IVb. Wind Terms and Concepts
Valley Breeze

Warm air
Mountain Breeze
Fetch

• Distance the wind blows over a particular surface

• Example: the wind blowing in toward the shore has a long fetch (long distance over open water)
Duration

The amount of time wind blows over a particular surface
Land-Sea Breezes

- Land-sea breezes created by temperature differentials
- Winds also stronger near shore because of long unobstructed fetch
- Sea breezes typically strongest in late afternoon
Wind Rose

- A graphical representation showing the energy of the wind, the direction of the wind, and the percentages associated with the winds in a certain location in a typical year
Kinetic Energy in the Wind

Kinetic Energy = Work = \( \frac{1}{2} m V^2 \)

Where:
- \( M \) = mass of moving object
- \( V \) = velocity of moving object

What is the mass of moving air?

= density (\( \rho \)) x volume (Area x distance)
= \( \rho \times A \times d \)
= \( (\text{kg/m}^3) \times \text{m}^2 \times \text{m} \)
= kg
Wind Power

Power in the wind

\[ \text{Power in the wind} = \frac{1}{2} \rho A V^3 \]

- Effect of air density, \( \rho \)
- Effect of swept area, \( A \)
- Effect of wind speed, \( V \)

Swept Area: \( A = \pi R^2 \)

Area of the circle swept by the rotor (m²).