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EcoAir Ventilation System Assessment

Background

Average bathroom size in the US: 80 sq.ft.

Average bathroom volume: 80 sq.ft. x 8 ft. height = 640 cu.ft.

Standard commercial bathroom exhaust ventilator

- Air flow: 80 cfm
- Power usage: 36 W

EcoAir Ventilator

- Air Flow: 6 cfm
- Power usage: 7 W

Energy use Computations

Bathroom odor-dilution calculations:

- 640 cu. ft. bathroom volume / 80 cfm. air flow = 8 minutes
- Dilution reduction by 90% = 8 min x 10 = 80 minutes = 1.3 hours
- Power requirement: 36 watts x 1.3 hours = 48 watt hours or 0.048 KWH

EcoAir Design

- Power requirement:
7 watts x 10 min operation = 7 watts x 0.2 hours = 1.4 watt hours or 0.0014 KWH

Results:

- In comparison to the standard commercial bathroom ventilator, the EcoAir design uses only 3% of the power used by the commercial bathroom ventilator.

Explanation of results:

- EcoAir captures the odor directly at the "source" while a bathroom ventilator is required to dilute the odor present in the entire air volume of the bathroom, i.e., 640 cu.ft.
- Ventilation principles dictate that 10 volumes of fresh air are required to reduce an odor concentration inside a fixed volume by 90%.
- Therefore, while traditional ventilators require up to 1.3 hours to dilute the bathroom air, the EcoAir system must operate only 10 minutes thus conserving significant amounts of electrical energy.

Experimental Set-Up for Air Velocity Assessment

