Topic: Energy-related investment decisions for Data Centers.

Focus Group Questionnaire

First name: Mike S.

1. Which of the following do you do in your position?
   
   DATA CENTER OPERATIONS
   a. Participate in decisions about purchasing equipment for your data center (e.g., servers, software, racks, lighting, cooling equipment)? ☑ Yes ☐ No
   
   b. Participate in decisions about servicing or maintaining equipment for your data center?
       ☑ Yes ☐ No

2. How many data centers, server rooms, and server closets does your company own or operate?
   Enter number here: 44

3. [If more than one data center] For how many data centers are you involved in major equipment purchase and maintenance decisions?
   Enter number here: 44

4. The majority of the data centers you help manage are:
   a. Server closets or rooms (less than 500 square feet)
   b. Localized data centers (500 – 5,000 square feet)
   c. Enterprise data centers (> 5,000 square feet)
   ☑ d. Mega or utility-scale data centers (>10,000 square feet)

5. What is the average number of racks in your typical data center?
   Enter number here: ___________ or ☑ if > 2000

6. How many servers are there in your organization as a whole?
   ☐ < 2000
   ☐ 2000 – 10,000
   ☑ 10,000 – 50,000
   ☐ > 50,000

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1 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
7. What type of data centers does your company operate?
   - Server rooms or closets
   - Enterprise/corporate data centers
   - Cloud/hyperscale computing
   - High-performance/scientific computing
   - Multi-tenant/colocation data centers

8. Which sectors does your data center support? (Name top three)
   a. IT services
   b. Energy and utilities
   c. Media and telecommunications
   d. Banking and financial services
   e. Health care
   f. Education
   g. Co-location/shared
   h. Other: __________________________

9. What state(s) are your data centers located in?
   Enter states here: MA, NY, SFO, PA, MD

10. When did you last pursue a major equipment purchase/upgrade for your data center?
    a. Within the last 3 years
    b. 3-5 years ago
    c. More than 5 years ago

11. How often do you replace servers in your data centers?
    _________3 YEAR REFRESH________

12. How often do you make major infrastructure upgrades to your data centers? ________

13. Do you actively participate in the EnergySTAR Buildings, Green Grid, or another third-party energy-efficiency program?
    a. Yes  b. No

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2 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
14. Have you had an energy audit performed by a third party within the last three years?

☐ Yes  ☐ No

15. Do you track energy use on a regular basis?  ☑ Yes

a. What is the typical annual electricity consumption (kwh) of one of your data centers?

16. Do you track power usage effectiveness (PUE) or any other energy efficiency measures?

a. If so, what is the average PUE of your data centers?

17. Do you track server utilization?

a. Is so, what is the average server utilization rate of your data centers?

18. Do you rent data center space from another company?

☐ Yes  ☐ No

If yes, what percentage of your data center needs are met by renting space from others?

19. Do you lease or outsource from another company any of the following elements of your data centers?

b. Servers  ☐ Yes  ☐ No  ☐ Sometimes
c. Facility management  ☐
d. Maintenance & repairs  ☐
e. Other, specify:  ☐

20. Do you lease space in your data center(s) to other companies?

☐ Yes  ☐ No

If yes, what percentage of your racks are leased to other companies?

21. If you lease DC space to or from another company, does the tenant or facility owner typically pay for electricity costs?

☐ Yes  ☐ No

3 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
22. Has your company considered or used any of the following technologies and energy saving strategies: (check all that apply)

<table>
<thead>
<tr>
<th>Facility Management</th>
<th>Has used</th>
<th>Never used</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>would use again</td>
<td>would not use again</td>
<td>would consider in the future</td>
</tr>
<tr>
<td>Isolating hot/cold aisles</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Blanking panels</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Enclose server racks (e.g., strip curtains)</td>
<td>☐</td>
<td>✔</td>
<td>☐</td>
</tr>
<tr>
<td>Data center infrastructure management (DCIM) software</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Raising temperature set points</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>List typical facility temperature: 76°F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable speed fan drives</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Energy-efficient air handling units</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Modular facility design for data center expansion</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Air-side economizer</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Water-side economizer</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Energy-efficiency lighting</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Predictive modeling of future IT deployments</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other, specify:</td>
<td></td>
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<td></td>
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<table>
<thead>
<tr>
<th>Servers</th>
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<th>Don’t know</th>
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</thead>
<tbody>
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<td></td>
<td>would use again</td>
<td>would not use again</td>
<td>would consider in the future</td>
</tr>
<tr>
<td>Energy-efficient server hardware (e.g., power supply, fans, etc.)</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Underclocking</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Virtualization</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Decommission idle servers</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Consolidate lightly used servers</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Improve data storage efficiency</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>IT power management software</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other, specify:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[Multi-tenant DCs] Adjust pricing models to incentivize energy efficiency</th>
<th>Has used</th>
<th>Never used</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>would use again</td>
<td>would not use again</td>
<td>would consider in the future</td>
</tr>
<tr>
<td>Space-based pricing</td>
<td>☐</td>
<td>☐</td>
<td>✔</td>
</tr>
<tr>
<td>Space and power block pricing (differentiate power and energy)</td>
<td>☐</td>
<td>☐</td>
<td>✔</td>
</tr>
<tr>
<td>Space and actual power pricing (differentiate power and energy)</td>
<td>☐</td>
<td>☐</td>
<td>✔</td>
</tr>
<tr>
<td>Other, specify:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
Topic: Energy-related investment decisions for Data Centers.

Focus Group Questionnaire

First name:

1. Which of the following do you do in your position?
   a. Participate in decisions about purchasing equipment for your data center (e.g., servers, software, racks, lighting, cooling equipment)? ☑ Yes ☐ No
   b. Participate in decisions about servicing or maintaining equipment for your data center? ☑ Yes ☐ No

2. How many data centers, server rooms, and server closets does your company own or operate?
   Enter number here 100-1000-50+ Closets

3. [If more than one data center] For how many data centers are you involved in major equipment purchase and maintenance decisions?
   Enter number here 2

4. The majority of the data centers you help manage are:
   a. Server closets or rooms (less than 500 square feet)
   b. Localized data centers (500 – 5,000 square feet)
   ☑ Enterprise data centers (> 5,000 square feet)
   d. Mega or utility-scale data centers (>10,000 square feet)

5. What is the average number of racks in your typical data center?
   Enter number here 0 or □ if > 2000

6. How many servers are there in your organization as a whole?
   ☑ < 2000
   □ 2000 – 10,000
   □ 10,000 – 50,000
   □ > 50,000

1 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
7. What type of data centers does your company operate?
   - [ ] Server rooms or closets
   - [x] Enterprise/corporate data centers
   - [ ] Cloud/hyperscale computing
   - [x] High-performance/scientific computing
   - [ ] Multi-tenant/colocation data centers

8. Which sectors does your data center support? (Name top three)
   a. IT services
   b. Energy and utilities
   c. Media and telecommunications
   d. Banking and financial services
   e. Health care
   f. Education
   g. Co-location/shared
   h. Other: ________________________________

9. What state(s) are your data centers located in?
   Enter states here: MA ______________

10. When did you last pursue a major equipment purchase/upgrade for your data center?
   a. Within the last 3 years
   b. 3-5 years ago
   c. More than 5 years ago

11. How often do you replace servers in your data centers?
   [x] 3-4 yr. Assess & Refurbish Cycle

12. How often do you make major infrastructure upgrades to your data centers?
   [x] NA - New Facility
       Less than 5 yr

13. Do you actively participate in the EnergySTAR Buildings, Green Grid, or another third-party energy-efficiency program?
   - [x] Yes
   - [ ] No

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2 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
14. Have you had an energy audit performed by a third party within the last three years?

☐ Yes  ☒ No

15. Do you track energy use on a regular basis?  Yes - Real Time

   a. What is the typical annual electricity consumption (kwh) of one of your data centers?

16. Do you track power usage effectiveness (PUE) or any other energy efficiency measures?

   a. If so, what is the average PUE of your data centers? 1.4

17. Do you track server utilization?

   a. Is so, what is the average server utilization rate of your data centers?

18. Do you rent data center space from another company?  ☒ Yes  ☐ No

   If yes, what percentage of your data center needs are met by renting space from others?

19. Do you lease or outsource from another company any of the following elements of your data centers?

   b. Servers  ☒ Yes  ☐ No  ☐ Sometimes
   c. Facility management  ☐ Yes  ☒ No  ☐ Sometimes
   d. Maintenance & repairs  ☐ Yes  ☒ No  ☐ Sometimes
   e. Other, specify: ____________________________

20. Do you lease space in your data center(s) to other companies?  ☒ Yes  ☐ No

   If yes, what percentage of your racks are leased to other companies? 10

21. If you lease DC space to or from another company, does the tenant or facility owner typically pay for electricity costs?  Yes

3 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
22. Has your company considered or used any of the following technologies and energy saving strategies: *(check all that apply)*

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<th>Has used</th>
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<th>Don't know</th>
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<tr>
<td>Isolating hot/cold aisles</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Blanking panels</td>
<td></td>
<td>yes</td>
<td></td>
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<td>yes</td>
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<td>no</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Raising temperature set points</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>List typical facility temperature: <img src="image" alt="Temperature" /></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable speed fan drives</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
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<td></td>
</tr>
</tbody>
</table>

4 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
Topic: Energy-related investment decisions for Data Centers.

Focus Group Questionnaire

First name: Dave R.

1. Which of the following do you do in your position?
   
a. Participate in decisions about purchasing equipment for your data center (e.g., servers, software, racks, lighting, cooling equipment)? ☑ Yes ☐ No

b. Participate in decisions about servicing or maintaining equipment for your data center? ☑ Yes ☐ No

2. How many data centers, server rooms, and server closets does your company own or operate?

Enter number here 20 - 30

3. [If more than one data center] For how many data centers are you involved in major equipment purchase and maintenance decisions?

Enter number here 1

4. The majority of the data centers you help manage are:
   
a. Server closets or rooms (less than 500 square feet)
   
   ☐ Localized data centers (500 – 5,000 square feet)
   
c. Enterprise data centers (> 5,000 square feet)
   
d. Mega or utility-scale data centers (>10,000 square feet)

5. What is the average number of racks in your typical data center?

Enter number here 50 or ☐ if > 2000

6. How many servers are there in your organization as a whole?
   
 problème 2000
   
☐ 2000 – 10,000
   
☐ 10,000 – 50,000
   
☐ > 50,000

1 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
7. What type of data centers does your company operate?
   - Server rooms or closets
   - Enterprise/corporate data centers
   - Cloud/hyperscale computing
   - High-performance/scientific computing
   - Multi-tenant/colocation data centers

8. Which sectors does your data center support? (Name top three)
   a. IT services
   b. Energy and utilities
   c. Media and telecommunications
   d. Banking and financial services
   e. Health care
   f. Education
   g. Co-location/shared
   h. Other: 

9. What state(s) are your data centers located in?

   Enter states here: Providence RI

10. When did you last pursue a major equipment purchase/upgrade for your data center?
    a. Within the last 3 years
    b. 3-5 years ago
    c. More than 5 years ago

11. How often do you replace servers in your data centers?
    Frequently

12. How often do you make major infrastructure upgrades to your data centers? 2 - 5 years

13. Do you actively participate in the EnergySTAR Buildings, Green Grid, or another third-party energy-efficiency program?
    - Yes    - No

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2 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
14. Have you had an energy audit performed by a third party within the last three years?

☐ Yes ☐ No

15. Do you track energy use on a regular basis? ☐ Yes

   a. What is the typical annual electricity consumption (kwh) of one of your data centers?

16. Do you track power usage effectiveness (PUE) or any other energy efficiency measures? ☐ No

   a. If so, what is the average PUE of your data centers?

17. Do you track server utilization? ☐ Yes

   a. Is so, what is the average server utilization rate of your data centers? ☐ 0%

18. Do you rent data center space from another company? ☐ Yes ☐ No

   If yes, what percentage of your data center needs are met by renting space from others?

% 

19. Do you lease or outsource from another company any of the following elements of your data centers?
   b. Servers ☐ Yes ☐ No ☐ Sometimes
   c. Facility management ☐ Yes ☐ No ☐ Sometimes
   d. Maintenance & repairs ☐ Yes ☐ No ☐ Sometimes
   e. Other, specify: ☐ Yes ☐ No

20. Do you lease space in your data center(s) to other companies? ☐ Yes ☐ No

   If yes, what percentage of your racks are leased to other companies? ☐ 0%

21. If you lease DC space to or from another company, does the tenant or facility owner typically pay for electricity costs? ☐ Yes ☐ No

   DC location

This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
22. Has your company considered or used any of the following technologies and energy saving strategies? (check all that apply)

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</tr>
<tr>
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</table>

**Facility Management**
- Isolating hot/cold aisles
- Blanking panels
- Enclose server racks (e.g., strip curtains)
- Data center infrastructure management (DCIM) software
- Raising temperature set points
  - List typical facility temperature: **68-70**
- Variable speed fan drives
- Energy-efficient air handling units
- Modular facility design for data center expansion
- Air-side economizer
- Water-side economizer
- Energy-efficiency lighting
- Predictive modeling of future IT deployments
- Other, specify: ______________

**Servers**
- Energy-efficient server hardware (e.g., power supply, fans, etc.)
- Underclocking
- Virtualization
- Decommission idle servers
- Consolidate lightly used servers
- Improve data storage efficiency
- IT power management software
- Other, specify: ______________

[Multi-tenant DCs] Adjust pricing models to incentivize energy efficiency
- Space-based pricing
- Space and power block pricing (differentiate power and energy)
- Space and actual power pricing (differentiate power and energy)
- Other, specify: ______________
Topic: Energy-related investment decisions for Data Centers.

Focus Group Questionnaire

First name: Jim

1. Which of the following do you do in your position?
   a. Participate in decisions about purchasing equipment for your data center (e.g., servers, software, racks, lighting, cooling equipment)? Yes ☐ No ☐
   b. Participate in decisions about servicing or maintaining equipment for your data center? Yes ☐ No ☐

2. How many data centers, server rooms, and server closets does your company own or operate?

   Enter number here > 100 &

3. [If more than one data center] For how many data centers are you involved in major equipment purchase and maintenance decisions?

   Enter number here

4. The majority of the data centers you help manage are:
   a. Server closets or rooms (less than 500 square feet)
   b. Localized data centers (500 — 5,000 square feet)
   c. Enterprise data centers (> 5,000 square feet)
   d. Mega or utility-scale data centers (>10,000 square feet)

5. What is the average number of racks in your typical data center?

   Enter number here ____________________ or ☐ If > 2000

6. How many servers are there in your organization as a whole?
   ☐ < 2000
   ☐ 2000 – 10,000
   ☐ 10,000 – 50,000
   ☐ > 50,000

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7. What type of data centers does your company operate?
   - [ ] Server rooms or closets
   - [ ] Enterprise/corporate data centers
   - [ ] Cloud/hyperscale computing
   - [ ] High-performance/scientific computing
   - [x] Multi-tenant/colocation data centers

8. Which sectors does your data center support? (Name top three)
   - a. IT services
   - b. Energy and utilities
   - c. Media and telecommunications
   - d. Banking and financial services
   - e. Health care
   - f. Education
   - g. Co-location/shared
   - h. Other: ________

9. What state(s) are your data centers located in?

   Enter states here: ________

10. When did you last pursue a major equipment purchase/upgrade for your data center?
    - a. Within the last 3 years
    - b. 3-5 years ago
    - c. More than 5 years ago

11. How often do you replace servers in your data centers?
    ________

12. How often do you make major infrastructure upgrades to your data centers?
    ________

13. Do you actively participate in the EnergySTAR Buildings, Green Grid, or another third-party energy-efficiency program?
    - [ ] Yes
    - [ ] No

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14. Have you had an energy audit performed by a third party within the last three years?

☐ Yes  ☐ No

15. Do you track energy use on a regular basis? ☑ Yes

   a. What is the typical annual electricity consumption (kwh) of one of your data centers?

16. Do you track power usage effectiveness (PUE) or any other energy efficiency measures? ☑ Yes

   a. If so, what is the average PUE of your data centers?

17. Do you track server utilization?

   a. Is so, what is the average server utilization rate of your data centers?

18. Do you rent data center space from another company? ☐ Yes  ☐ No

   If yes, what percentage of your data center needs are met by renting space from others?

19. Do you lease or outsource from another company any of the following elements of your data centers?

   b. Servers  ☑ Yes  ☐ No  ☐ Sometimes
   c. Facility management  ☑ Yes  ☐ No  ☐ Sometimes
   d. Maintenance & repairs  ☑ Yes  ☐ No  ☐ Sometimes
   e. Other, specify: ____________________________

20. Do you lease space in your data center(s) to other companies? ☐ Yes  ☐ No

   If yes, what percentage of your racks are leased to other companies?

21. If you lease DC space to or from another company, does the tenant or facility owner typically pay for electricity costs? ☑ No

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3 This project is approved by U.S. Office of Management and Budget. The clearance # is 2090-0028.
22. Has your company considered or used any of the following technologies and energy saving strategies: \(\text{check all that apply}\)

<table>
<thead>
<tr>
<th>Has used</th>
<th>Never used</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>would use again</td>
<td>would not use again</td>
<td>would consider in the future</td>
</tr>
</tbody>
</table>

### Facility Management
- **Isolating hot/cold aisles**: mark
- **Blanking panels**: mark
- **Enclose server racks (e.g., strip curtains)**: mark
- **Data center infrastructure management (DCIM) software**: mark
- **Raising temperature set points**
  - List typical facility temperature: 24.78
- **Variable speed fan drives**: mark
- **Energy-efficient air handling units**: mark
- **Modular facility design for data center expansion**: mark
- **Air-side economizer**: mark
- **Water-side economizer**: mark
- **Energy-efficiency lighting**: mark
- **Predictive modeling of future IT deployments**: mark
- **Other, specify:**

### Servers
- **Energy-efficient server hardware (e.g., power supply, fans, etc.)**: mark
- **Underclocking**: mark
- **Virtualization**: mark
- **Decommission idle servers**: mark
- **Consolidate lightly used servers**: mark
- **Improve data storage efficiency**: mark
- **IT power management software**: mark
- **Other, specify:**

### Multi-tenant DCs
- [Multi-tenant DCs] Adjust pricing models to incentivize energy efficiency
  - **Space-based pricing**: mark
  - **Space and power block pricing (differentiate power and energy)**: mark
  - **Space and actual power pricing (differentiate power and energy)**: mark
  - **Other, specify:**

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