Reducing the Energy Cost of Effective Ventilation in Multi-Unit Buildings

Nearly 18% of Minnesota's occupied housing units are in multifamily buildings. Evaluating and improving building ventilation can impact building energy performance and indoor air quality, solve odor and moisture problems, and reduce operating costs. This CARD grant project identified the most common multifamily central ventilation deficiencies and determined cost appropriate remedies for these deficiencies. The ultimate goal was to develop standardized protocols for screening, diagnosing and retrofitting multifamily ventilation systems to be used by utility energy conservation programs to help achieve energy savings goals. The process was also designed to improve ventilation effectiveness and indoor air quality for occupants.

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CORRIDOR VENTILATION

Common Issues

- Design flow rates higher than current required
- Faulty controls/sensors
- Flow rates not verified

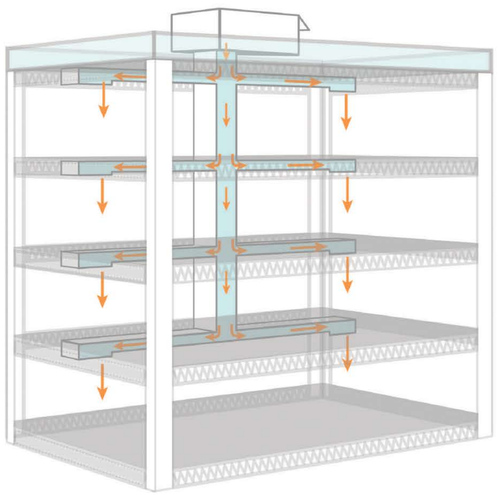
Improvement Opportunities

- Reduce fan speed to provide code required ventilation flow (3 of 16)
- Balance flow to each floor

Case Study

- Flow 4,700cfm greater than code required
- Re-sheave fan to reduce flow rate
- Annual savings: 9,611 therms and 7,244 kWh
- Cost: $1,200 for less than 6 month payback

Diagram of Typical Supply-Only System



METHOD

- **Evaluate improvement opportunities for central ventilation systems in 18 apartment buildings**
- **Complete 6 retrofits**
  - **1 corridor supply**
  - **4 apartment exhaust**
  - **1 trash chute**

IMPROVEMENT OPPORTUNITIES

- **Corridor Ventilation: 3 of 16 buildings**
- **Apartment Exhaust: 7 of 12 buildings**
- **Garbage Chute: 7 of 11 buildings**

Corridor Ventilation Retrofit

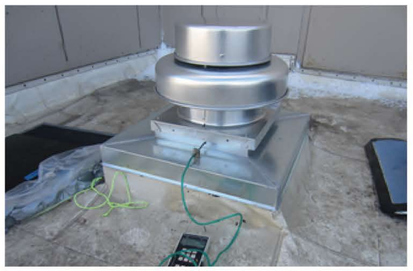
Re-sheave (change pully size) to reduce fan speed

Central Apartment Exhaust Retrofit

Balancing devices prone to clogging - replace with fixed orifces

Seal leakage below fans at curb

Seal duct leakage at inlet



Replace with ECM fans

APARTMENT EXHAUST VENTILATION

Common Issues

- Design flow rates higher than current required
- Unbalanced flow
- PRV flow rates difficult to measure and seldom verified

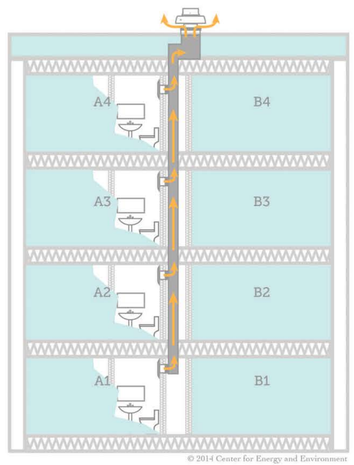
Improvement Opportunities

- Reduce balance and flow (7 of 12)
- Seal inlets, curbs and ducts
- Install high efficiency fans

Case Study

- Replace operable balancing louvers with fixed orifices and replace belt drive exhaust fans with high-efficiency type. 2,299cfm flow reduction
- Annual savings: 4,706 therms and 21,979 kWh, $5,000
- Cost: $35,000 for 7 year payback

Diagram of Typical Apartment Bathroom Exhaust System



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