

ENERGY IN BUILDINGS 2024 CONFERENCE

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Does HVAC System & Equipment Selection with Decarbonization Considerations work?

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WRITE THE NEXT CHAPTER IN YOUR CAREER**

ASHRAE Members who are active at their chapter and society become leaders and bring information and technology back to their job.

YOU ARE NEEDED FOR:

- ❖ Society Technical Committees
- ❖ Society Standard Committees
- ❖ Young Engineers in ASHRAE
- ❖ Chapter Membership Promotion
- ❖ Chapter Research Promotion
- ❖ Chapter Student Activities
- ❖ Chapter Technology Transfer



Find your Place in ASHRAE and volunteer

OVERVIEW

An interactive discussion

Considerations for System and Equipment selection

Decarbonization Thoughts

Simple example

Wrap up

WHAT ARE CRITERIA?

System & Equipment Selection

2024 ASHRAE HANDBOOK – HVAC SYSTEMS AND EQUIPMENT

CHAPTER 1 HVAC SYSTEM ANALYSIS AND SELECTION

SYSTEM SELECTION

1. Temperature
2. Humidity
3. Air Motion
4. Air/Water Velocity
5. Water quality and/or reuse
6. Outdoor air quality or purity
7. *Indoor air purity or quality*
8. Air changes per hour

System & Equipment Selection

2024 ASHRAE HANDBOOK – HVAC SYSTEMS AND EQUIPMENT

CHAPTER 1 HVAC SYSTEM ANALYSIS AND SELECTION

SYSTEM SELECTION

9. Acoustics and vibration

10. Local climate

11. Mold and mildew prevention

12. Capacities (existing, proposed, and future expansion)

13. Redundancy

14. Spatial requirements (present and future)

15. Environmental health and safety design

16. Security

System & Equipment Selection

2024 ASHRAE HANDBOOK – HVAC SYSTEMS AND EQUIPMENT

CHAPTER 1 HVAC SYSTEM ANALYSIS AND SELECTION

SYSTEM SELECTION

- 17. First cost
- 18. Return on investment cost
- 19. Energy consumption costs
- 20. Operator labour costs
- 21. Maintenance costs
- 22. Serviceability
- 23. Reliability
- 24. Flexibility

System & Equipment Selection

2024 ASHRAE HANDBOOK – HVAC SYSTEMS AND EQUIPMENT

CHAPTER 1 HVAC SYSTEM ANALYSIS AND SELECTION

SYSTEM SELECTION

25. Controllability

26. Replaceability

27. Life cycle analysis

28. Sustainability of design

29. Seismic protection

30. Filtration and filtration effects eg Covid

31. Changing codes and standards

OTHER GOALS

- 1. Seasonal start up date**
- 2. Occupant move in date**
- 3. Operator training**
- 4. Supporting a process, such as operation of computer equipment**
- 5. Promoting a germ-free environment**
- 6. Increased marketability of rental spaces**
- 7. Increasing net rental income**
- 8. Improving property saleability**
- 9. Public image of the property**
- 10. Certification (LEED, CAGBC, BOMA, ENERGY STAR, BUILDING EQ)**

Constraints

- 1. Performance limitations (temperature, humidity, space pressure)**
- 2. Code updates and/or new codes**
- 3. Available capacity (equipment, ductwork, pipe size)**
- 4. Available space and access in and/or out with new or old equipment**
- 5. Available utility source**
- 6. Energy budget (conceptual consumption per year) code driven or targeted**
- 7. Equipment efficiency**
- 8. Operator knowledge and capabilities**
- 9. Existing building occupants**
- 10. Building architecture**

Constructability Constraints

- 1. Existing conditions (eg floor load, access into and through a building)**
- 2. Rigging equipment into and out of a building to a designated area**
- 3. Demolition and impact on adjacent space and existing systems in operation**
- 4. Maintaining existing building occupancy, use of building, and system operation**
- 5. Ability to phase HVAC system installation**
- 6. Temporary HVAC**
- 7. Equipment availability (eg delivery lead time)**
- 8. Construction schedule**
- 9. Construction budget**

Evaluation

- 1. List the possible options**
- 2. Pros and cons for each**
- 3. Weigh the benefits vs the drawbacks**
- 4. Building Envelope & EHS concerns**
- 5. Outline the constraints**
- 6. Go over the owners requirements and narrow down to a few choices- checklist**
- 7. Make decision with decision maker on desired choice considering all the factors**

DECARBONIZATION CONSIDERATIONS

What are they?

DECARBONIZATION CONSIDERATIONS

- 1. Energy Consumption**
- 2. Electrifying**
- 3. Refrigerant (incl leaks)**
- 4. Manufacturing, Energy consumption, materials**
- 5. Carbon capture and storage, Grid intersection**
- 6. End of life impact**

SIMPLE EXAMPLE

Existing 6 ton (21.1 kw) Electric/Electric Packaged Rooftop down discharge on roof curb on roof.

Change in use of space and now more people and equipment. Load calcs from modelling show an increased cooling load to 7.5 tons (26.4 kw) and corresponding reduced heating load.

What needs to be considered?

SUMMARY

Gather all the parameters

List the pros and cons and constraints

Evaluate the options including decarbonization

Make the best recommendation with decision maker considering all the details

Remember no silver bullet

QUESTIONS ?

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