ASHRAE 90.1 2010

- **It’s out..and should be our code in 3 years**
- **Work on sealing and testing building envelope, commissioning**
- **Cool Roofs..hey were already doing that**
- **Extensive Controls enhancements**
- **Equipment efficiencies increase..some**
- **Economizers**
- **Energy Recovery**
- **Decreased Lighting Power Densities**
- **Extensive controls for lighting & power**

How “Green” can you go?

- **Net Zero**

Energy used is generated on site, depends on defined “Site”

- **Carbon Neutral**

Use no fossil fuel Greenhouse Gas emitting energy to operate .

- **Living Building**

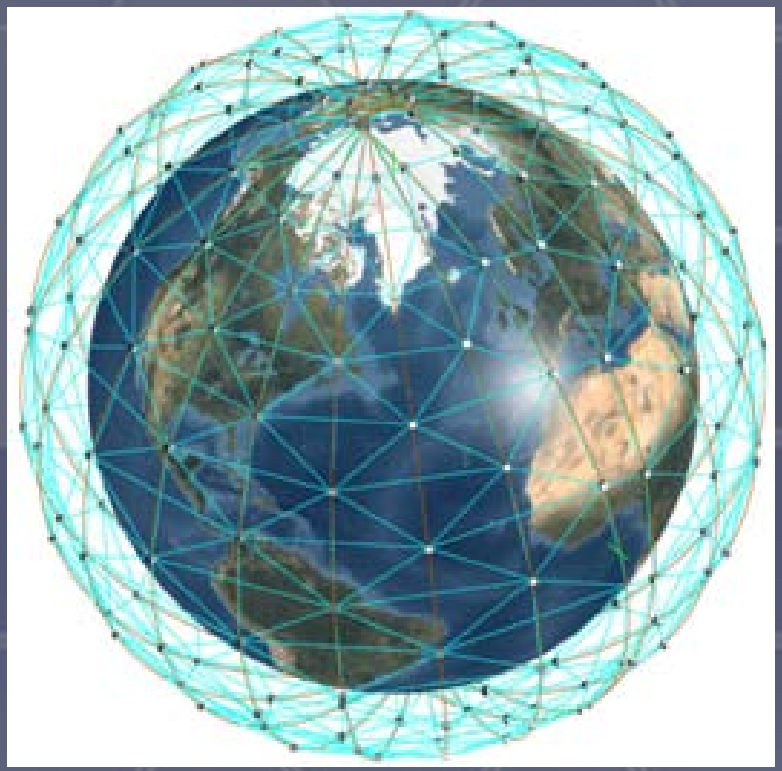
Use only resources at the site for energy, water and all necessary building activities.

Resources

- **ASHRAE Documents and Users Manuals**
- **ASHRAE Advanced Energy Design Guides FREE**
- **ASHRAE 189.1..The Green Code**
- **ASHRAE Houston Chapter 1 day seminar**
- **Extensive AEE Training and books**

•We'll all get thru this together..we need each others expertise.

Are We Responsible for the Protection of the World??



Who Else Is??

Thank you for your time!

Questions & Discussion

Economizers

- Climate and size dependent (Table 6.5.1)
- There are LOTS of exceptions
- Can use air economizers
  - 100% of design supply air
  - Sequenced with mechanical cooling equipment
  - High limit shutoff
  - Dampers
- Can use water economizers
  - 100% of expected system cooling load at 50°F DB, 45°F WB
  - Maximum pressure drop limitation

Section 6.5.1

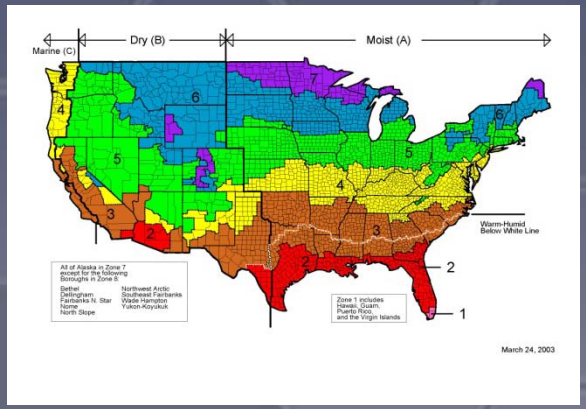
HVAC - P

Economizer Exceptions

- Exceptions:
  - Cooling capacity - Table 6.5.1
  - Systems with gas phase air cleaning per Standard 62
  - Where >25% of the air must be humidified >35°Fdp
  - Systems with condenser heat recovery per 6.5.6.2
  - Residential systems <5X limits in Table 6.5.1
  - Systems with a balance point <=60°F
  - Systems expected to operate < 20hrs/wk
  - Systems serving zones with refrigerated casework
  - Where cooling efficiency exceeds Table 6.3.2

Economizers (Table 6.5.1)

Climate zone	Cooling capacity for which an economizer is required
1a, 1b, 2a, 3a, 4a (Miami, St. Louis, Charlotte)	**Economizer unnecessary**
2b, 5a, 6a, 7, 8 (Yuma, Chicago, Edmonton)	**≥ 135,000 Btu/h**
3b, 3c, 4b, 4c, 5b, 5c, 6b (Denver, Lubbock, Vancouver)	**≥ 65,000 Btu/h**



Design Capacity – Air Economizers

- System capable of modulating outside air and return air dampers to provide up to 100% of the design supply air quantity as outside air for cooling

Section 6.5.1.1

HVAC . P

Control Signal

- Dampers capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature
- Exception
  - Systems controlled from space temperature (such as single-zone systems)

Section 6.5.1.1.2

HVAC - P

High Limit Shutoff

- Automatically reduce outdoor air intake to minimum outdoor air quantity when outdoor air intake will no longer reduce cooling energy usage
- Control types for specific climates from Table 6.5.1.1.3A
- Settings from Table 6.5.1.1.3B

Section 6.5.1.1.3

HVAC - P

Dampers

- Return air and outdoor air dampers to meet the damper leakage specified in 6.4.3.4.4

Section 6.5.1.1.4

HVAC - P

Relief of Excess Outside Air

- Means to relieve excess outdoor air during economizer operation to prevent overpressurizing the building
- Outlet located to avoid recirculation into the building

Section 6.5.1.1.5

HVAC - P

Design Capacity – Water Economizers

- System capable of cooling supply air by indirect evaporation and providing up to 100% of expected system cooling load at outside air temperatures of 50°F dry bulb/45°F wet bulb and below
- Exception
  - You can also meet this requirement if your design can meet 100% of expected cooling load at 45°F dry bulb/40°F wet bulb

Section 6.5.1.2.1

HVAC .P

Maximum Pressure Drop

- Precooling coils and water-to-water heat exchangers to have either
  - Water-side pressure drop of < 15 ft of water **OR**
  - Bypassed when not in use

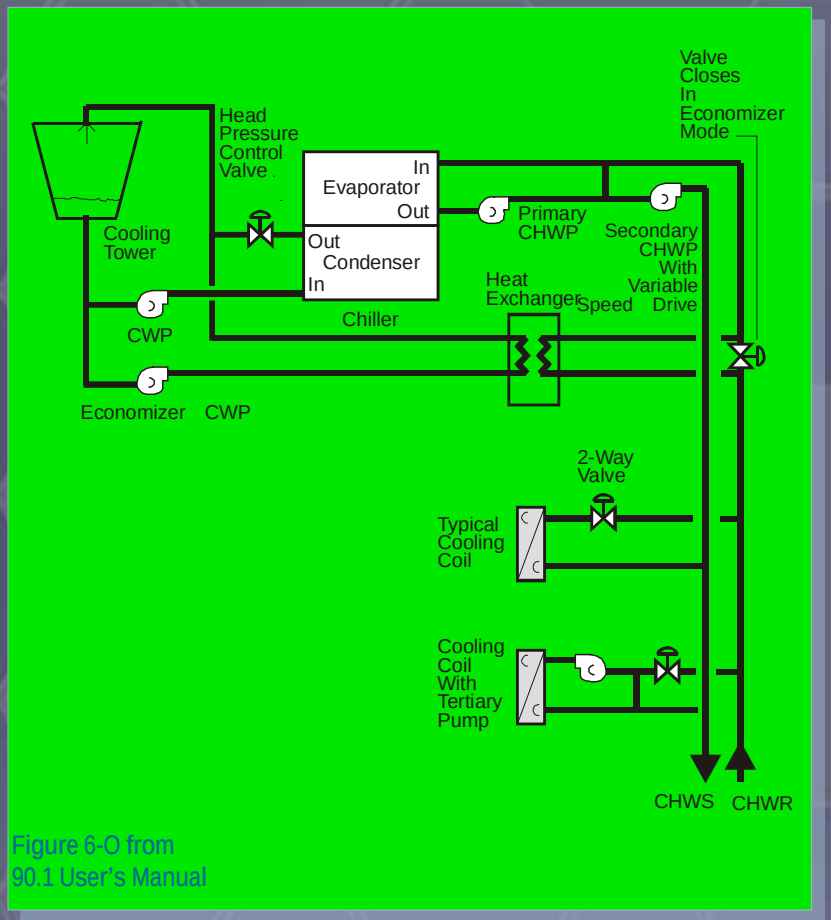


Figure 6-O from 90.1 User's Manual

Section 6.5.1.2.2

HVAC - P

Integrated Economizer Control

- Economizers must be integrated with mechanical cooling systems and be capable of providing partial cooling even when additional mechanical cooling is required
- Some exceptions to this

Section 6.5.1.3

HVAC - P

Economizer Heating System Impact

- Designed so economizer operation doesn't increase the building heating energy use during normal operation
- Exception
  - Economizers on VAV systems that cause zone level heating to increase due to a reduction in supply air temperature

Section 6.5.1.4

HVAC - P