

Green heating, ventilation and air conditioning

Efficient use of resources necessary to heat and/or cool a building can be a source of significant energy savings. While continued use of existing equipment (boilers, air conditioners, furnaces, and air handlers) may condition the building, replacement or upgrading the equipment may result in major energy savings.

http://doas-radiant.psu.edu/DOE_report.pdf

Replacement

Replacement of standard efficiency (80% AFUE) furnaces or boilers with 90-96% efficiency equipment; anecdotal evidence suggests energy savings of up to 40% by utilizing condensing heating appliances with no other modifications to the existing HVAC system.

Financial incentives:

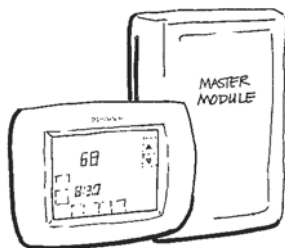
<http://www.centerpointenergy.com/services/naturalgas/business/rebatesforbusiness/boilerandboilersystemcomponentrebates/MN/>

Modular boilers

Replacing a large boiler with a series of high efficiency smaller boilers can save money in multiple ways. The boilers can be set so that in mild weather only one comes on and as the temperature drops the others come on line. This can be done using a control called a 'cut-out' which stops the boiler from coming on above a set temperature. You can use this control on each boiler and you can rotate which boiler comes on first each year so that there is even wear and tear on each boiler. Proper control of the heat supplied prevents overheating and reduces the likelihood of open windows during the heating season.

Controls

Energy management systems (EMS)



Automated control systems can rely on timers, occupancy sensors, outdoor temperature sensors and/or computer programming. This is a rapidly expanding field. Matching a system to your needs will be very important in achieving the desired results.

Individual tenant control and sub-metering of fuel usage.

By making each tenant responsible for paying for the energy they use, consumption drops because they each see costs reflected in their gas or electric bills. Even if the tenants are not paying the bills, sub metering can help by alerting you to sudden increases in usage.

Hydronic controls

Indoor/outdoor resets for boilers work by raising the boiler water temperature as the outdoor temperature drops lower. When temperatures are mild this allows the boiler to work less and avoids over-shooting of indoor temperatures.

http://www.pmengineer.com/Articles/Feature_Article/cdd55d5472298010VgnVCM100000f932a8c0

Heat recovery

Air exhaust systems

When environmental air exhaust systems are being installed or replaced, an air to air heat exchanger should be included to recover the energy needed to condition the outside air that replaces the exhausted air.

http://en.wikipedia.org/wiki/Heat_recovery_ventilation

Waste heat

Some companies actually increase their energy consumption by installing separate cooling systems just to remove the heat generated by computers and server rooms. For example, this excess heat could potentially be diverted to the building's hot water. In an existing building the layout of rooms and piping greatly affect the feasibility of some adaptations like this.

Distribution

Zoned heating and air conditioning

Zoned systems have an activating device or switch that can either render the supply closed or vary the setting to program a lower energy setting when rooms are not in use.

If space usage-occupancy varies throughout your building, creating more zones for spot usage of heating or air conditioning may make your building more efficient.

For air conditioning, mini-split systems are one option that can provide cooling at the points that need it the most.

Variable air volume controls (VAV)

Systems utilizing VAV controls fine tune air flow to occupied spaces. This can go beyond having separate zones in that it gives more of a customized and precise response to the conditions in the space.

Ductwork and air supply

Investigate ductwork and diffusers for optimum routing and insure that all joints are sealed. Sealing leaky ductwork, shortening ductwork and optimizing the use of bends will reduce the energy consumed. For airflow, straighter is better but generally using two 45 degree bends has lower resistance than one 90 degree turn.

Placing grills and diffusers in locations that deliver better coverage will keep the occupant more comfortable and eliminate the need for electric heaters or additional fans.

Blower replacement upgrades

When replacing blower motors make sure to use the more efficient DC type whenever possible. DC motors can be wired to reduce air movement providing a quieter operation, achieve more comfort, and deliver cleaner air by filtration plus fresh air at a constant flow.

Other energy sources

Geothermal systems can be used for space heating and air conditioning plus water heating.

<http://energy.gov/energysaver/geothermal-heat-pumps>

Solar systems can be used for space heating and water heating as well as producing electricity.

<https://mn.gov/commerce/industries/energy/solar/mim/>

Technical resources

Xcel Energy provides design assistance to help meet energy conservation goals. They offer a new construction program and an ASHRAE requirement assessment for commercial buildings.

<http://www.xcelenergy.com/>

Disclaimer: Green Building Ideas for Existing Commercial Buildings contains links to many outside sites. These links are set up to provide information that is currently available. The City of Minneapolis cannot guarantee the accuracy of information found at any linked site. Providing links to outside sites does not constitute an endorsement by the City of Minneapolis



Community Planning and Economic Development – Construction Code Services

Questions? Contact Vicki.Carey@minneapolismn.gov or visit the website at http://www.minneapolismn.gov/ccs/ccs_greenbuilding

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