

### **Data level of accuracy for off grid power system assessment.**

Taken from a draft version of IEC-62257-4 Recommendations for small renewable energy and hybrid systems for rural electrification – Part 4 : System selection and design

#### **SITE CHARACTERISTICS**

##### **Site topography**

<b>Level 1</b>	<p>Exact location of site including but not limited to:</p> <ul style="list-style-type: none"> <li>• Topographical map with a resolution of at least a 1:24,000 of the surrounding area including 10m elevation resolution.</li> <li>• Exact location of each of the load points through GIS plotting, detailed maps or aerial photos.</li> <li>• Specific understanding of the vegetation of the area around the site including but not limited to photos.</li> </ul>
<b>Level 2</b>	<p>Exact location of site including but not limited to:</p> <ul style="list-style-type: none"> <li>• Topographical map with a resolution of at least a 1:50,000 of the surrounding area including 25m elevation resolution.</li> <li>• Spatial layout of the community based on measurements or informal mapping techniques.</li> <li>• General understanding of the vegetation of the area around the site.</li> </ul>
<b>Level 3</b>	<p>Exact location of site including but not limited to:</p> <ul style="list-style-type: none"> <li>• Topographical map with a resolution of at least a 1:100,000 of the surrounding area including 50m elevation resolution.</li> <li>• No information of the spatial layout of the community and load centers.</li> <li>• No understanding of the vegetation of the area around the site</li> </ul>
<b>Level 4</b>	<p>Very low resolution map with minor topographical information such as international available data sets with 1 km resolution.</p>
	<p>Accounting for such characteristics as microclimate, masks, albedo, choice of incline collecting cost is not too high, it could be interesting to record general meteorological data such as temperature, humidity, rainfall, snowfall, sand storms</p>
<b>Site Climate</b>	
<b>Level 1</b>	<p>Monthly information on site temperature, humidity, rainfall, snowfall, days of ground fog and other environmental conditions. Data includes monthly averages as well as maximum and minimum values for all relevant parameters.</p>

<b>Level 2</b>	Seasonal information on site temperature, humidity, rainfall, snowfall, days of ground fog and other environmental conditions. Data includes seasonal averages as well as maximum and minimum values for all relevant parameters.
<b>Level 3</b>	Yearly information on site temperature, humidity, rainfall, snowfall, days of ground fog and other environmental conditions. Data includes averages as well as maximum and minimum values for all relevant parameters.
<b>Level 4</b>	No specific or unconfirmed understanding or of site climatic information
<b>Site Hazards</b>	
<b>Level 1</b>	Detailed information on the yearly occurrences of hazards such as floods, lightning, hail, high wind events, tornados, tropical storms, hurricanes, typhoons, sandstorms, and icing events. Data would include number of events, seasonal characteristics and historical maximum values for threats present to the local area.
<b>Level 2</b>	Basic information on the yearly occurrences of hazards such as floods, lightning, hail, high wind events, tornados, tropical storms, hurricanes, typhoons, sandstorms, and icing events. Data would include average number of events per year.
<b>Level 3</b>	No specific or unconfirmed understanding or of site climatic information
<b>RESOURCE DATA</b>	
<b>SOLAR DATA</b>	
<b>General Solar Data</b>	
<b>Level 1</b>	Diffusion and direction components measured at a fine hourly frequency, over a horizontal surface, with ambient temperature, wind speed and direction for a given site
<b>Level 2</b>	Daily sunshine irradiation over a horizontal surface, for a given site
<b>Level 3</b>	Average daily sunshine over a horizontal surface, for a given site
<b>Level 4</b>	Average monthly sunshine representing this geographical zone, over a horizontal surface (sources: atlas measurements or observations from satellites)
<b>Solar data retained for site in question</b>	
<b>Case 1</b>	The site is that for which general data is available
<b>Case 2</b>	Climate wise, the site is similar to other sites whose general data are available (excepting level 4)
<b>Case 3</b>	This site is Level 4 (see above)
<b>Range of data history</b>	
	N years

<b>WIND DATA</b>	
<b>Level 1</b>	<p>15-minute average wind speed measurements.</p> <ul style="list-style-type: none"> <li>• Measured at a height to provide unobstructed fetch to the windward direction</li> <li>• Wind measurement at two heights recording Maximum, minimum and standard deviation of readings.</li> </ul> <p>15 minute average measurements of wind direction. Measurement of ambient temperature and barometric pressure recommended.</p>
<b>Level 2</b>	<p>15-minute average wind speed measurements at a height to provide unobstructed fetch to the windward direction</p> <p>15 minute average measurements of wind direction. Measurement of ambient temperature and barometric pressure recommended.</p>
<b>Level 3</b>	<p>Hourly average wind speed measurements taken on 1 second intervals.</p> <ul style="list-style-type: none"> <li>• Measured at a height to provide unobstructed fetch to the windward direction</li> <li>• Wind measurement at two heights recording Maximum, minimum and standard deviation of readings.</li> </ul> <p>Hourly average measurements of wind direction.</p>
<b>Level 4</b>	<p>Hourly average wind speed measurements at a height to provide unobstructed fetch to the windward direction</p> <p>Hourly average measurements of wind direction.</p>
<b>Level 5</b>	<p>Periodic sample of wind speed and direction throughout every day, such as on a 3 hour basis. Common at most airports</p>
<b>Level 6</b>	<p>Periodic sample of wind speed and direction throughout the day light hours of every day, such as three recordings per day. Also common at smaller airports.</p>
<b>Level 7</b>	<p>Monthly average of wind speed.</p>
<b>Level 8</b>	<p>Yearly average wind speed.</p>
<b>Wind data retained for site in question</b>	
<b>Case 1</b>	<p>At the approximate location for the system installation at the site in question.</p>
<b>Case 2</b>	<p>At a location in very close proximity to the site in question and with the same general are flow characteristics.</p>
<b>Case 3</b>	<p>At a location removed from the site in question but where correlations can be made to the site in question using either mathematical formulations or proven resource mapping techniques.</p>
<b>Case 4</b>	<p>At a location removed from the site in question but with the same general air flow characteristics is expected.</p>

<b>Case 5</b>	At a location removed from the site in question and where accurate correlations can not be made
<b>Range of data history</b>	
<b>Case 1</b>	N years
<b>Case 2</b>	N Months of data with M years of historical data what can be used in a general correlation
<b>Case 3</b>	N Months of data with M years of historical weather statistics
<b>MICRO HYDRO DATA</b>	
<b>Level 1</b>	Run of river: Hourly records of flow rate, water depth, water turbidity. Seasonal description of water quality and debris. Standard: Daily records of Volumetric flow rate and water turbidity. Values for storage capacity, head height, pipe length. Seasonal description of water quality and debris.
<b>Level 2</b>	Run of river: Daily records of flow rate and water depth. Seasonal description of water quality and debris. Standard: Monthly records of Volumetric flow rate and water turbidity. Values for storage capacity, head height, pipe length.
<b>Level 3</b>	Run of river: Monthly records of flow rate, water depth, water turbidity. Seasonal description of water quality and debris. Standard: Seasonal records of Volumetric flow rate, water turbidity, general water quality and debris. Values for storage capacity, head height, pipe length,
<b>BIOMASS DATA</b>	
<b>Level 1</b>	Feedstock specification including BTU value, moisture content, size. Quantity available per day.
<b>Level 2</b>	Feedstock specification, Quantity available per month
<b>Level 3</b>	Feedstock specification, Quantity available per season