

The Future of Energy Efficient Technology

Prepared and Presented by:

Klas C. Haglid, PE, RA
Founder & CEO

Haglid Engineering and Associates, Inc.®

Building Performance Equipment, Inc.®

80 Broadway Hillsdale, NJ 07642

Ph: (201) 722-1414, (201) 722-1114

Fax: (201) 722-0999



Zero Energy Buildings

Envelope: Walls and floors typically R-40 with roofs R-60 or better. Very tight construction, mechanical ventilation or air to air energy recovery code mandated.

Lighting: Old high efficiency was 1.0 watt/sqft, new LED 0.1 watt/sqft or better.

HVAC: 90.1-2004 minimum standards are low teens or EER of 11 to 13. New technologies can exceed EER of 60 and EER of 20 or better is common.

Air-to-Air Energy Recovery: Traditional efficiencies was 45% with 2" static, New high efficiency is over 90% with 1/8" Static. NOTE: Twice the energy recovery with 1/5 the power consumption or 10x net energy savings.

As built, passive buildings with these high efficiency options can reduce power consumption by over

90% over traditional technologies.



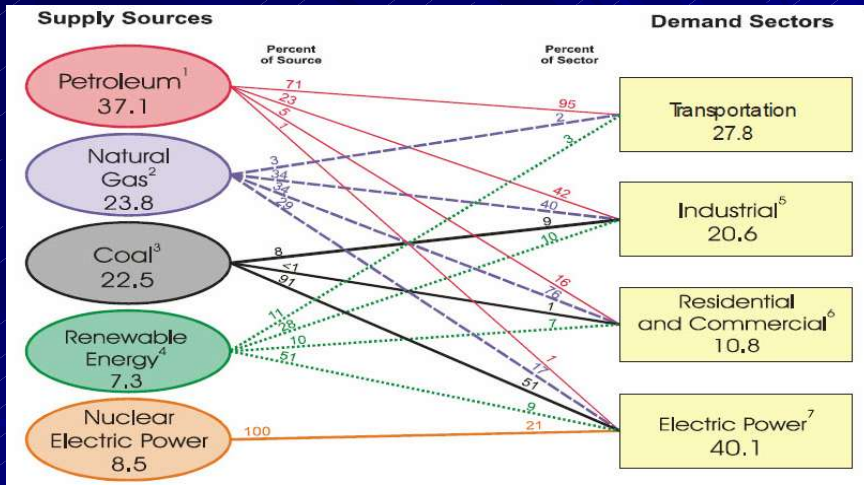
The Energy Information Administration conducts the Commercial Buildings Energy Consumption Survey (CBECS) to collect information on energy-related building characteristics.

- In 2003, CBECS reports that commercial buildings:
- total nearly 4.9 million buildings
- comprise more than 71.6 billion square feet of floorspace
- consumed more than 6,500 trillion Btu of energy, with electricity accounting for 55 percent and natural gas 32 percent (Figure 1)
- consumed 36 percent of energy for space heating and 21 percent for lighting (Figure 2)



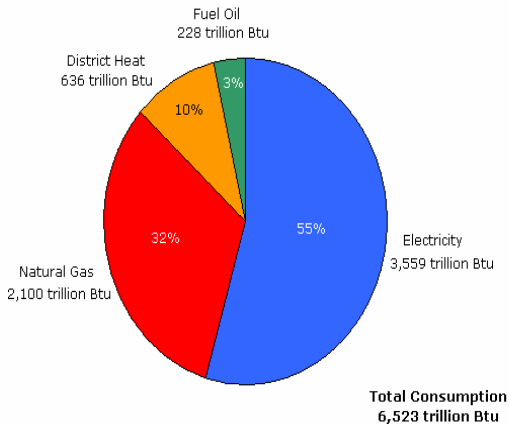
U.S. Primary Energy Consumption

by Source and Sector, 2008 (Quadrillion Btu)



Source: Energy Information Administration, *Annual Energy Review 2008*

Figure 1. Electricity accounts for more than half of energy consumed by commercial buildings.

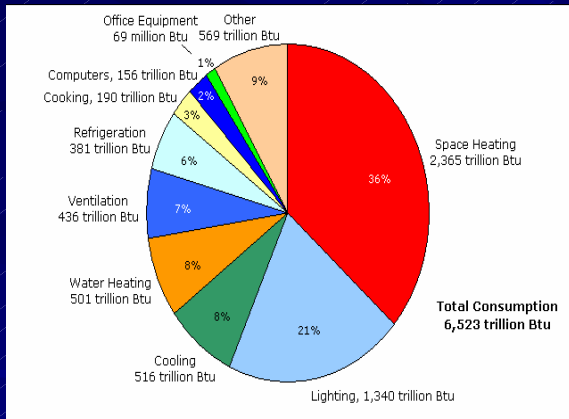


Note: 55% of consumed energy is Electricity or 3,559 trillion Btu per year.

If we could reduce over-all energy consumption by 50%. We could eliminate all fossil fuel use and still reduce electric usage.

Source: Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

Figure 2. More than half of energy consumed in commercial buildings is used for space heating and lighting.



Note: HVAC, Lighting and Water Heating is 80% of total energy consumed in the US.

Passive buildings and high efficiency energy recovery and HVAC can easily cut this in half.

Source: Energy Information Administration, 2003 Commercial Buildings Energy

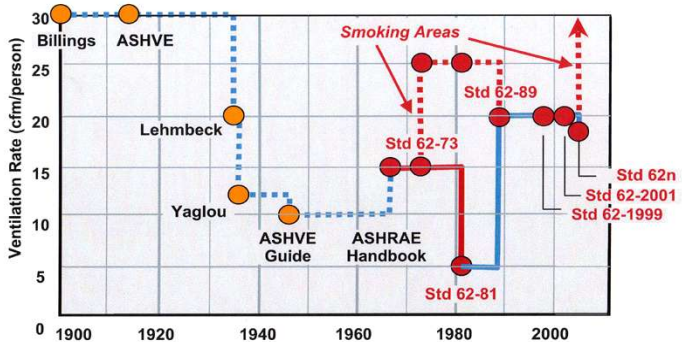
History of Ventilation

- The highest ventilation rates were in the late 1800's.
- Lowest ventilation rates in 1980's.
- Most challenging engineering design in 2000+.



Brief Ventilation Rate History

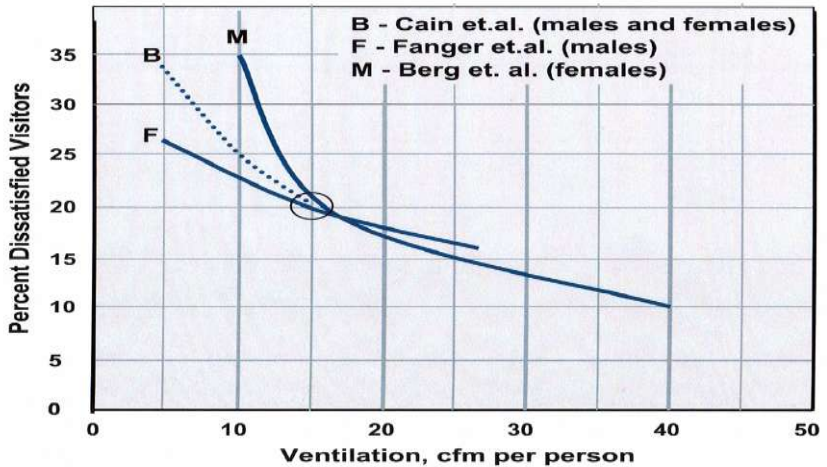
For office spaces...



Ref.: Fred Kohloss, P.E. – Past President of ASHRAE
“History of Ventilation Rates”, June 2003

www.LowKWH.com





Ref.: Fred Kohloss, P.E. – Past President of ASHRAE
“History of Ventilation Rates”, June 2003

www.LowKWH.com



Zero Energy Case Studies & Discussion

Transportation = 27.8 % of Energy Consumption

All Buildings and Infrastructure = 72.2 % of Energy Consumption

Source: Energy Information Administration, *Annual Energy Review 2008*

Building Performance Equipment, Inc.®
80 Broadway Hillsdale, NJ 07642
Ph: (201) 722-1414, (201) 722-1114
Fax: (201) 722-0999



Pressure Drop

- Quality Control Tests
 - BPE-XE-MIR 2000
 - @ 2200 CFM
- Static Pressure =
(10.8125" - 9.9375")
= **0.875" WC**
- LESS THAN
FILTERS!!!



Glatt Air Techniques

NJ Board of Public Utilities Recognizes
'Energy Savings' Leadership Exhibited by
Glatt Air Techniques

LOCATION

Glatt Air Techniques
Ramsey, NJ
USA



- Used IDEC to provide cooling with no compression cycle.
- Passive ultrasonic micro misting technology of tap water used for 5 tons of indirect evaporative cooling.
- No heating in winter time, just process energy recovery!

Chanel Perfume

- First step towards Net Zero Energy: Air-to-Air Energy Recovery
- Saved 23% on Natural Gas consumption compared to previous year
- Eliminated Alcohol and IAQ problems while eliminating gas reheat in winter!



LOCATION

Chanel Inc.
International Manufacturer
Of Fine Perfumes
Piscataway, NJ
USA

Block Island

Zero Energy Use - Earth Building Block Island, Rhode Island



Oil Tycoons New
Construction Home

- R-40 Walls
- R-60 Roof and Ceiling
- Geothermal
- Photovoltaic
- Energy Recovery

Outcome: Net Zero
Energy

Summary of Net Zero

- Current technology as tested can support Net Zero Energy Use Building.
- Initial cost is higher then tradition construction.
- 20 year life cycle cost is a fraction of traditional construction.
- During energy price increases and blackouts no business impact.



Questions and Answers

- What do you do to reduce peak energy consumption?
- What can you do with an existing building?

