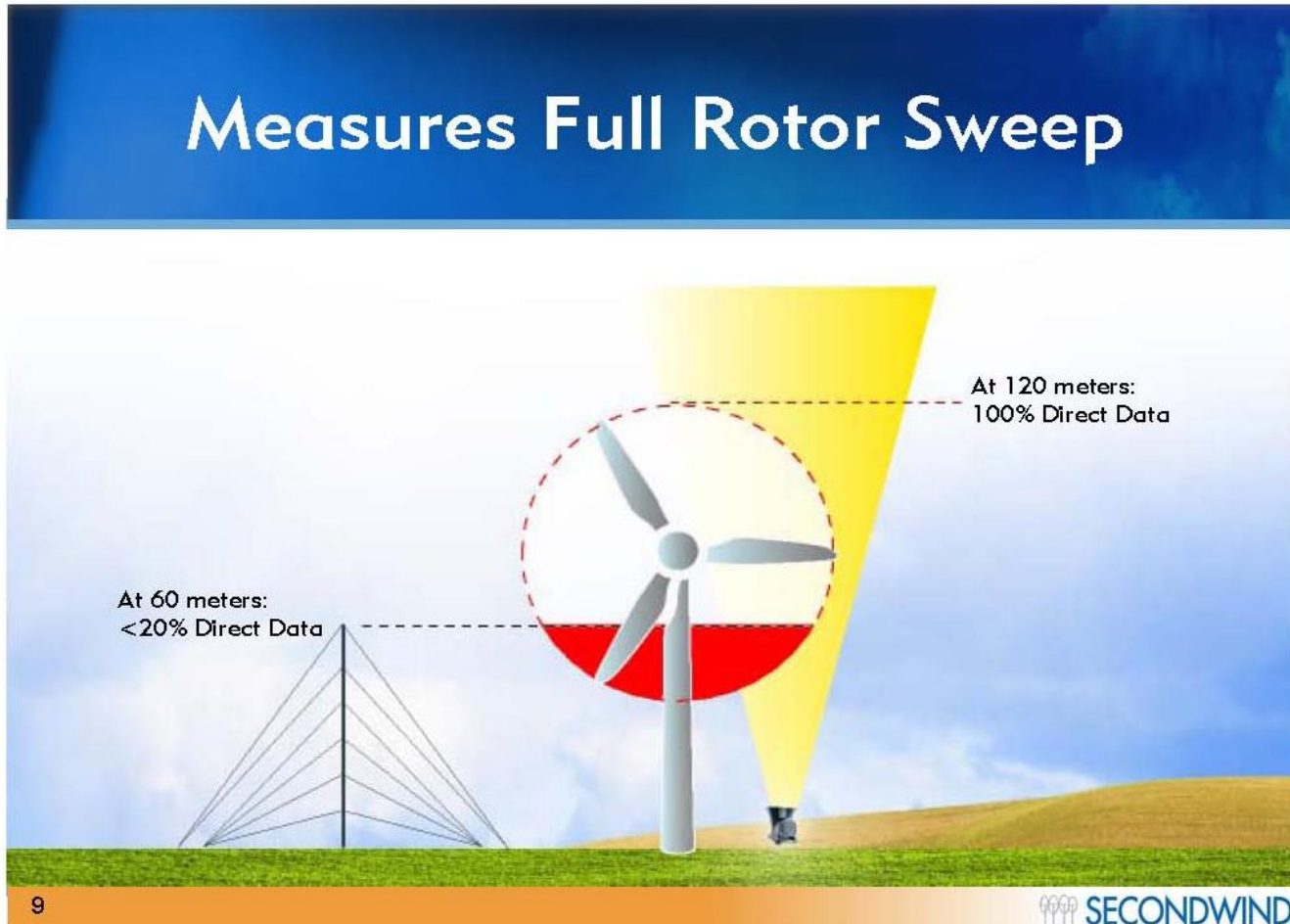
SODAR



**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

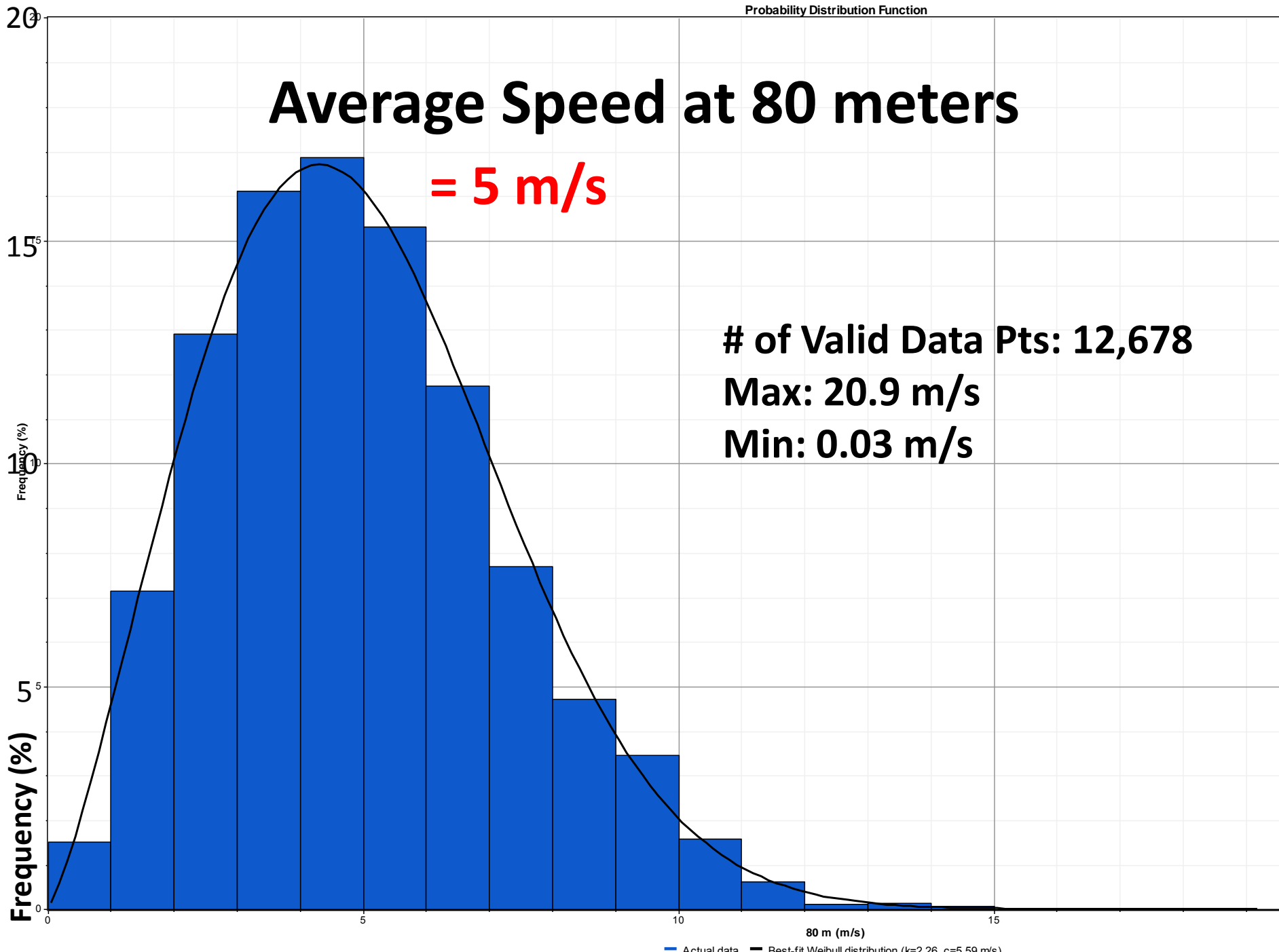
Average Speed at 80 meters

= 5 m/s

of Valid Data Pts: 12,678

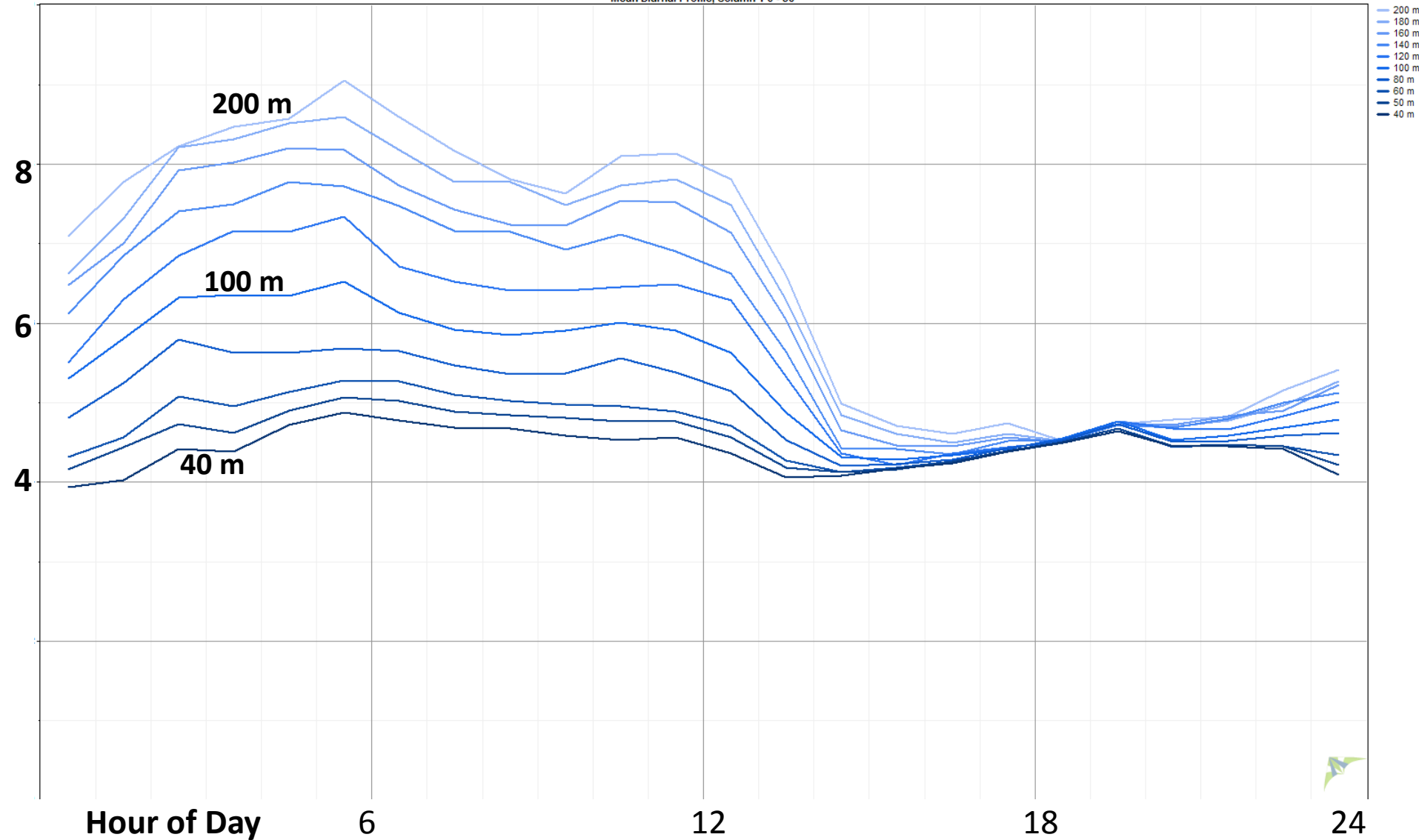
Max: 20.9 m/s

Min: 0.03 m/s



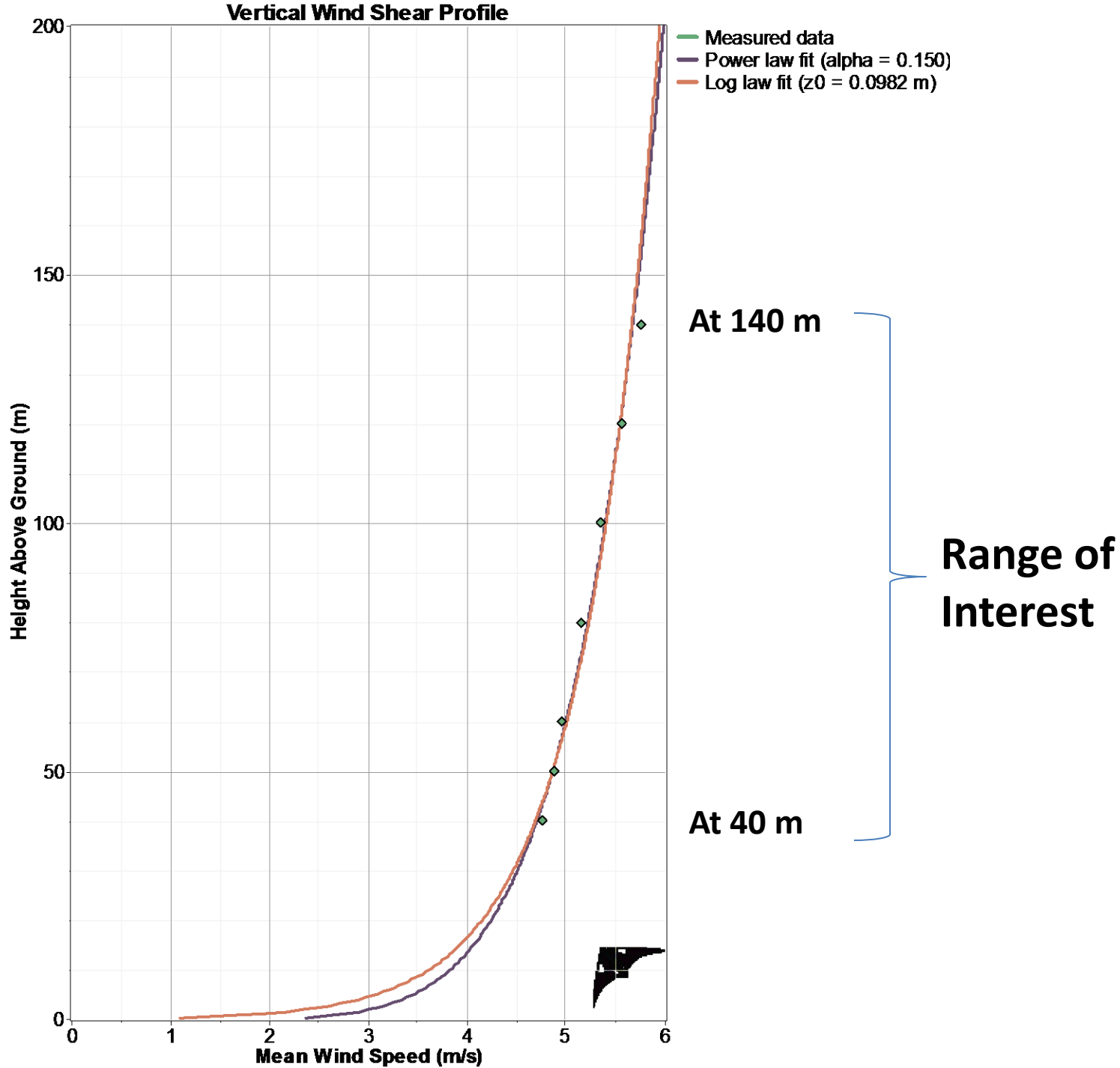
Mean Diurnal Wind Speed (m/s)

Mean Diurnal Profile, Column 10 - 50



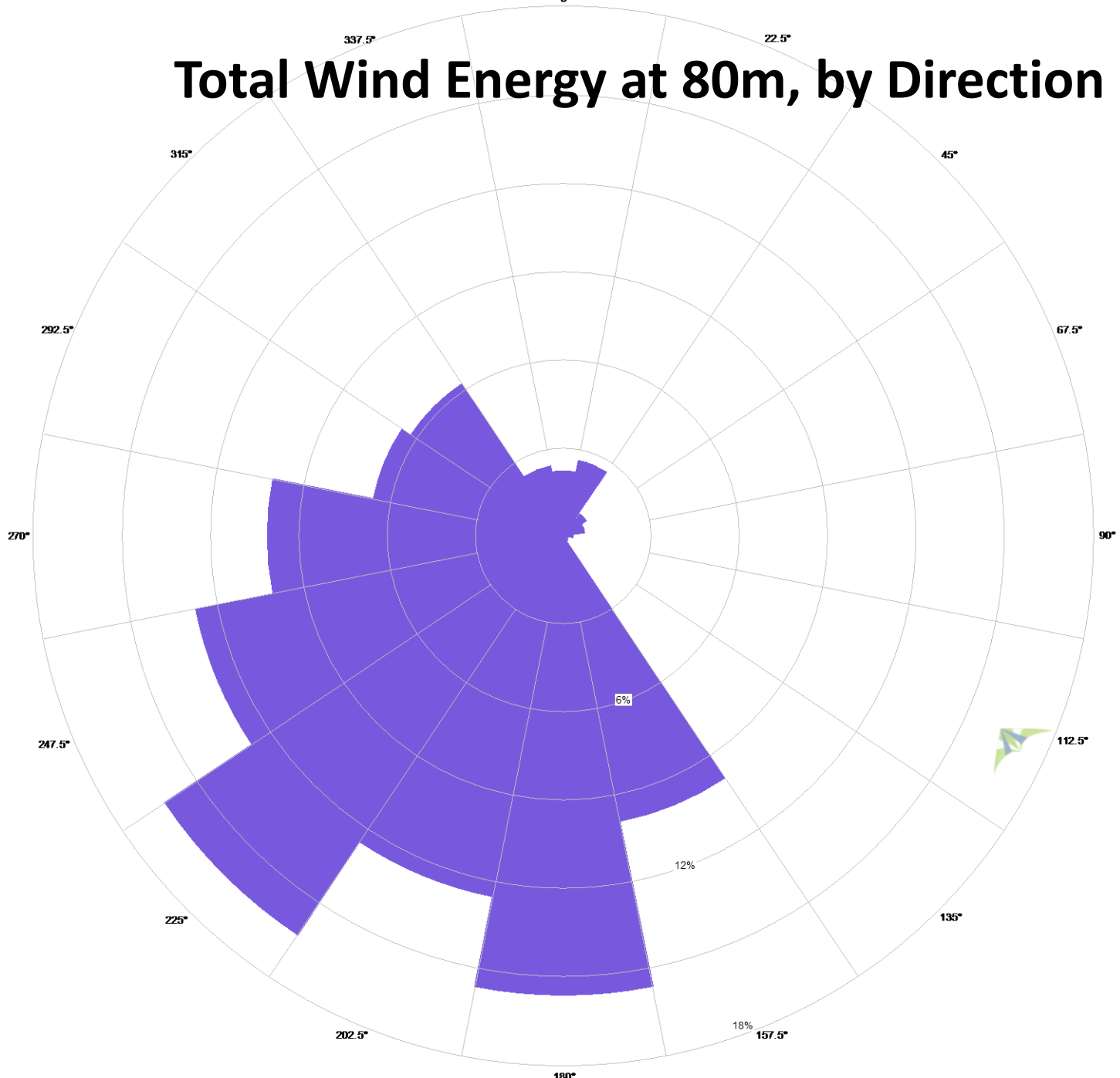
**S
h
e
a
r

P
r
o
f
i
l
e**

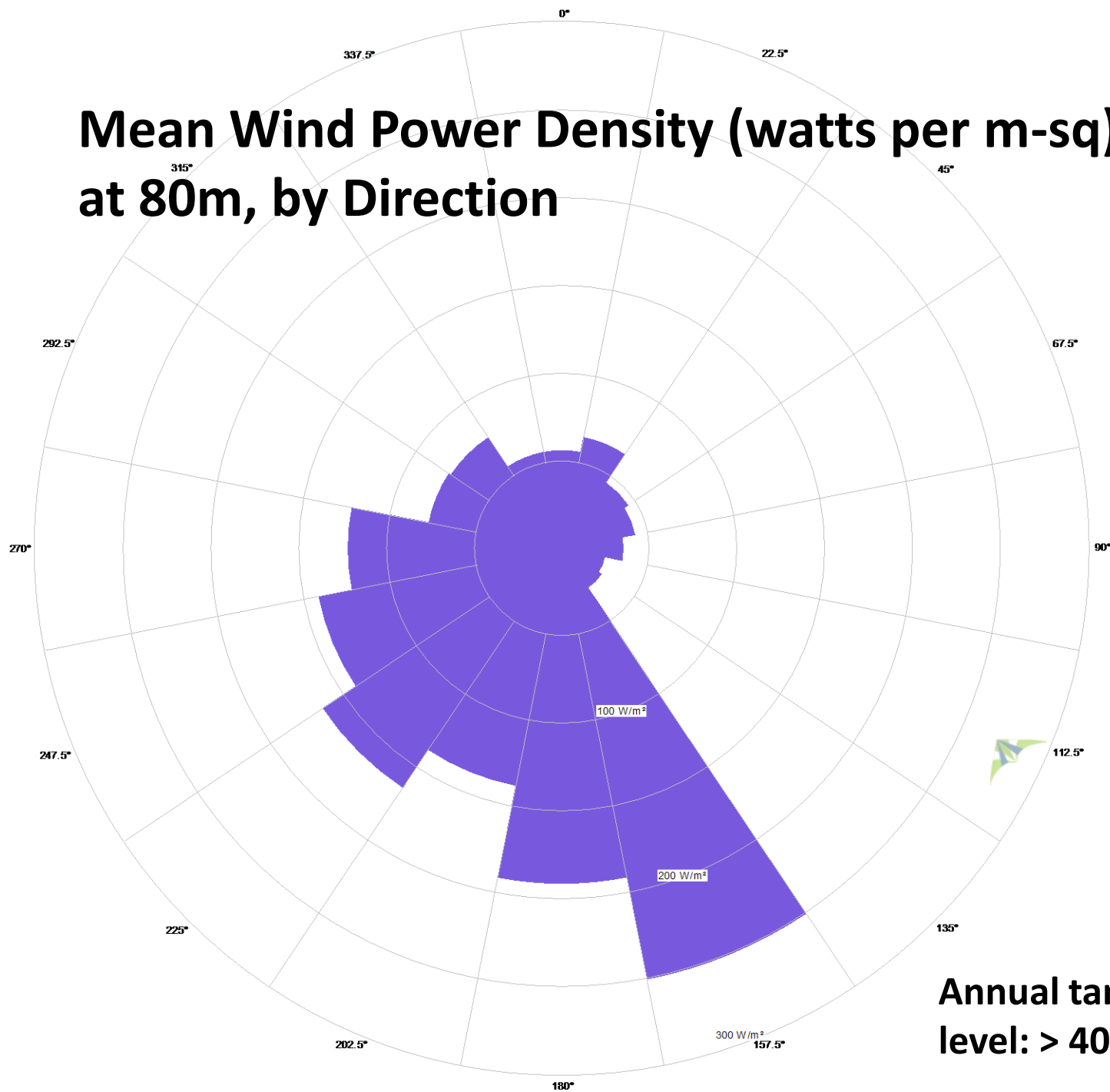


Total Wind Energy (80 m)
0°

Total Wind Energy at 80m, by Direction



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



**Annual target
level: > 400**



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/m²)

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

