









# DUCKER WORLDWIDE

## **Metal Benefits Case Study Program Final Report August 29, 2007**

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## AGENDA

-  INTRODUCTION
-  EXECUTIVE SUMMARY
-  MAINTENANCE PROGRAM/ INITIATIVES
-  PURCHASE DECISION PROCESS
-  SUSTAINABILITY AND ENERGY PERFORMANCE
-  APPENDIX: RESPONDENT PROFILE



# INTRODUCTION

## Introduction

## Background

Over the past few years, the industry associations and marketing groups in the metal construction industry have aggressively sought to increase awareness of metal roofs and wall panels while clearly demonstrating all the benefits metal offers. Significant time and resource has been spent to target select building types and decision makers to influence their choice and drive them toward metal as a valuable solution for cladding and roofing. Throughout this process, Ducker Worldwide has been a valuable partner by providing excellent intelligence and actionable information to use in the marketing and sales process. Further, it has been proven in leading marketing institutions around the world that fact based marketing and value based selling are the two most effective tools for continuous revenue.

Despite the metal construction industries' success, there are further opportunities and challenges to overcome, primarily the perceptions among building owners that are driving the material selection process for their facilities. Research indicates that these owners perceive metal panel roofs and walls to be more expensive and costly than other competing materials, and may not understand the additional benefits regarding life cycle cost, maintenance, energy performance, sustainability and design.

## Introduction

## Background

Therefore, the industry needs to develop a new fact based marketing tactic that can be used to accomplish the following:

- Generate awareness and educate building owners on the truth regarding metal panel costs and benefits relative to competing materials
- Allow for differentiation and adjustment based upon building type and key use region

Building from the success of previous efforts in the metal construction industry, Ducker will develop a valuable and reliable metal panel case study program. This program focuses on real world evidence of the benefits metal panels provide in the areas of first cost, maintenance cost, sustainability, design flexibility and energy performance.

The following report contains the final results of the case studies performed over the last six months analyzing metal roofing and wall systems versus other wall/roofing material types.

## Introduction

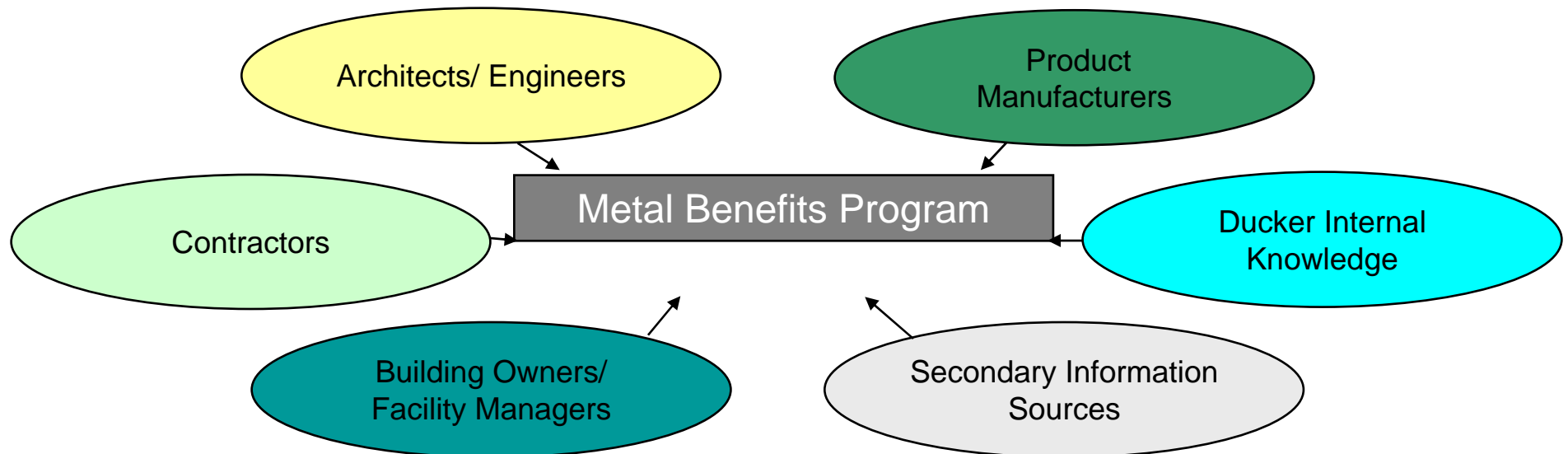
### Study Objectives

- Develop a comprehensive research program to collect and analyze important facts related to metal panel benefits in nonresidential facility construction
- Create individual case study building profiles that detail the benefits of metal panels and clearly articulate advantages over competing materials from both a cost and environmental perspective
- Provide strategic conclusions regarding successful positioning of metal in future marketing activities, based upon insights gained through research
- Product segments: Metal versus its predominant competing material for low slope roofing, and preformed walls
- Building category: Focus on retail, healthcare, hotel/motel, office, warehouse (though overall difficulty obtaining information on the hotel/motel segment)
- Regional segments: Sunbelt and rustbelt
- Four to six in-depth case studies which provide comparisons of metal vis-à-vis its key competitive set

## Introduction

## Methodology

- Ducker uses a multi-faceted approach in order to gain a full understanding of metal costs and benefits. Numerous interviews have been conducted to obtain costing and building profile information



## Introduction

### Study Methodology

The qualitative results of this study are based upon real world experiences through effective research design and interview implementation segmented properly across the United States.

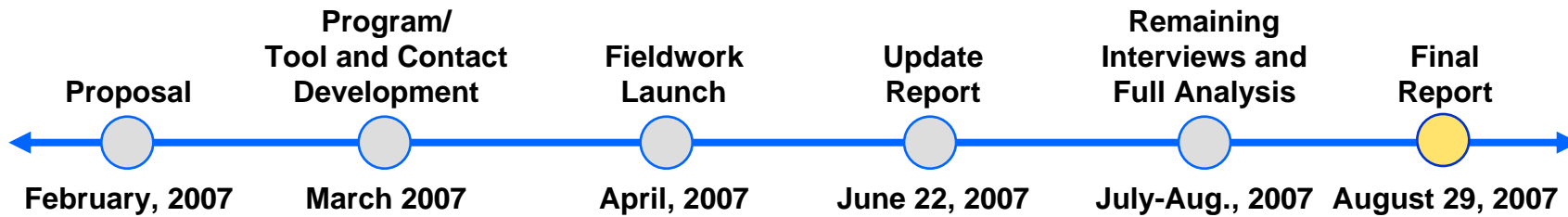
- All interviews were conducted in-house by Ducker Research personnel
- Building owners and facility managers were pre-screened and pre-qualified as to their experience and knowledge related to roof and wall system issues and selection
- Most roofing/wall information obtained based on installation prior to 2001
- All buildings profiled were five stores or less
- Over 40 interviews have been conducted, where important details of real activity feeds directly into the lifecycle model
- Regional input received and appropriate balanced segmentation of input obtained
- Balance of application/building category obtained
- Both quantitative (fixed, objective) and qualitative (subjective) techniques utilized
- Quality control procedures practiced throughout interviews and analysis
- Respondents were not provided an incentive for participation



Introduction

**Study Timeline**

The timeline below details major milestones throughout the project:





# EXECUTIVE SUMMARY

## Executive Summary

### Summary. . .



Weatherability, low maintenance, service life/ longevity and life cycle most critical decision factors in the purchase decision process for both roofs and wall systems



Maintenance activity is still the exception, but increasing

- Increase in overall activity and preventative maintenance (represents 6% of annual maintenance budget versus 4% in 2004; increase in the number of building owners with formal maintenance programs)
- Low maintenance is most critical to the homeowner for the roof and wall systems
- Metal annual maintenance cost per square foot 35 to 50 percent the cost of asphalt or single ply systems



Associations' role in educating the industry about roofing and wall systems more important today than it was three years ago – indications that TMI's efforts have been successful based on commentary and ratings

## Executive Summary

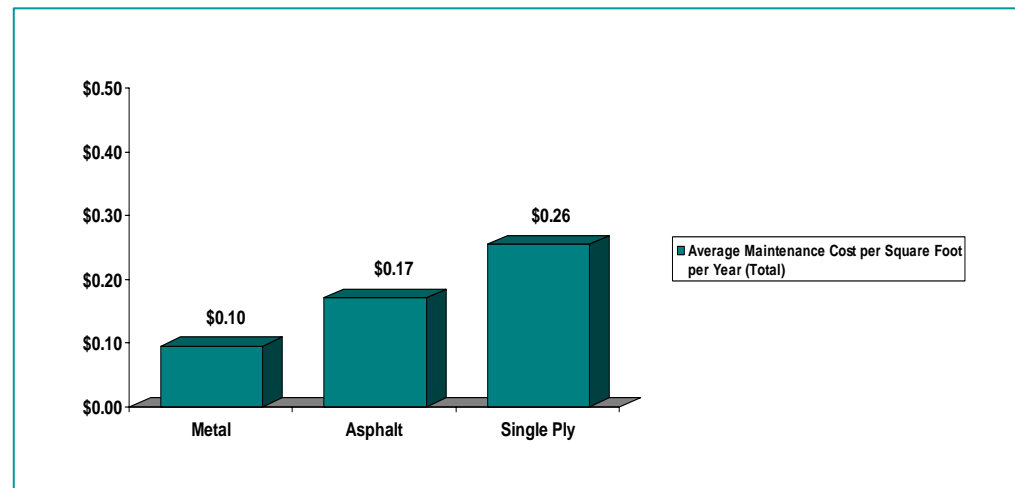
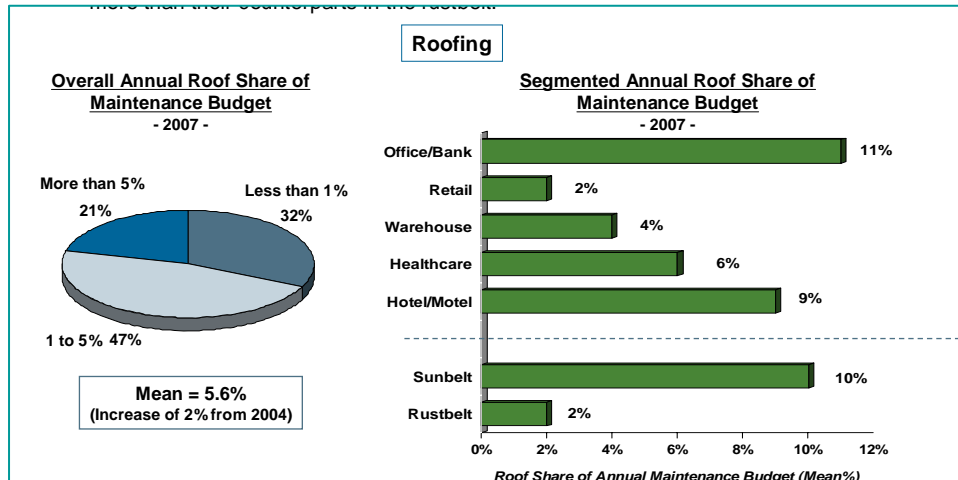
**Weatherability, low maintenance, service life/ longevity and life cycle most critical decision factors in the purchase decision process for both roofs and wall systems**

### Roof and Wall System Selection Criteria

Criteria	Roofs	Walls
Low maintenance	4.90	4.90
Weatherability	4.90	4.70
Service life/ longevity	4.80	4.65
Life cycle cost	4.63	4.63
Average annual maintenance expense	4.37	4.37
Energy efficiency	4.32	4.26
Familiarity/past history of product	4.10	4.10
Initial cost (total installed)	4.05	4.11
Environmentally friendly (material and/or installation)	3.94	4.00
Tax/Insurance Benefits	3.81	3.75
Reducing greenhouse gas as a result of energy efficiencies/conservation	3.65	3.65
Ability to integrate with other Materials	3.63	4.00
Reduction of construction waste	3.22	3.17
Use of recycled materials	2.89	2.83
Flexibility of Design (ability to achieve desired image)	2.83	4.00
Appearance/Aesthetics	2.79	4.35
Use of natural materials	2.17	2.33

## Executive Summary

### Maintenance activity is still the exception, but increasing...

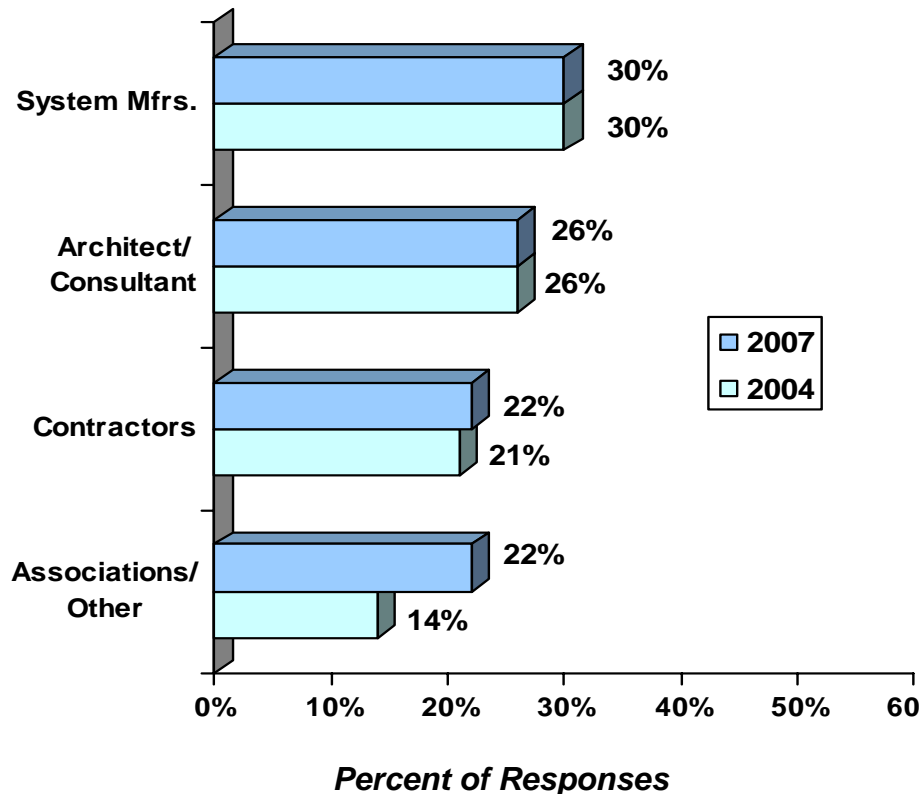


## Executive Summary

### Responsibility in Educating Building Owners

Building owners believe that both manufacturers and architects share in the responsibility of educating them on roofing/wall products, though it is interesting to note that they believe that associations should play a larger role than in 2004. This could be due to TMI/other groups efforts in educating the owner.

#### Verbatim Comments



*“The system manufacturers have to convince the engineers and architects to specify their product; they also need to go to contractors.” – Sunbelt, Healthcare*

*“The manufacturer is the one who has to make the architects aware of what is available and the advantages/disadvantages of it. From there it has to trickle down, so the architects can inform owners and contractors regarding what products are available. The burden of education goes to the manufacturer who has the trade groups at his disposal, to get this information out there.” – Sunbelt, Office Bank*

*“Architects don’t know about roofing products. Contractors need to know how to install the products. I feel the associations are already doing this, like the Metal Construction Association.”- Sunbelt, Office/Bank*

## Executive Summary

### Summary. . .



Metal roof service life expectations (by the building owner) still exceeds other materials, now by 20+ years



Though metal roofing is still ahead, life cycle cost (based on the sample of building owners interviewed for this analysis) of competing materials is closer versus the 2004 analysis



Metal considered a premium system for roofing, but more commodity/ lower end for wall systems compared to brick/ masonry

– Overall satisfaction as well as fit for sustainability/ green message



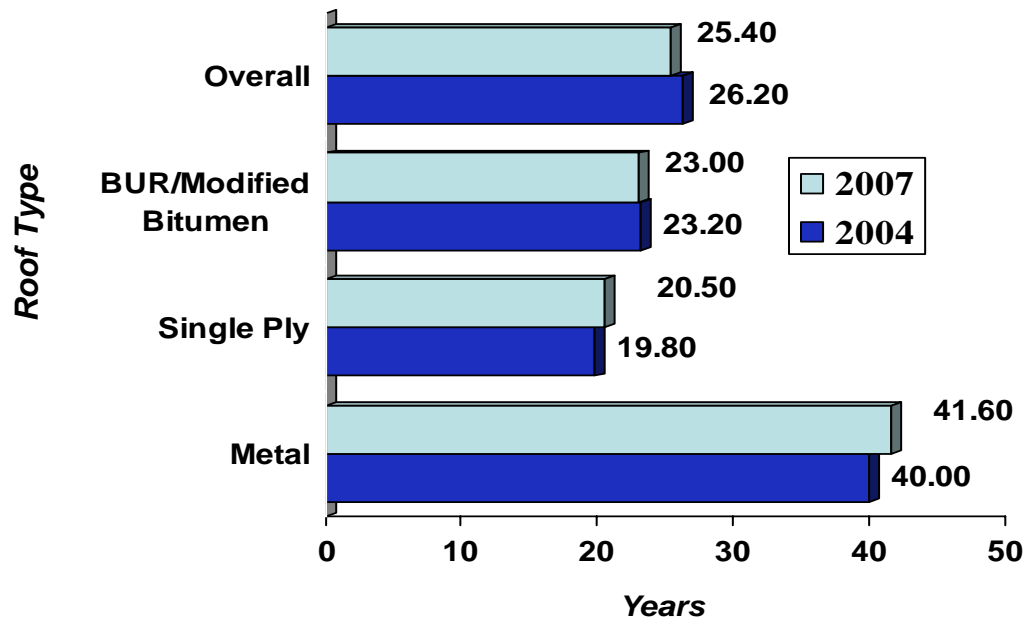
Satisfaction level with metal roofing at its peak, though building owner perception view of single ply systems increasing

Executive Summary

Metal roof service life expectations (by the building owner) still exceeds other materials, now by 20+ years

Roofing

Expected Roof Service Life By Material



*(Defined: Time from original installation through recover/re-roof)*



## Executive Summary

- The life cycle cost (LCC) of a roof is the present value of all of the costs associated with the roof over time
- The life cycle cost of a roof is typically calculated as follows:

$$\text{LCC} = \text{Present Value(Initial Installed Cost)} + \text{PV(Annual Energy Cost)} + \text{PV(Annual Maintenance Cost)}$$

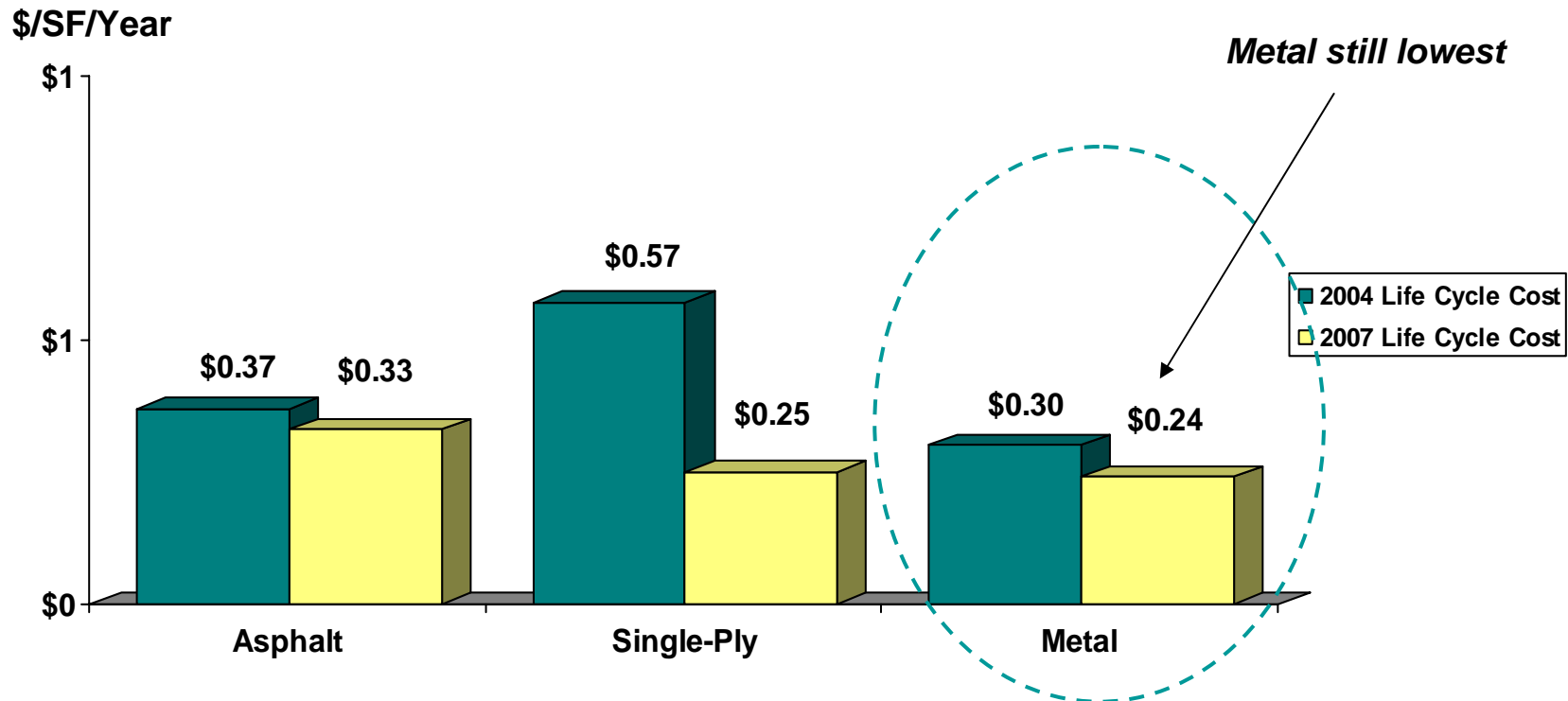
*Not incorporated due to vast differences in region, building function, insulation thicknesses, etc., however, based on past research, the use of a reflective roof system with adequate insulation usage can yield savings of approximately \$0.08-\$0.10 per square foot*

- In addition, the following assumptions were used in the development of the life cycle costs:
  - Average annual inflation rate of 3.1%
  - Actual service life figures by roofing material utilized based on Ducker/ NRCA analysis

Executive Summary

Though metal roofing is still ahead, life cycle cost (based on the sample of building owners interviewed for this analysis) of competing materials is closer versus the 2004 analysis...

Life Cycle Cost Analysis by Product Segment  
(Based on Expected Longevity)



## Executive Summary

**Note: Outliers/extreme data points not included in overall life cycle cost quantification**

Region	Roofing Material Type	Wall Cladding Type	Building Type	Roof Cost/ SF	AVERAGE ROOF MAINTENANCE COST/ SF OF ROOF	TOTAL ROOF LIFECYCLE COST/ SF/ YEAR THROUGH 2007	EXPECTED SERVICE LIFE	TOTAL ROOF LIFECYCLE COST/ SF/ YEAR BASED ON EXPECTED SERVICE LIFE (ROOF)
Rustbelt	Asphalt	Other	Office/Bank	\$ 0.65	\$ 0.08	\$ 0.14	17.28	\$ 0.13
Sunbelt	Asphalt	Tilt-up Concrete	Office/Bank	\$ 1.85	\$ 0.05	\$ 0.22	17.28	\$ 0.26
Rustbelt	Asphalt	Masonry Brick and/or Block	Healthcare	\$ 9.15	\$ 0.11	\$ 1.01	17.28	\$ 0.99
Sunbelt	Asphalt	Masonry Brick and/or Block	Healthcare	\$ -	\$ -		17.28	
Sunbelt	Asphalt	Tilt-up Concrete	Warehouse	\$ -	\$ 0.00	\$ 0.00	17.28	\$ 0.00
Rustbelt	Asphalt	Masonry Brick and/or Block	Retail/Shopping	\$ 3.33	\$ -	\$ 0.40	17.28	\$ 0.28
Sunbelt	Asphalt	EIFS/Stucco	Hotel/Motel	\$ -	\$ -		17.28	
Rustbelt	Copper	Masonry Brick and/or Block	Office/Bank	\$ 22.22	\$ 0.01	\$ 2.02		
Rustbelt	Single Ply	Masonry Brick and/or Block	Healthcare	\$ 2.58	\$ 0.10	\$ 0.36	12.80	\$ 0.47
Rustbelt	Single Ply	Masonry Brick and/or Block	Retail/Shopping				12.80	
Rustbelt	Single Ply	Other	Office/Bank	\$ 4.00	\$ 0.04	\$ 0.44	12.80	\$ 0.55
Rustbelt	Single Ply	Masonry Brick and/or Block	Warehouse	\$ 4.00	\$ -	\$ 0.51	12.80	\$ 0.44

*Note: The majority of the metal roof building owner/ facility managers report a negligible amount of maintenance.*

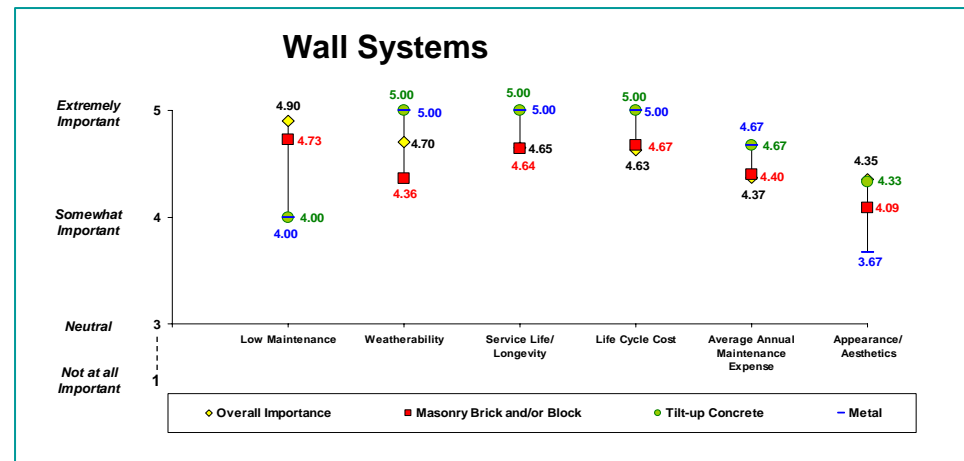
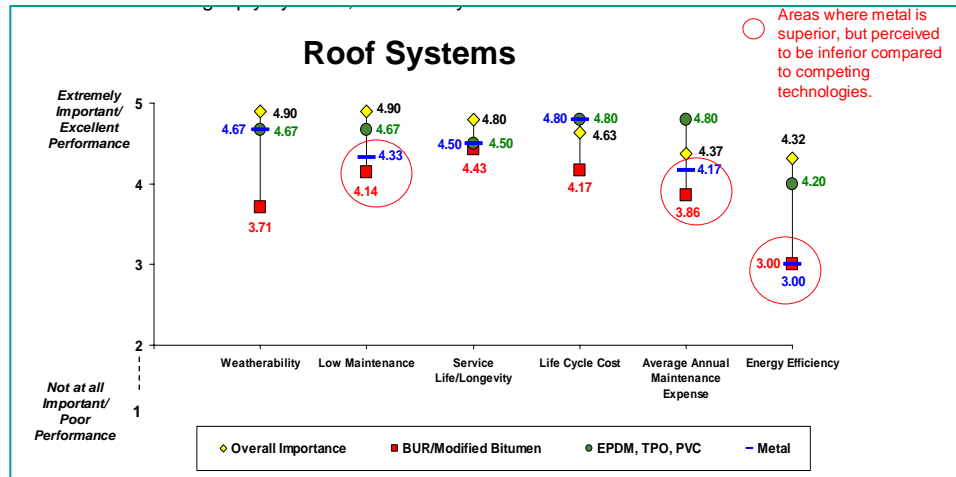
## Executive Summary

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Sunbelt	Single Ply	Masonry Brick and/or Block	Retail/Shopping	\$ 4.65	\$ -	\$ 0.59	12.80	\$ 0.51
Sunbelt	Single Ply	Tilt-up Concrete	Healthcare	\$ 7.50	\$ 0.16	\$ 0.80	12.80	\$ 1.68
Rustbelt	Metal	Metal	Warehouse	\$ 3.00	\$ -	\$ 0.25	28.41	\$ 0.24
Sunbelt	Metal	Metal	Warehouse	\$ 1.05	\$ 0.08	\$ 0.21	28.41	\$ 0.08
Rustbelt	Metal	Masonry Brick and/or Block	Retail/Shopping	\$ 2.88	\$ 0.05	\$ 0.42	28.41	\$ 0.16
Sunbelt	Metal	Masonry Brick and/or Block	Retail/Shopping	\$ 5.83	\$ 0.00	\$ 0.74	28.41	\$ 0.29
Rustbelt	Metal	Metal	Warehouse	\$ 4.67	\$ 0.0010	\$ 0.59	28.41	\$ 0.23
Rustbelt	Metal	Masonry Brick and/or Block	Healthcare	\$ 6.77	\$ -	\$ 0.86	28.41	\$ 0.33
Sunbelt	Metal	Masonry Brick and/or Block	Healthcare	\$ -	\$ -		28.41	
Rustbelt	Metal	Metal	Warehouse	\$ 5.75	\$ 0.01	\$ 0.92	28.41	\$ 0.26
Sunbelt	Metal	Masonry Brick and/or Block	Healthcare	\$ 6.25	\$ -	\$ 1.25	28.41	\$ 0.26
Sunbelt	Metal	Masonry Brick and/or Block	Hotel/Motel	\$ 6.82	\$ -	\$ 1.36	28.41	\$ 0.29

## Executive Summary

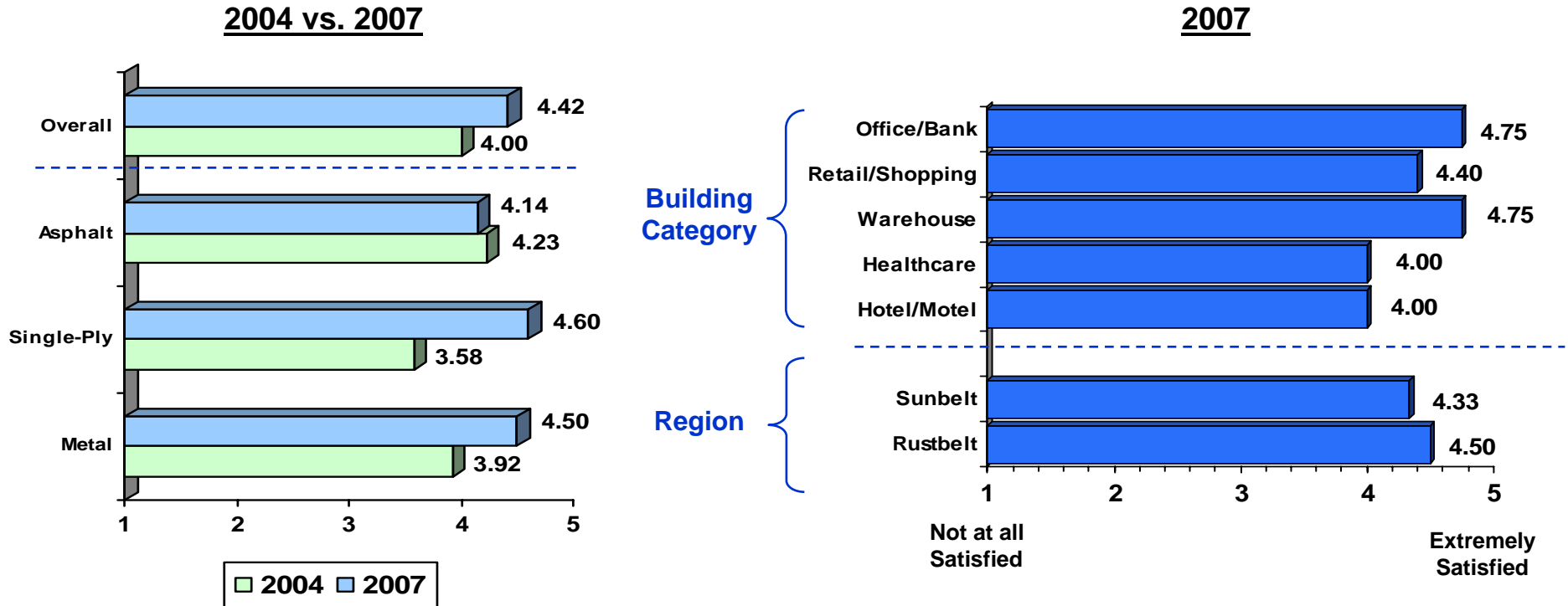
Metal considered a premium system for roofing, but more commodity/ lower end for wall systems compared to brick/ masonry...overall satisfaction as well as fit for sustainability/ green message...



Executive Summary

Satisfaction level with metal roofing at its peak, though building owner perception view of single ply systems increasing...

Satisfaction Level With Current Roofing System



## Executive Summary



Though not as extreme, the update analysis reinforces that the life cycle cost of a metal roof is significantly less than competing systems



Though building owners' ability to provide information on wall system costs is limited (typically not available unless the building was recently built), life cycle cost is not as much of a direct factor for wall systems



Communication efforts have clearly been effective from a roofing perspective, however, further efforts are necessary to further enhance the perception of metal wall systems beyond masonry



# MAINTENANCE PROGRAMS/ INITIATIVES



## Maintenance Programs/ Initiatives

### Overview

- Building owners/facility managers believe low maintenance is the most important factor in selecting a roofing material; and equally important when choosing wall cladding
- However, the majority of respondents report they do not have professional roof inspections performed and they do not have formal maintenance programs for roofing or wall systems
- Overall, respondents indicate that five percent of their annual maintenance budgets are spent maintaining their roofs; while less than two percent is spent on maintenance of wall cladding
- Visual inspections are the most frequently performed maintenance activity for both roof and wall systems
- Though maintenance programs and activities are still low, activities are increasing
  - Annual roof share of maintenance budget was four percent in 2004 versus six percent in 2007
  - More formal roof maintenance schedules versus 2004
  - Increase in patching and cleaning activities for the roof

## Maintenance Programs/ Initiatives

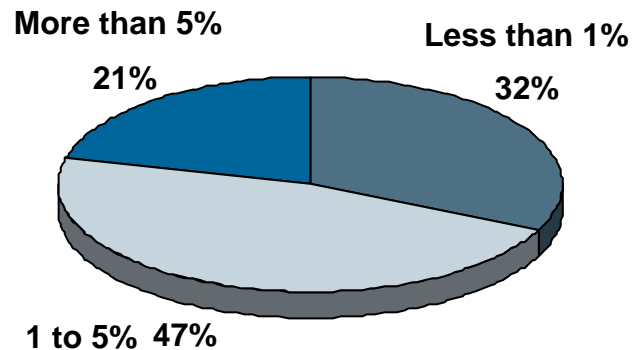
### Average Annual Roof Share of Maintenance Budget

- On average, building owners spend approximately five to six percent of their annual maintenance budget on their roof although owners of office/bank buildings report their costs are higher (nearly doubled). Facility Managers in the sunbelt spend five times more than their counterparts in the rustbelt.

#### Roofing

#### Overall Annual Roof Share of Maintenance Budget

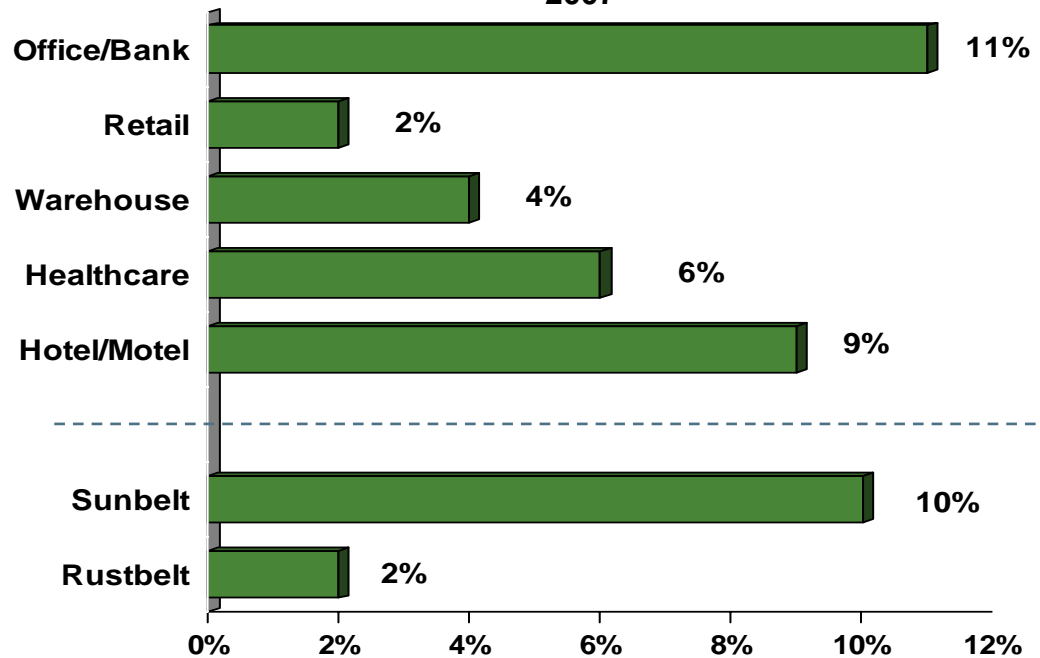
- 2007 -



**Mean = 5.6%**  
(Increase of 2% from 2004)

#### Segmented Annual Roof Share of Maintenance Budget

- 2007 -



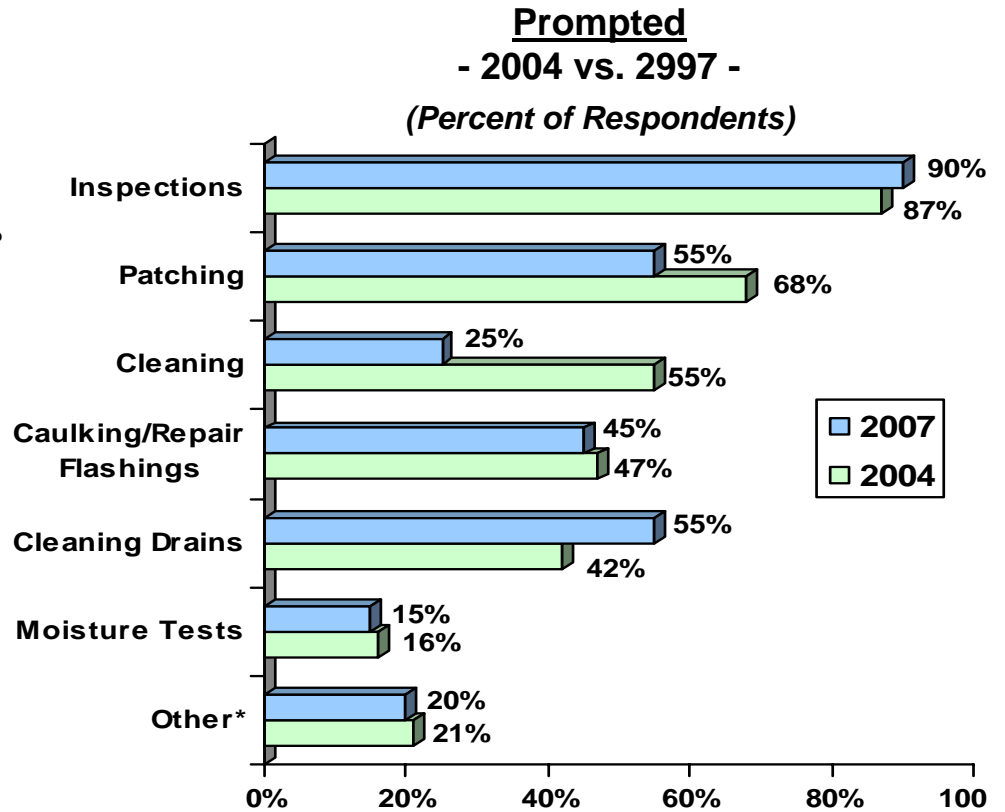
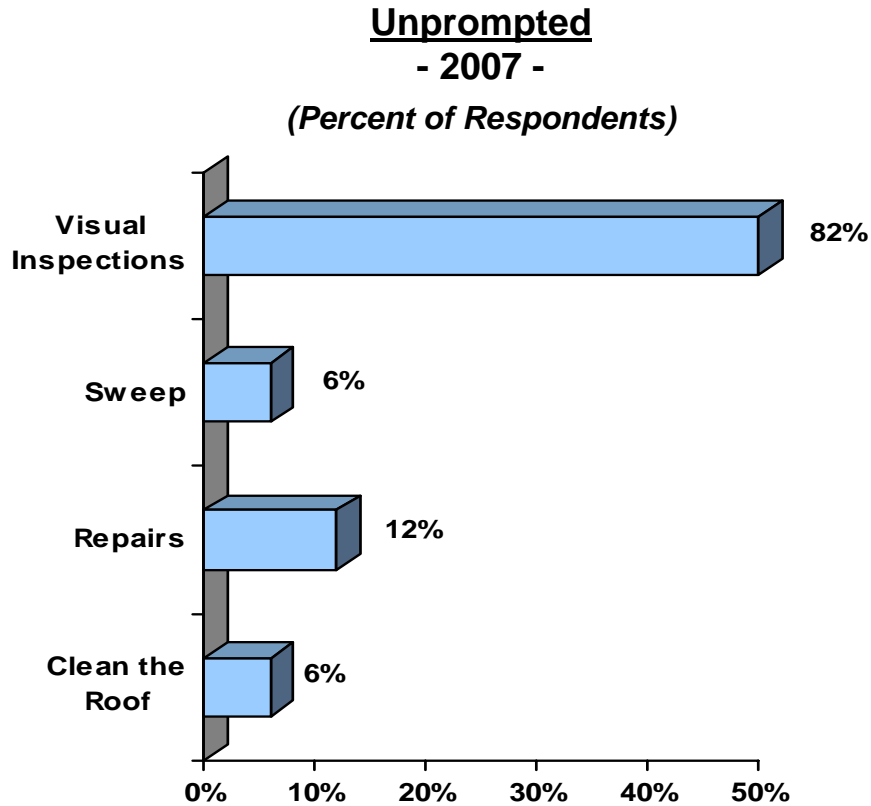
*Roof Share of Annual Maintenance Budget (Mean%)*

Maintenance Programs/ Initiatives

**Regularly Performed Maintenance Activities –Roofing Materials  
Unprompted vs. Prompted**

- Inspections are the most frequently mentioned maintenance activity both prompted and unprompted, however, patching and drain cleaning are also common. Owners interviewed in 2007 tend to do slightly more patching and cleaning

**Roofing**



\*Other includes: coatings, ice removal and tightening rivets.

## Maintenance Programs/ Initiatives

### Regularly Performed Maintenance Activities – Verbatim Comments

*“Four times a year, we inspect this roof, repair any holes with metal patches and caulk.” – Sunbelt, Warehouse, Metal*

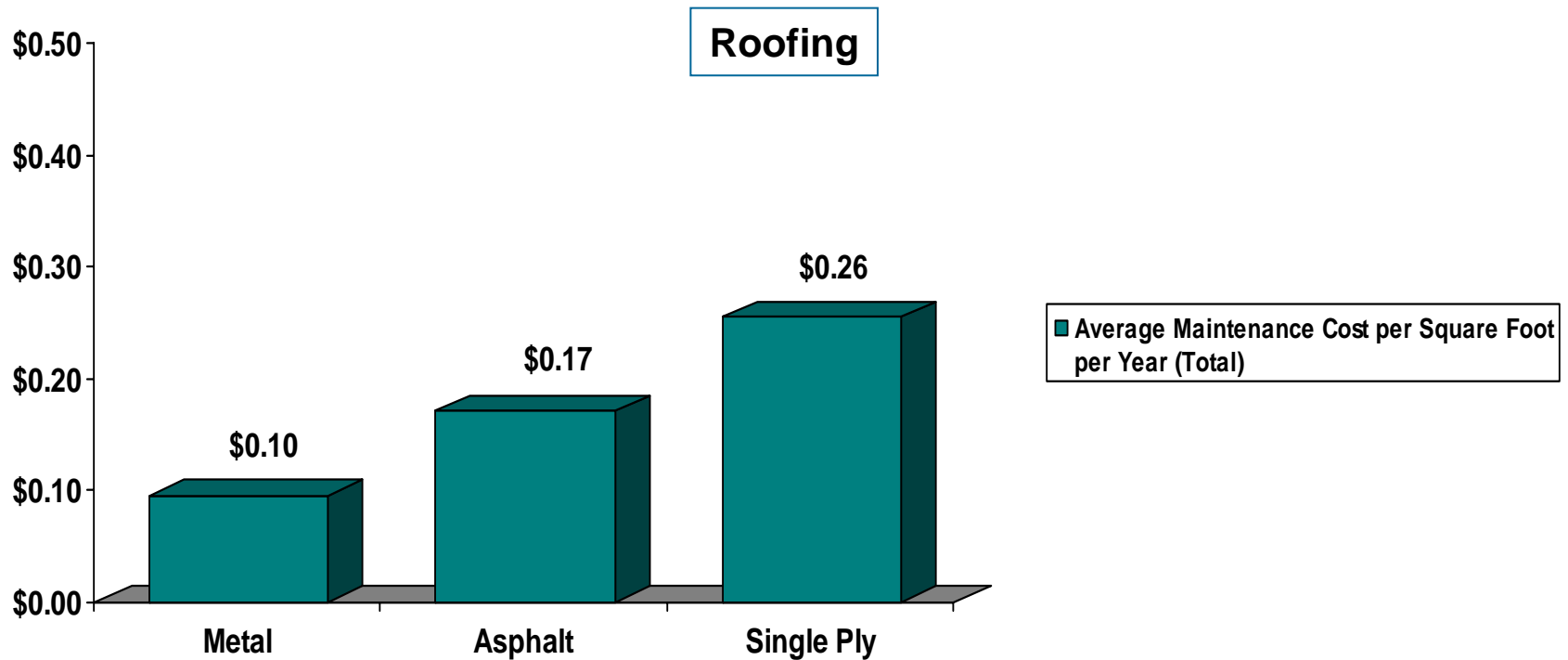
*“We have a very informal maintenance routine, in the spring - we walk the roof and look for problems.” – Sunbelt, Warehouse, BUR, Mod Bit*

*“Nothing is done to the metal roof; the rain washes it off. Only maintenance is done on the smaller EPDM roofing where HVAC, etc. sets. There was an issue (quire a few years ago) with the flashing and waterproofing (EPDM area, not metal). This was proven to be a masonry issue so was not the EPDM or metal roof.” - Rustbelt, Healthcare, Metal*

Maintenance Programs/ Initiatives

**Cost of Maintenance Activities**

- Metal average maintenance cost per square foot much less than competing roofing systems



**Maintenance Programs/ Initiatives**

**Cost of Maintenance Activities**

- Roofing maintenance activities vary by roof and building type, but overall costs are similar with the exception of metal which is proportionally less overall and in most categories

**Roofing**

<i>Maintenance Activity</i>	<i>Price per Square foot</i>			
	<i>Overall</i>	<i>Asphalt</i>	<i>Single-Ply</i>	<i>Metal</i>
Inspections	\$0.04	\$0.05	\$0.05	\$0.03-\$0.05
Cleaning	\$0.01-\$0.02	\$0.01	\$0.02	\$0.01
Cleaning Drains	\$0.02	\$0.01	\$0.05	Negl.
Caulking/Repair Flashings	\$0.04-\$0.05	\$0.04-\$0.06	\$0.04-\$0.06	\$0.04-\$0.05
Patching	\$0.07	\$0.05	\$0.08-\$0.10	---
Moisture tests*	Most not aware of cost			

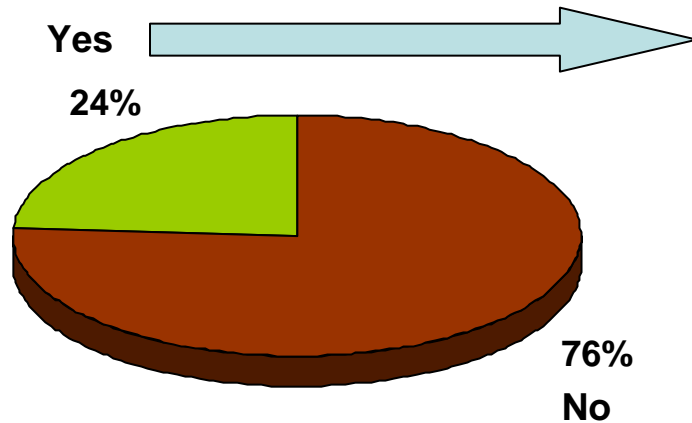
Maintenance Programs/ Initiatives

**Professional Roof Inspections**

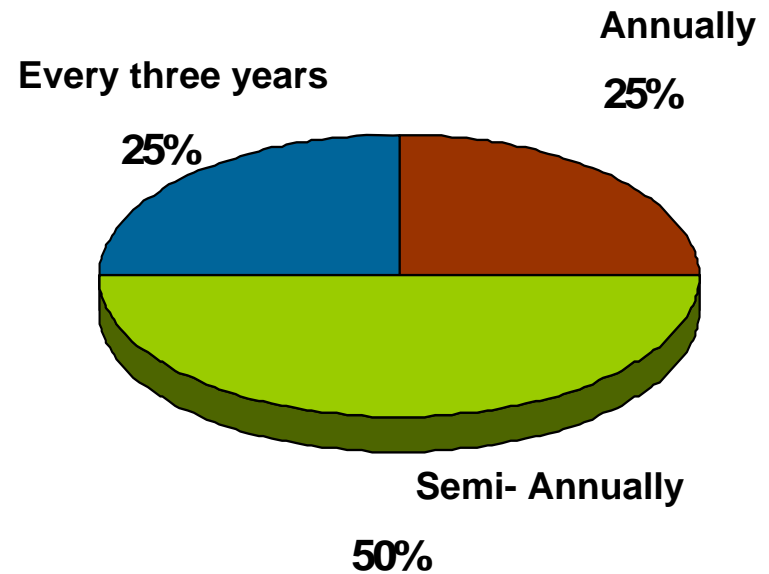
Majority of respondents do not schedule professional roofing inspections (though a slight increase from 2004). Of those that do- majority schedule inspections on a semi annual basis.

**Roofing**

Share of Respondents that Schedule Regular Roof Inspections  
- 2007 -



Frequency of Roof Inspections  
- 2007 -



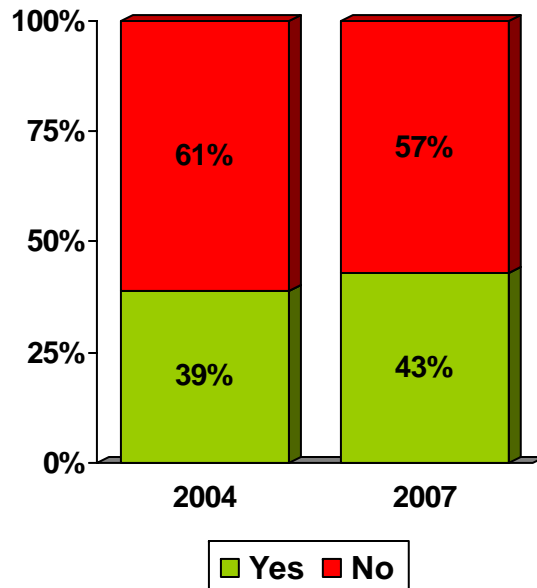
## Maintenance Programs/ Initiatives

### Roof Maintenance Schedule

Nearly half of respondents have a formal maintenance schedule that includes things such as infrared screening and computer generated work orders.

#### Roofing

#### Formal Roof Maintenance Schedule - 2004 vs. 2007 -



#### Verbatim Comments

*“Every three years a plane is flown over the building and an infrared camera takes a picture to show moisture points. We then go up to the roof to look at those points and see what repairs have to be done.” – Sunbelt, Healthcare, BUR/Modified Bitumen*

*“Time management produces a work order every quarter for our roof inspection.” – Sunbelt, Healthcare, Metal*

*“Our corporate office comes out once a year and does an 8 hour walk through of our entire building and roof. If they find anything wrong, we get it fixed.” – Sunbelt, Retail/Shopping, Metal*

*“The program is visual, we look for leaks. This roof has never leaked. We are mandated by the state to do this once a year.” – Sunbelt, Healthcare, Metal*

*“We are part of Life Point Hospital out of Tennessee; they have an ongoing program. We do the inspections, maintenance, when required and report back to them.” – Rustbelt, Healthcare, BUR, Mod Bit*



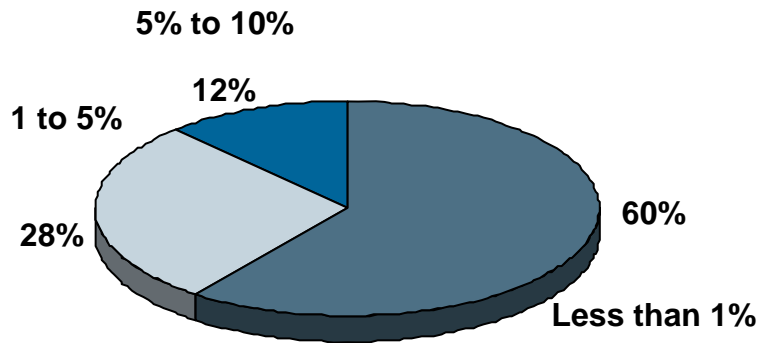
Maintenance Programs/ Initiatives

**Average Annual Wall Share of Maintenance Budget**

Maintenance on wall cladding, on the other hand, is much smaller and typically represents less than one percent of annual maintenance budgets. Maintenance here is typically reactive versus proactive. However Hotel/Motel owners spend over five percent of their maintenance budget to maintain wall systems.

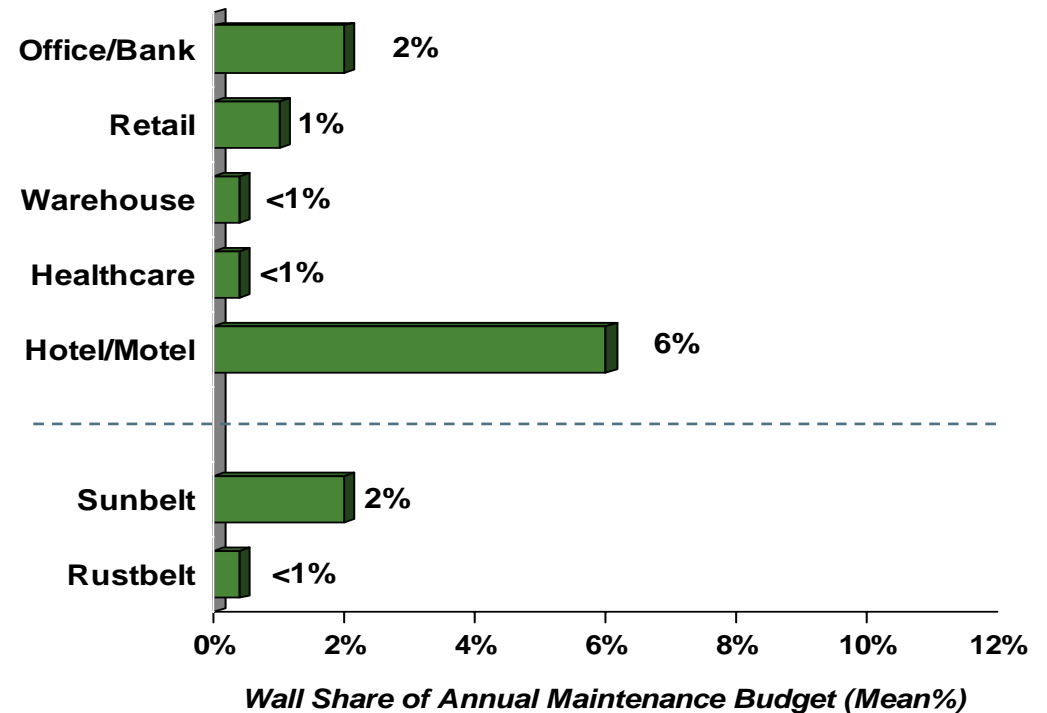
**Walls**

**Overall Annual Wall Share of Maintenance Budget - 2007 -**



**Mean = 1.4%**

**Segmented Annual Wall Share of Maintenance Budget - 2007 -**



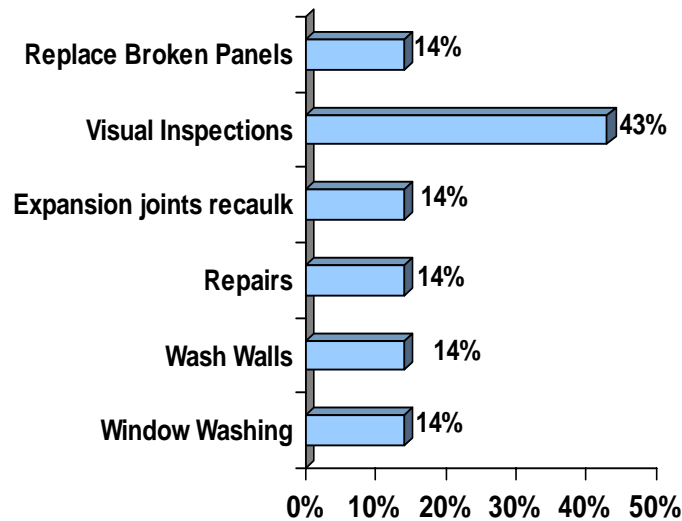
Maintenance Programs/ Initiatives

**Regularly Performed Maintenance Activities – Wall Cladding Materials  
Unprompted vs. Prompted**

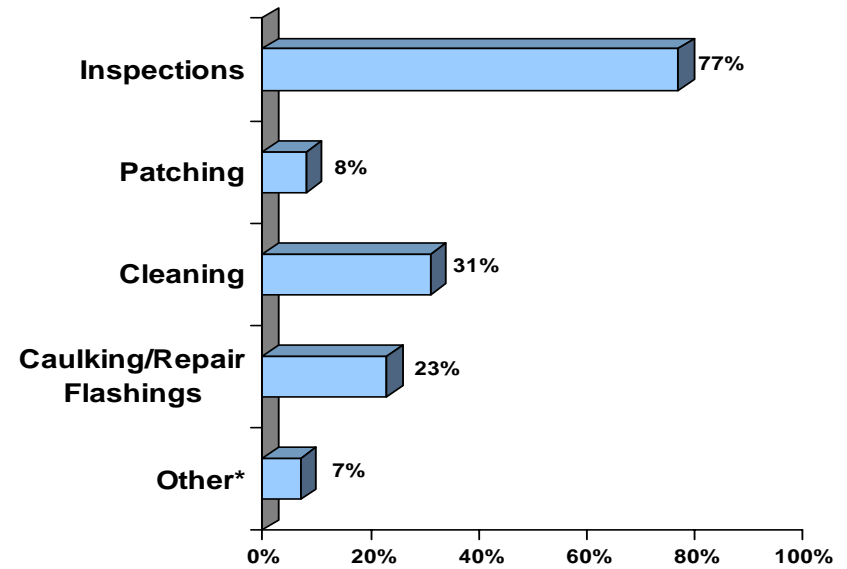
Regular wall maintenance is typically limited to inspections, repairs and re-caulking expansion joints.

**Walls**

**Walls Unprompted**  
**- 2007 -**  
*(Percent of Respondents)*



**Walls Prompted**  
**- 2007 -**  
*(Percent of Respondents)*



\*Other includes cleaning gutters

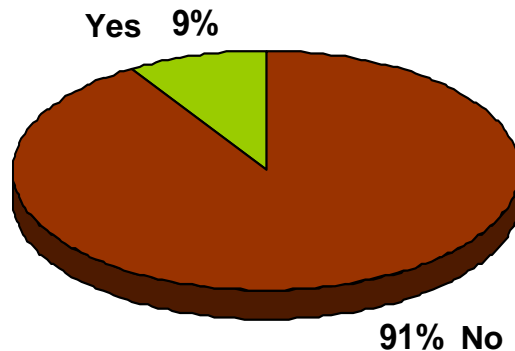
## Maintenance Programs/ Initiatives

### Wall Maintenance Schedule

The majority of building owners do not have a formal maintenance schedule for their wall cladding.

#### Walls

#### Formal Wall Maintenance Schedule - 2007 -



#### Verbatim Comments

*“Our corporate office comes out once a year and does an 8 hour walkthrough of our entire building and roof. If they find anything wrong, we have it fixed.”*

*“ We have an ongoing program. We do the inspections and maintenance per our corporate office and report back to them.”*

## Maintenance Programs/ Initiatives

### Regularly Performed Maintenance Activities

#### Verbatim Comments- Roofing Materials

*“We have a very informal maintenance routine, in the spring we walk the roof and look for problems.” – Sunbelt, Warehouse, BUR/Modified Bitumen*

*“I inspect one or two times a year, and sweep the roof one or two times a year.” – Sunbelt, Office/ Bank, BUR/Modified Bitumen*

*“So far, the maintenance has been minimal; the EPDM roof is under warranty, so the contractor comes out about once a year and checks for problems.” – Rustbelt, Warehouse, EPDM/TPO/PVC*

#### Verbatim Comments- Wall Cladding Materials

*“ We periodically check and caulk the expansion joints.” – Sunbelt, Office/Bank, Tilt-up concrete*

*“All we have to do is pressure wash the walls.” – Sunbelt, Retail/Shopping, Metal*



# PURCHASE DECISION PROCESS

## Purchase Decision Process

### Overview

- Building owners believe that system manufacturers have the most responsibility when it comes to educating them regarding roof and wall products; followed by architects
- Weatherability and low maintenance remain the most critical factors building owners look for when selecting roofing and wall materials
- Current roofing systems are meeting expectations overall; however gaps exists with regard to energy efficiency and use of recycled materials
  - Insulated metal panels however are perceived as energy efficient
- Overall, wall cladding products fall short with regard to low maintenance (critical factor), energy efficiency and use of recycled materials

## Purchase Decision Process

### Roofing Selection Criteria - Overview

- Weatherability, low maintenance, and service life/longevity are the most important factors that building owners look for in choosing a roofing system; all attributes that reflect the benefits of metal

### Roofing Selection Criteria

Criteria	Overall	Roofing Material				Building Type					Region	
		BUR/Modified Bitumen	EPDM/PVC/Hypalon	Metal	Other	Office/Bank	Retail/Shopping	Warehouse	Health Care	Hotel/Motel	Sunbelt	Rustbelt
Weatherability	4.90	4.86	4.83	5.00	5.00	5.00	4.80	5.00	4.80	5.00	4.78	5.00
Low maintenance	4.90	5.00	4.83	4.83	5.00	5.00	4.60	5.00	5.00	5.00	4.89	4.91
Service life/ longevity	4.80	4.86	4.83	4.67	5.00	4.75	4.60	5.00	4.80	5.00	4.78	4.82
Life cycle cost	4.63	4.33	4.67	5.00	4.00	4.50	4.60	5.00	4.40	-	4.38	4.82
Average annual maintenance expense	4.37	4.14	4.60	4.50	4.00	4.25	4.40	4.25	4.60	4.00	4.22	4.50
Energy efficiency	4.32	3.86	5.00	4.33	4.00	4.50	5.00	3.25	4.60	3.00	4.11	4.50
Familiarity/past history of product	4.10	3.71	4.50	4.17	4.00	4.50	4.40	3.80	4.00	3.00	3.89	4.27
Initial cost (total installed)	4.05	4.50	4.17	3.50	4.00	4.25	4.00	4.00	4.00	-	4.13	4.00
Environmentally friendly (material and/or installation)	3.94	3.50	4.20	4.17	4.00	4.00	4.50	3.75	3.40	-	3.38	4.40
Tax/Insurance Benefits	3.81	3.60	3.60	4.40	3.00	4.00	4.00	4.67	2.75	-	3.83	3.80
Reducing greenhouse gas as a result of energy efficiencies/conservation	3.65	3.33	3.60	4.20	3.00	4.00	4.20	3.00	3.20	-	3.43	3.80
Ability to integrate with other Materials	3.63	3.83	4.00	3.33	2.00	4.00	3.80	3.20	3.60	-	3.63	3.64
Reduction of construction waste	3.22	3.00	4.00	2.83	3.00	3.50	3.20	2.50	3.60	-	2.50	3.80
Use of recycled materials	2.89	2.83	2.60	3.17	3.00	3.25	4.00	2.50	1.80	-	2.13	3.50
Flexibility of Design (ability to achieve desired image)	2.83	2.17	3.20	3.17	3.00	2.00	3.40	2.50	3.20	-	3.00	2.70
Appearance/Aesthetics	2.79	2.14	3.00	3.17	4.00	2.50	2.80	2.25	3.40	3.00	2.78	2.80
Use of natural materials	2.17	2.33	2.40	1.67	3.00	2.50	2.60	1.25	2.20	-	1.88	2.40

Scale:  
5= extremely important  
1= not at all important

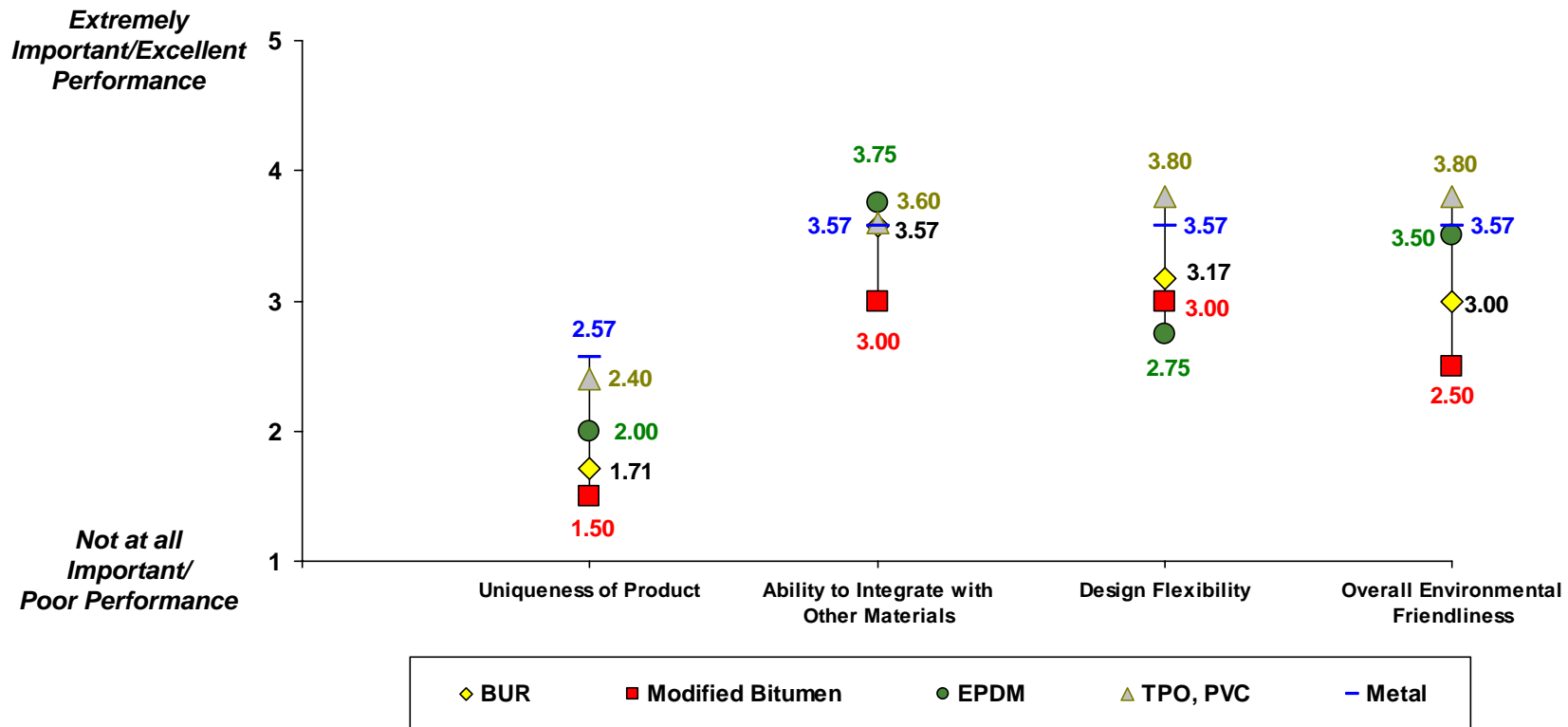
 **Top Criteria per Segment**

## Purchase Decision Process

### Roof Characteristics

Metal ranks highest among building owner perceptions regarding uniqueness of product.

### Roofing Material Performance – Design Flexibility





## Purchase Decision Process

### Perception of Metal Roofing – Verbatim Comments

*“Metal is a versatile, durable roofing material.” – Sunbelt, Warehouse, Metal*

*“I can only talk about the metal mansard accent type pieces we have as decorative components because of the way they were installed, with rolled roofing on the other side of them. They caused our mod bit roof to leak, I know it’s not the fault of the metal, but I have negative feelings because of the problems we’ve had.” – Sunbelt, Hotel/Motel, BUR, Mod Bit*

*“I am very impressed with metal’s reflective coatings and energy efficiency, I have read about them.” – Sunbelt, Office/Bank, BUR, Mod Bit*

*“I prefer metal roofing. It has a long life and it is reliable, does not leak.” – Sunbelt, Healthcare, Metal*

*“In large roofs where it is visible it looks good. I would choose it for its ease of installation and low maintenance.” – Sunbelt, Retail/Shopping, Metal*

*“Metal is easily damaged if people walk on it a lot or snow removal has to be done. There are a lot of joints, so there is an opportunity for leaks, unless it is really sloped.” – Rustbelt, Retail/Shopping, BUR, Mod bit*

*“Metal roofing is very durable, it has certainly performed well for me, it has longevity, so I am pleased with it on a commercial building.” – Rustbelt, Retail/Shopping, Metal*

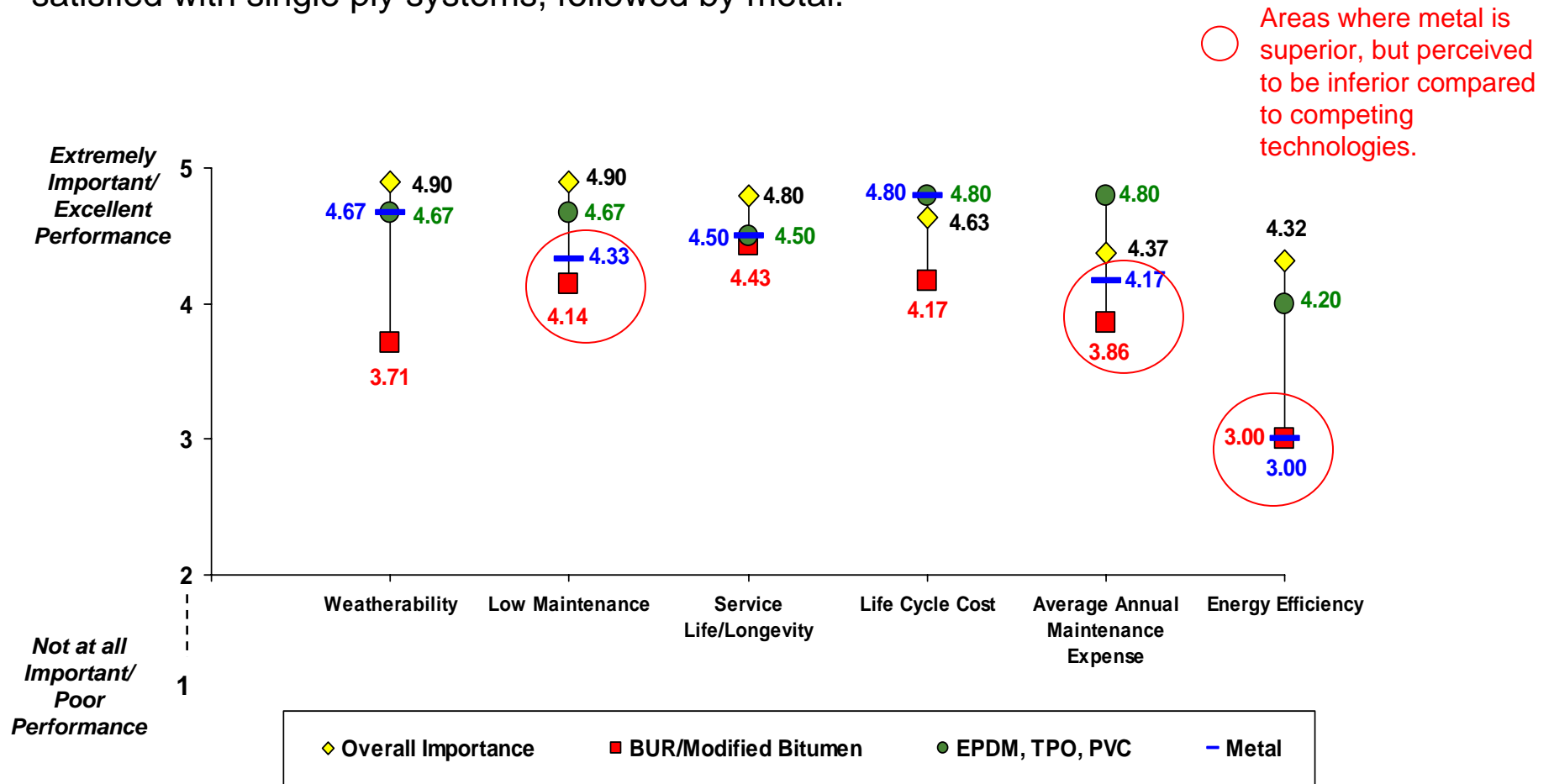
*“I’ve been to places where we put metal roofs on buildings and have seen that they do not hold up to salt air, near oceans. I think they are interesting and something to explore.” – Rustbelt, Retail/Shopping, EPDM, TPO, PVC*

*“I like metal roofing systems; we put several on our outlying buildings. They are one story buildings, we can see the roofs, they are huge buildings and it really dressed up the buildings.” – Rustbelt, Healthcare, EPDM, TPO, PVC*

## Purchase Decision Process

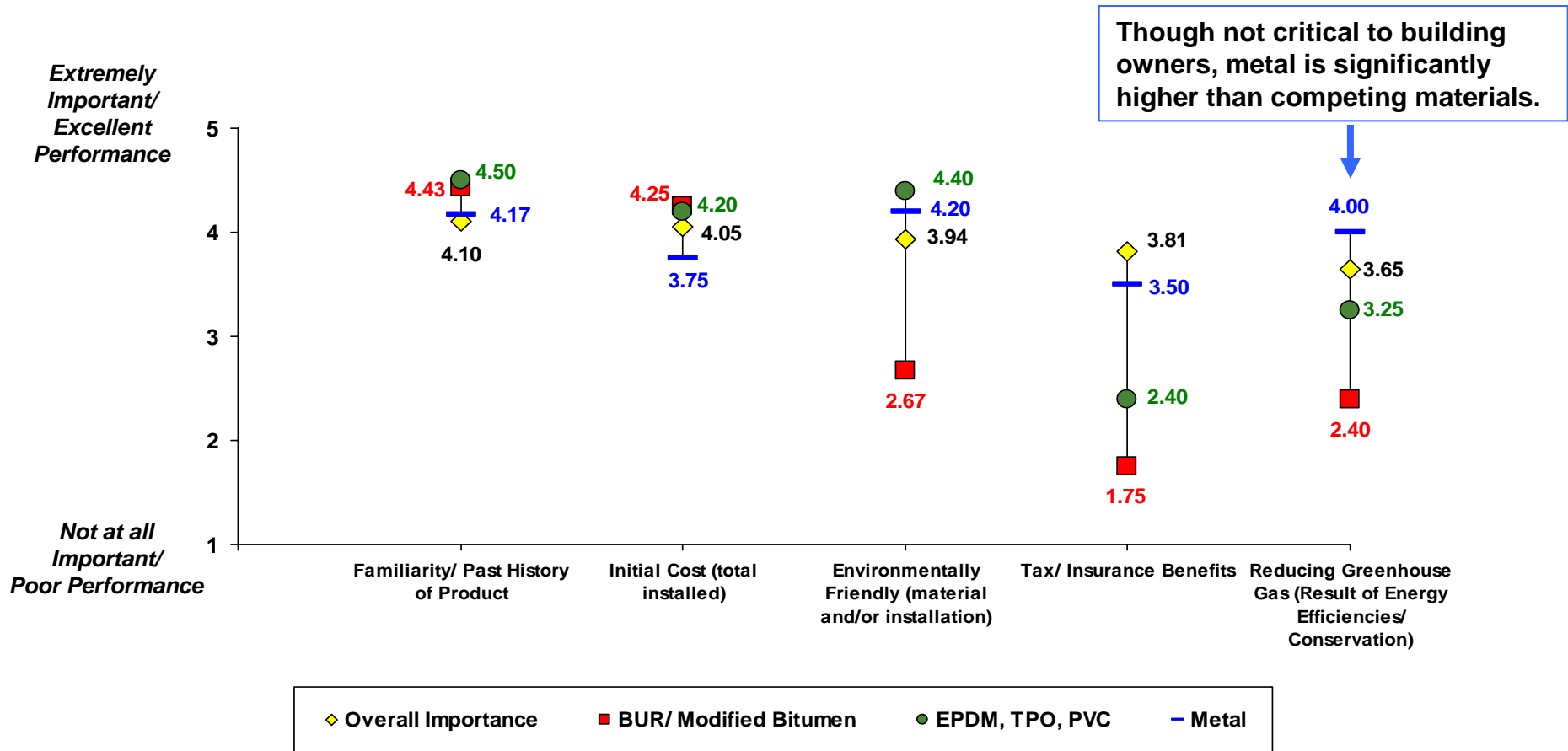
### Roofing – Importance versus Performance – by Roofing Material

Metal roofing systems rank lowest in initial cost; however are equal to single ply roofing systems when it comes to overall life cycle cost. In general, building owners are most satisfied with single ply systems, followed by metal.



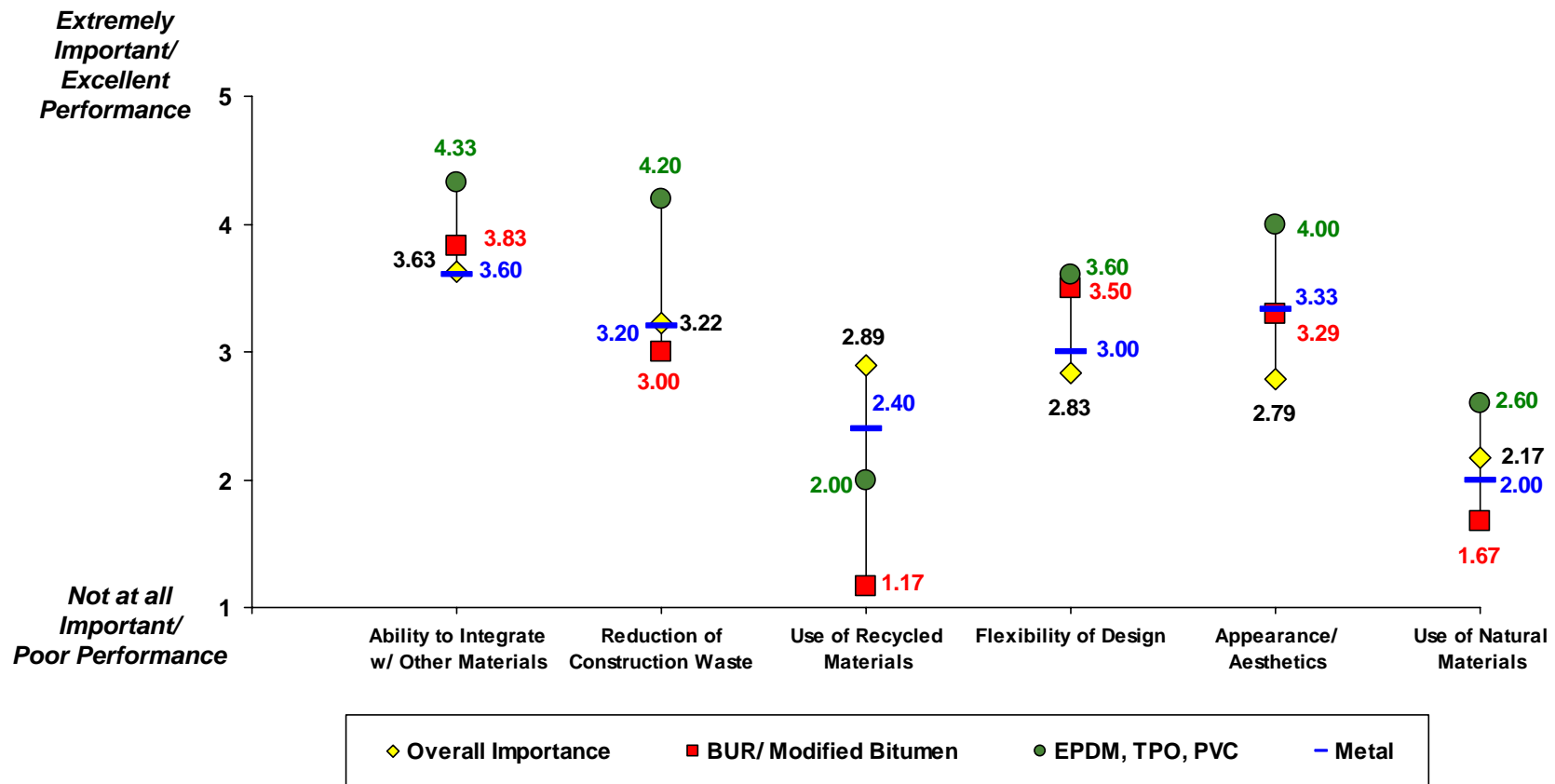
## Purchase Decision Process

### Roofing – Importance versus Performance – by Roofing Material



## Purchase Decision Process

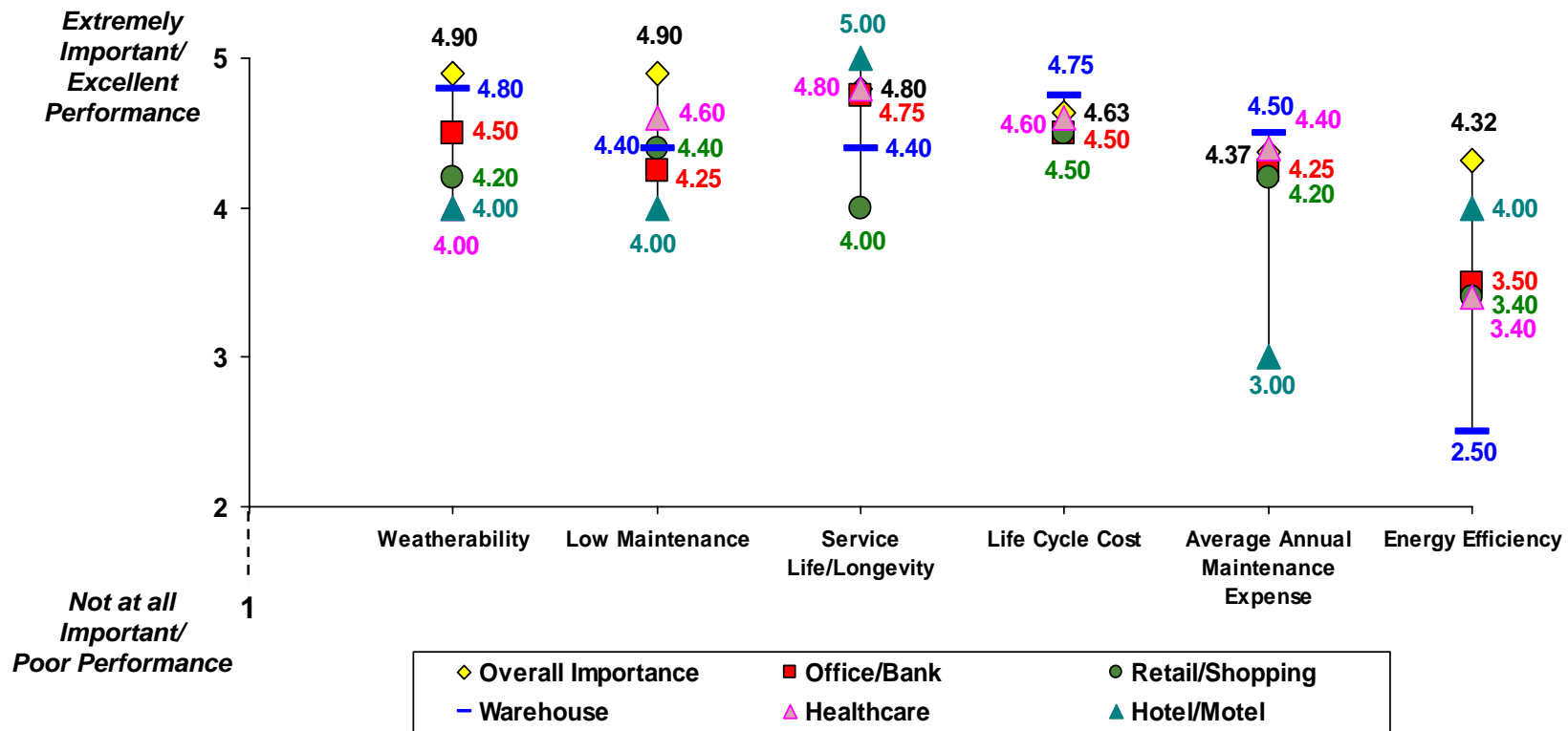
### Roofing – Importance versus Performance – by Roofing Material



## Purchase Decision Process

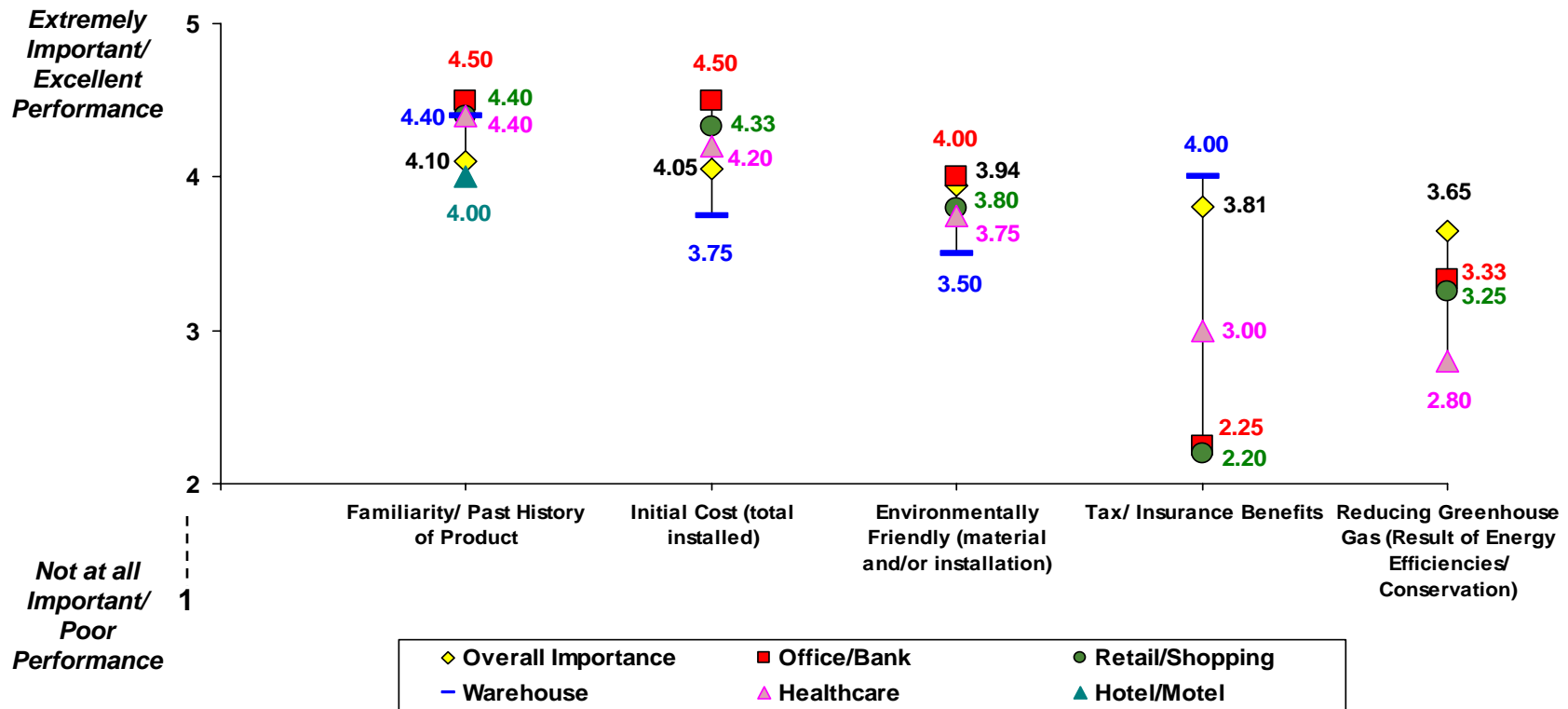
### Roofing – Importance versus Performance – by Building Category

Building owners of healthcare facilities are the most satisfied with their current roofing systems; especially with maintenance issues and service life.



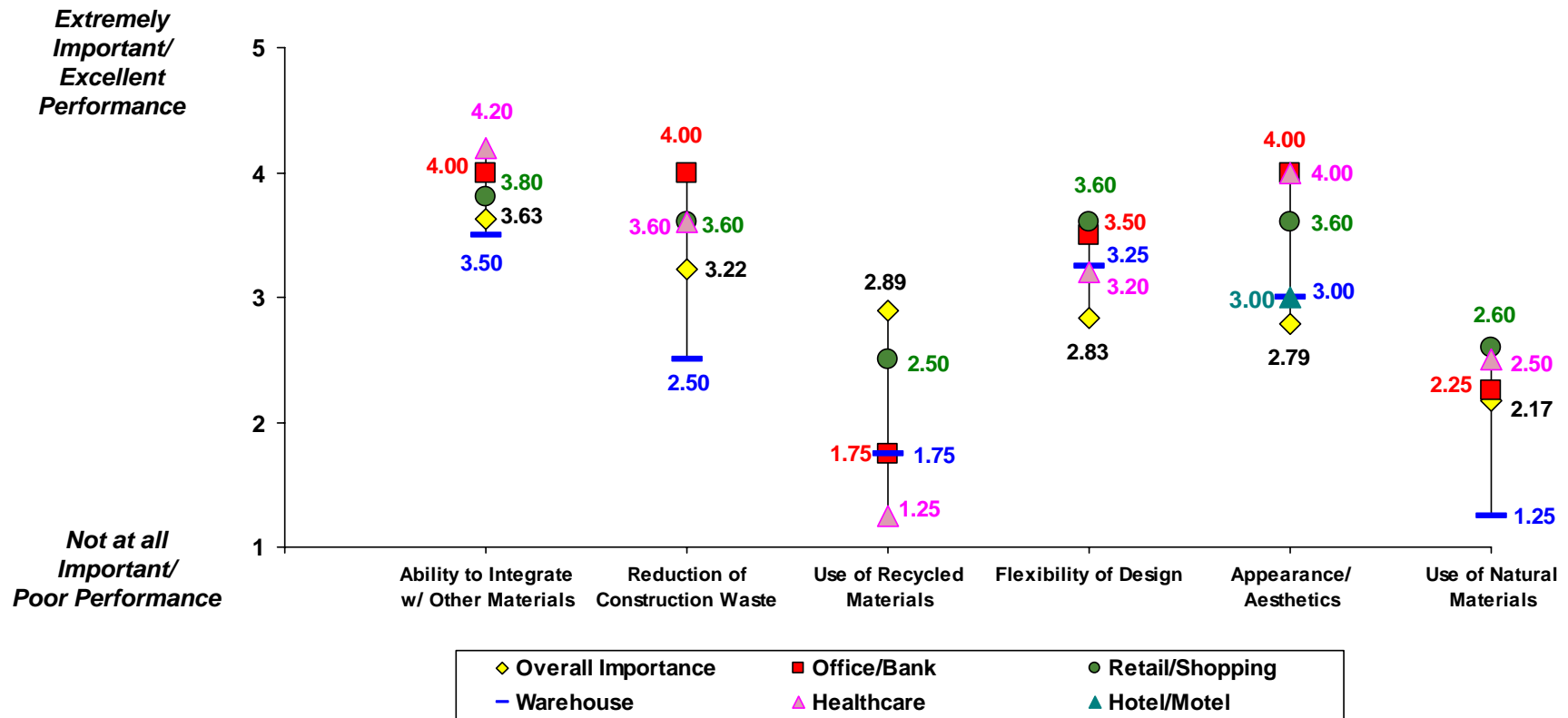
## Purchase Decision Process

### Roofing – Importance versus Performance – by Building Category



## Purchase Decision Process

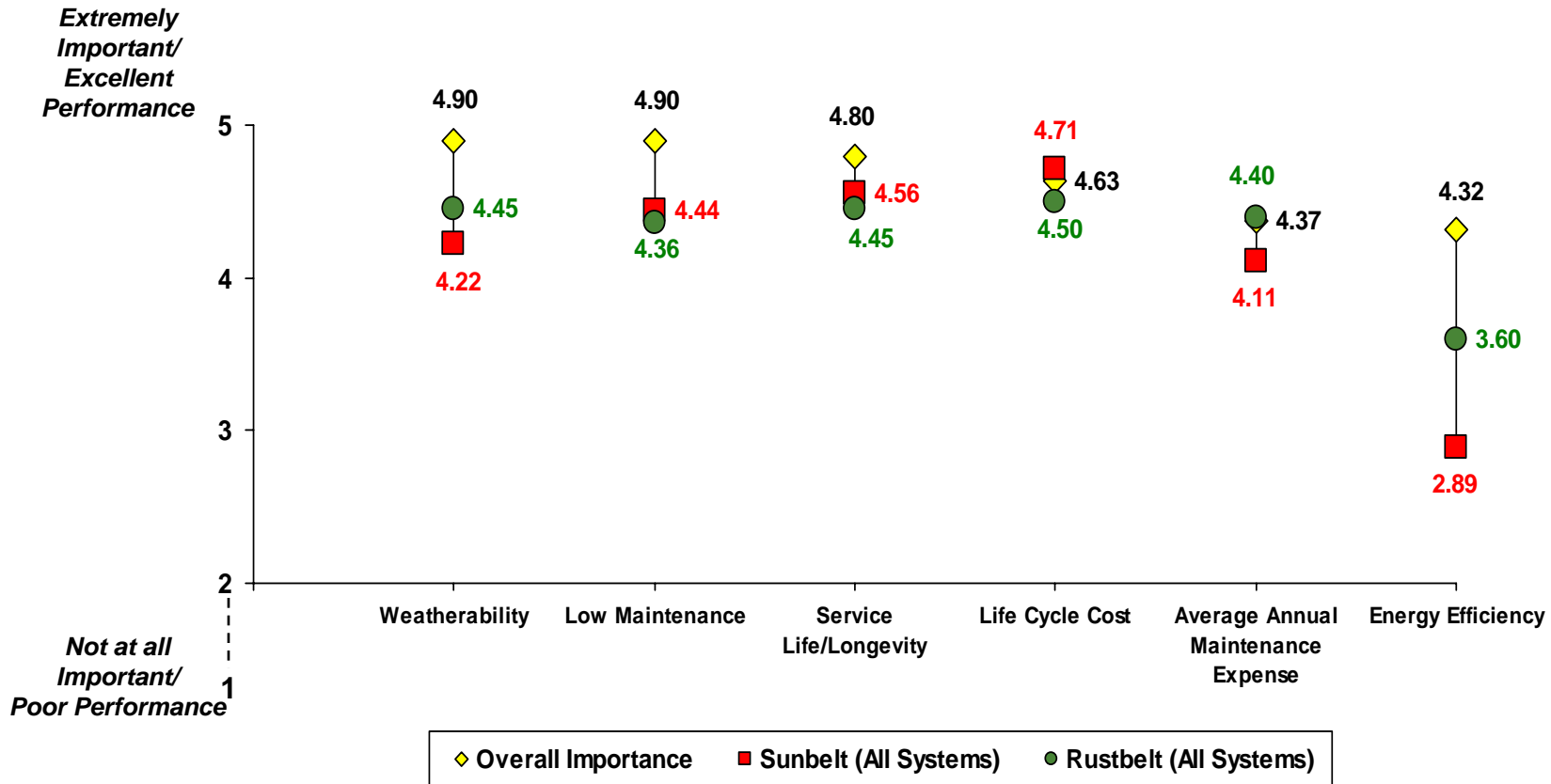
### Roofing – Importance versus Performance – by Building Category



## Purchase Decision Process

### Roofing – Importance versus Performance – by Region

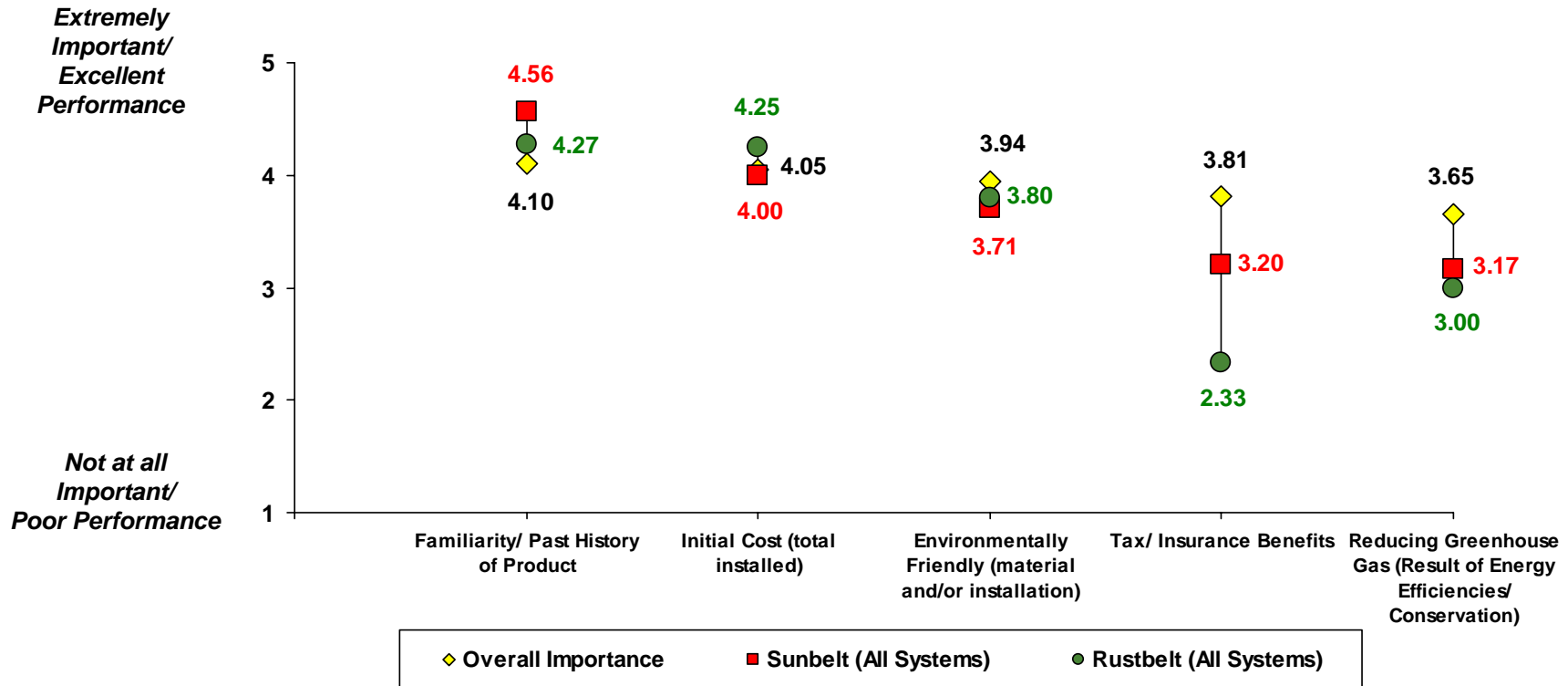
There is little variance in performance by region, with the exception of energy efficiency and tax/insurance benefits.





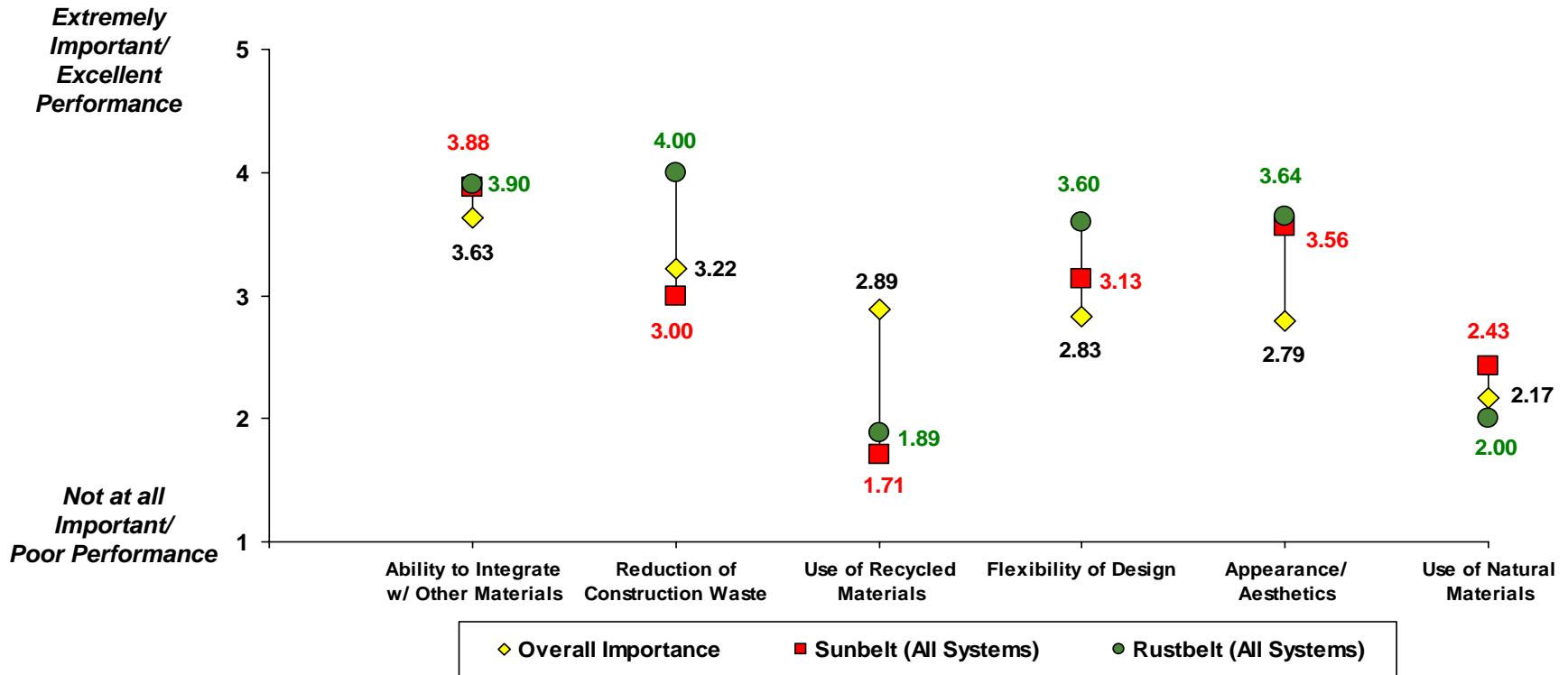
## Purchase Decision Process

### Roofing – Importance versus Performance – by Region



## Purchase Decision Process

### Roofing – Importance versus Performance – by Region

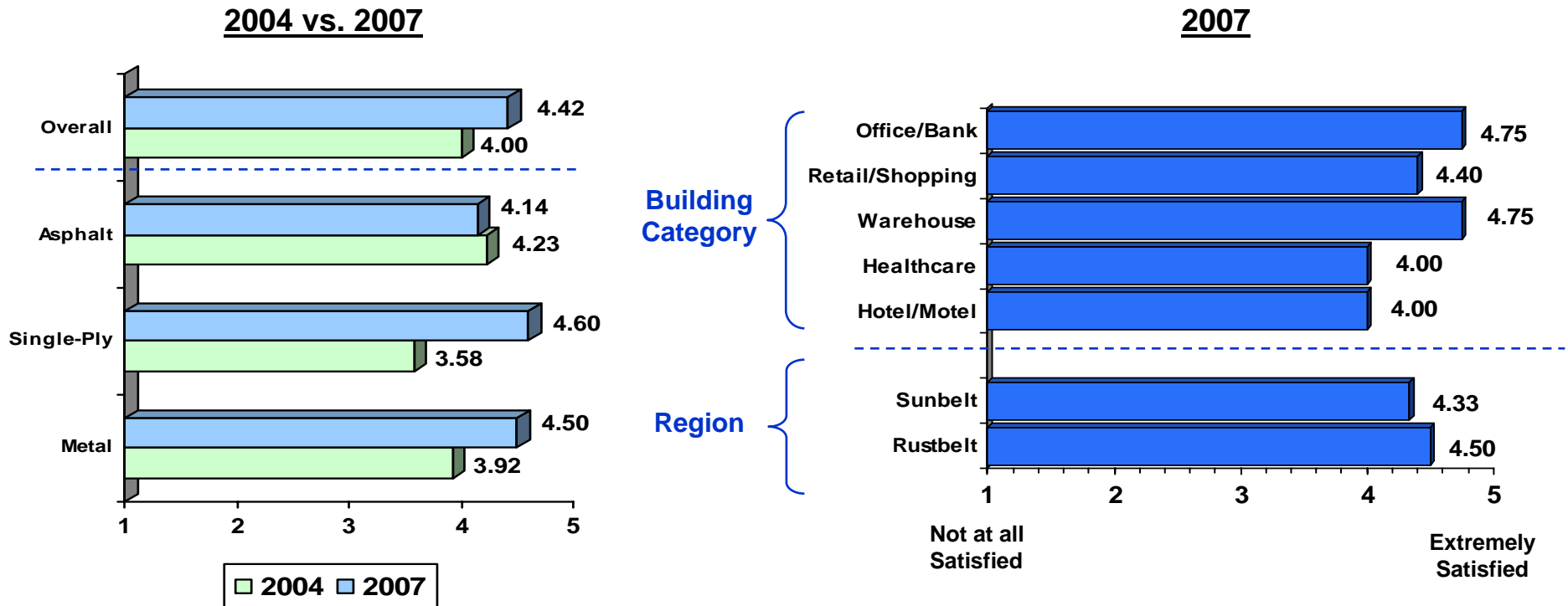


## Purchase Decision Process

### Satisfaction with Current Roofing System

Higher satisfaction levels are prevalent with single-ply systems and metal overall and versus 2004.

### Satisfaction Level With Current Roofing System



## Purchase Decision Process

### Satisfaction with Current Roofing System – Verbatim Comments

*“When installed correctly these roofs last over 20 years.” – Sunbelt, Healthcare, EPDM, TPO, PVC*

*“We prefer metal roofs as we don’t have problems with them.” – Sunbelt, Healthcare, Metal*

*“Metal has worked well these past 40 years.” – Rustbelt, Retail/Shopping, Metal*

*“Single-ply has performed faultlessly; we have not had to spend money on maintaining it, we haven’t had any leaks.” – Rustbelt, Healthcare, EPDM, TPO, PVC*

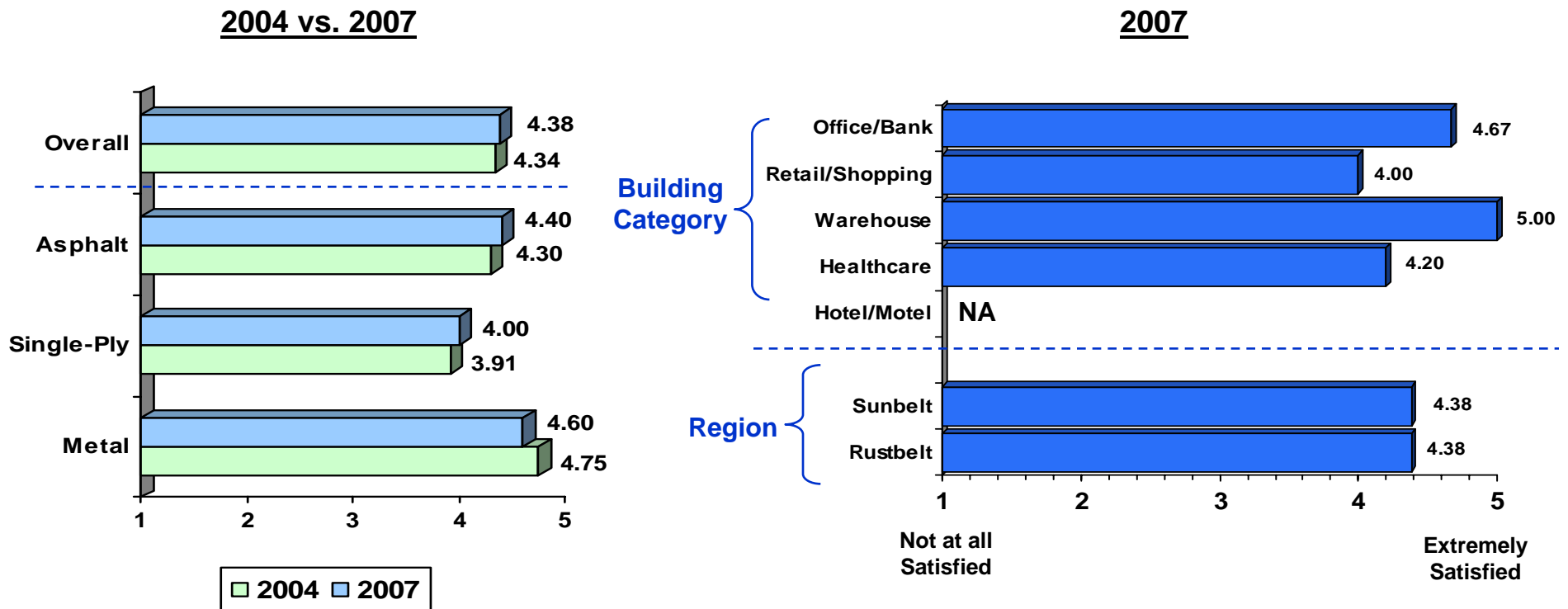
*“We have had only minor problems with a few leaks on our metal roof because of skylight penetration.” – Rustbelt, Warehouse, Metal*

## Purchase Decision Process

### Satisfaction with Value for Price Paid - Roofing Material

Though single ply owners were slightly more satisfied with their roof versus metal owners, the metal owners believe they have a better value versus the price paid (though not compared to 2004).

### Satisfaction Level With Value for Price Paid



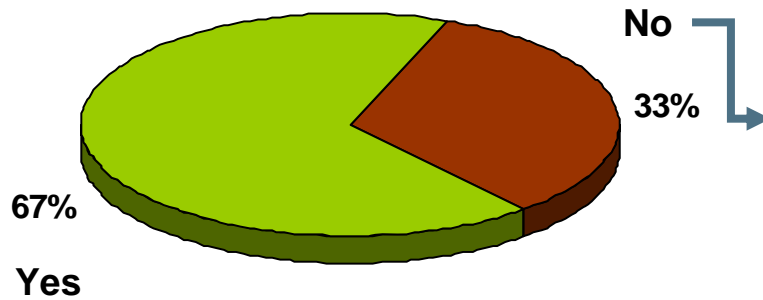
Purchase Decision Process

**Material Selection For Re-Roof**

Nearly two-thirds of respondents would choose the same roofing material if they were to re-build. Metal was cited as being the most likely replacement in 2007 whereas it was not even mentioned as a replacement option in 2004.

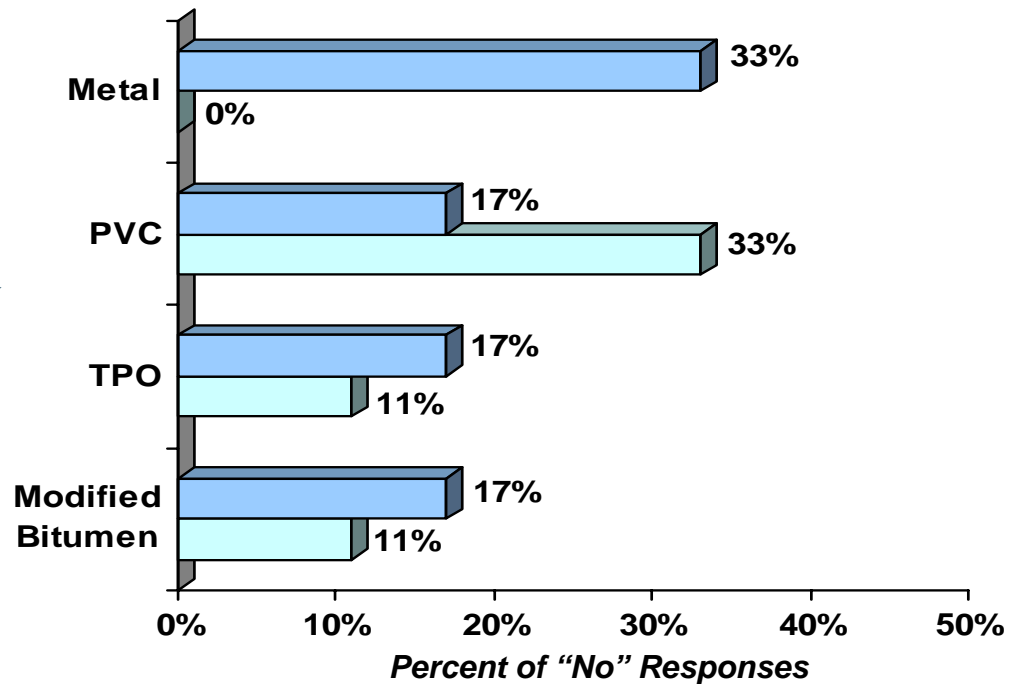
**Roofing**

**If you Were to Re-Roof , Would you Use Same Roofing Material?\***  
- 2007 -



\*Same response in 2004.

**If No, What Material?**  
- 2004 vs. 2007 -



## Purchase Decision Process

### Material Selection For Re-Roof– Verbatim Comments

*“It is a reasonable cost and durable roof if installed correctly, we will probably replace it this year.” – Sunbelt, Healthcare, EPDM, TPO, PVC*

*“Metal is an easy fix when leaks develop.” – Sunbelt, Retail/Shopping, Metal*

*“I think there are some better metal roofs out there that are durable and easy to install, I have to research them.” – Sunbelt, Warehouse, Metal*

*“There are newer systems that would perform better now. Metal would be more maintenance free.” – Sunbelt, Office/Bank, BUR, Mod Bit*

*“Butler metal buildings go up quickly and they last long with few problems.” – Rustbelt, Warehouse, Metal*

*“For cost and performance together, EPDM is an economical roof and it has performed well. There is also no down time for activities in the building when installing a new roof.” – Rustbelt, Healthcare, EPDM, TPO, PVC*

*“I am also interested in what is new out there. It might end up being a steel roof, but it would be a modern version of it. It would also depend on availability of steel and the price at the time.” – Rustbelt, Retail/Shopping, Metal*

*“We will go with PVC next time as it is easy to maintain, is reflective, helps in energy savings, keeps the building cooler.” – Rustbelt, Retail/Shopping, BUR, Mod Bit*

## Purchase Decision Process

### Wall Selection Criteria - Overview

The primary factors utilized in making wall decisions parallels roofing criteria, though appearance/aesthetics becomes more important.

### Wall Selection Criteria

Criteria	Overall	Wall Cladding				Building Type					Region	
		Masonry Brickand/or Block	Tilt-up Concrete	Metal	Other	Office/ Bank	Retail/ Shopping	Warehouse	Health Care	Hotel/ Motel	Sunbelt	Rustbelt
Low maintenance	4.90	4.82	5.00	5.00	5.00	5.00	4.60	5.00	5.00	5.00	4.89	4.91
Weatherability	4.70	4.64	5.00	4.33	5.00	5.00	4.60	4.60	4.60	5.00	4.33	5.00
Service life/ longevity	4.65	4.64	5.00	4.33	4.50	4.75	4.40	4.60	4.80	5.00	4.44	4.82
Life cycle cost	4.63	4.45	5.00	5.00	4.50	4.50	4.60	5.00	4.40	-	4.38	4.82
Average annual maintenance expense	4.37	4.40	4.33	4.67	4.00	4.25	4.40	4.25	4.60	4.00	4.22	4.50
Appearance/Aesthetics	4.35	4.09	5.00	4.33	5.00	4.75	4.20	4.20	4.40	4.00	4.44	4.27
Energy efficiency	4.26	4.60	3.67	4.00	4.50	4.50	4.80	3.25	4.60	3.00	4.00	4.50
Initial cost (total installed)	4.11	4.09	4.67	3.33	4.50	4.25	4.20	4.00	4.00	-	4.13	4.09
Familiarity/past history of product	4.10	3.82	5.00	4.33	4.50	4.50	4.20	4.00	4.00	3.00	4.11	4.09
Environmentally friendly (material and/or installation)	4.00	4.00	3.00	4.67	4.50	4.00	4.80	3.75	3.40	-	3.50	4.40
Flexibility of Design (ability to achieve desired image)	4.00	4.10	4.00	3.00	5.00	4.75	4.60	3.00	3.60	-	3.88	4.10
Ability to integrate with other Materials	4.00	3.91	4.33	3.67	4.50	4.25	4.20	3.80	3.80	-	4.25	3.82
Tax/Insurance Benefits	3.75	3.22	4.00	4.67	4.50	4.00	3.80	4.67	2.75	-	3.67	3.80
Reducing greenhouse gas as a result of energy efficiencies/c	3.65	3.60	3.00	4.00	4.50	4.00	4.20	3.00	3.20	-	3.43	3.80
Reduction of construction waste	3.17	3.20	2.33	3.00	4.50	3.50	3.40	2.50	3.20	-	2.63	3.60
Use of recycled materials	2.83	3.00	2.00	2.67	3.50	3.25	4.00	2.25	1.80	-	2.13	3.40
Use of natural materials	2.33	2.60	2.00	1.30	3.00	2.50	3.20	1.25	2.20	-	2.13	2.50

Scale:  
5= extremely important  
1= not at all important

 **Top Criteria per Segment**

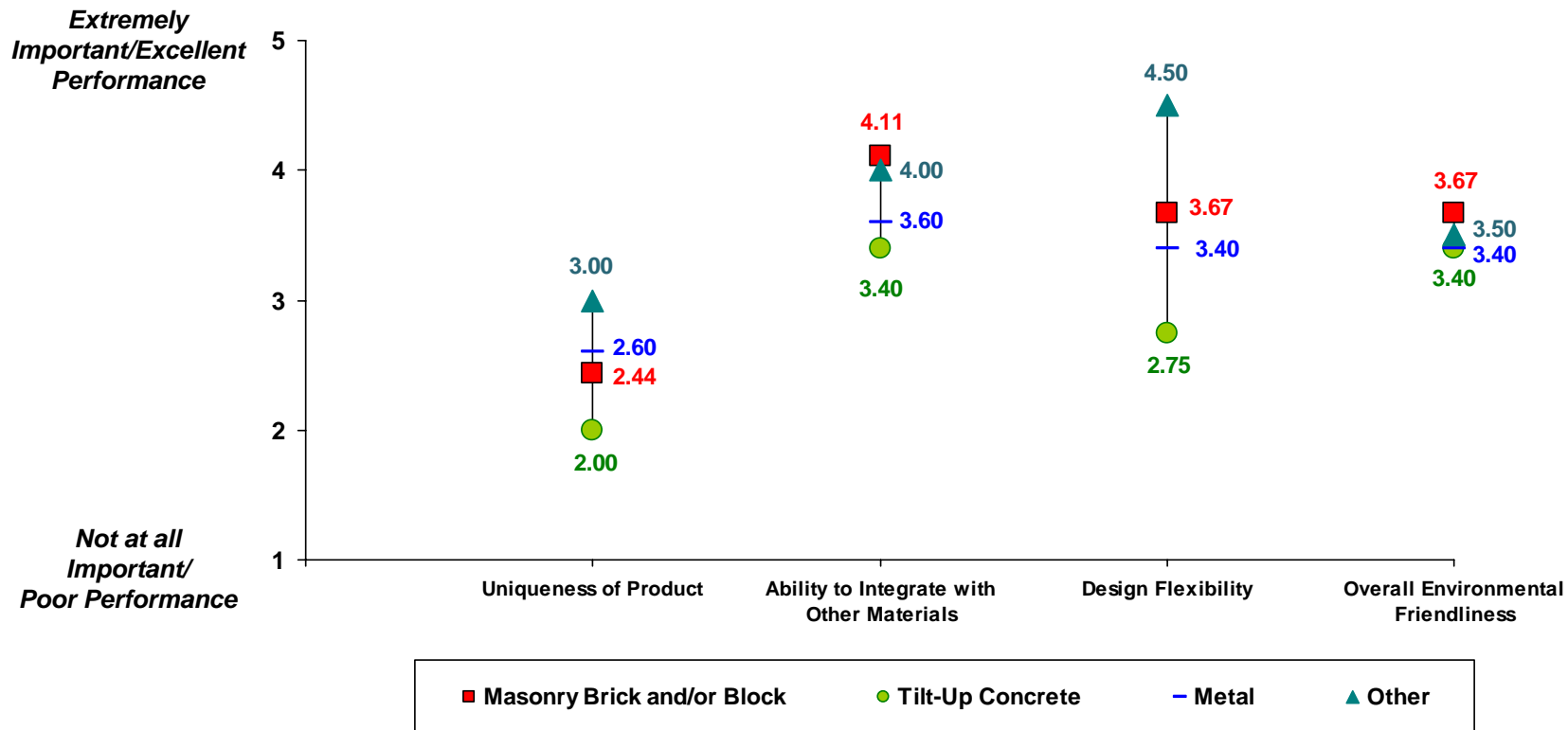


## Purchase Decision Process

### Wall Characteristics

Metal as a wall cladding is perceived to be average when it comes to uniqueness of product and has poor performance with regard to design flexibility and environmental friendliness.

### Wall Material Performance – Design Flexibility



\*Other includes glass/pre-cast and marble.

## Purchase Decision Process

### Perception of Metal Cladding – Verbatim Comments

*“I personally do not care for metal cladding, I just haven't seen a look that has really impressed me; I see them on manufacturing facilities.” – Sunbelt, Retail/Shopping, Masonry Brick and/or Block*

*“I have been in a building that has metal cladding and I liked the clean look.” - Sunbelt, Retail/Shopping, Masonry Brick and/or Block*

*“Metal cladding is okay as a wall material. There are others, like concrete, that are more durable and more secure, less likely to be broken into.” – Sunbelt, Warehouse, Metal*

*“We have used metal on other buildings such as shops. The insulated metal panels were easy to install and they have low maintenance, we are satisfied with them.” – Sunbelt, Healthcare, Tilt-Up Concrete*

*“I guess it is okay, but I have never seen a metal building that is aesthetically pleasing for healthcare. I have only seen them for warehouses in industrial applications.” – Sunbelt, Healthcare, Masonry Brick and/or Block*

*“I like the fact that with metal panels, I can replace a section if something happens to damage it.” – Rustbelt, Retail/Shopping, Masonry Brick and/or Block*

*“Very satisfied! Metal has a long life cycle and is easy to maintain.” – Rustbelt, Warehouse, Metal*

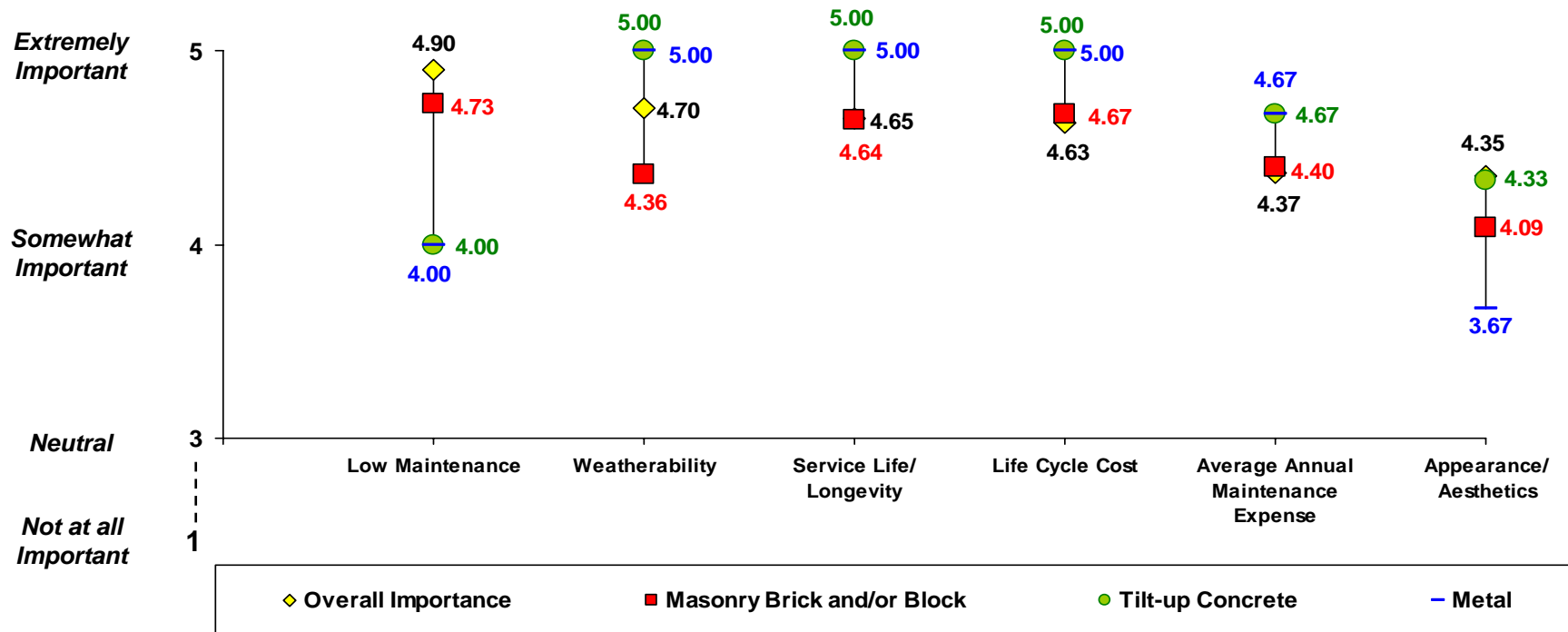
*“They do a good job, they can be pleasant in appearance, they can be efficient going up, they go up quickly.” – Rustbelt, Healthcare, Masonry Brick and/or Block*

*“It is durable, but it is not the look we want for an office building, it is more industrial looking. We have an office park and we want the brick here, we use metal on our breweries.” – Rustbelt, Office/Bank, Other*

## Purchase Decision Process

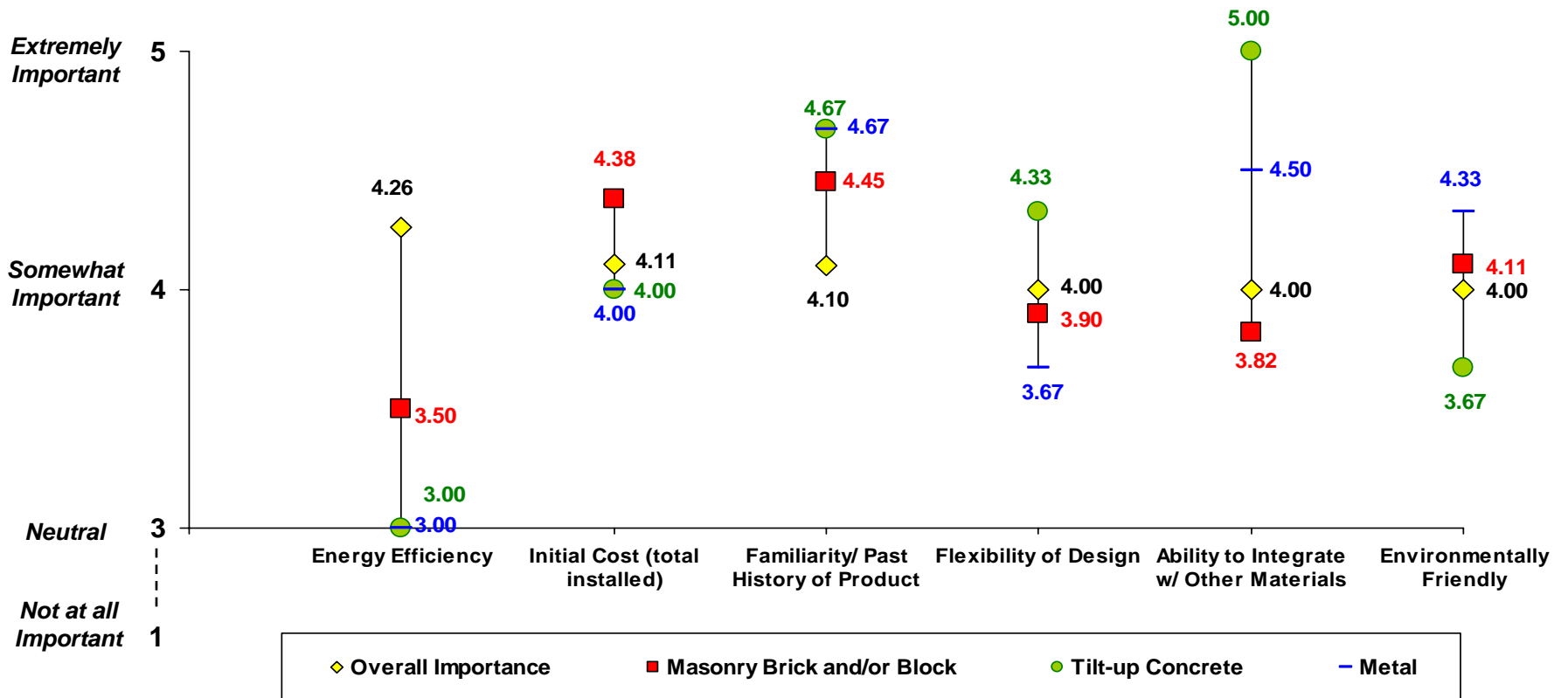
### Walls – Importance versus Performance – by Wall Type

Metal and tilt-up concrete exceed expectations with regard to low maintenance; however metal falls short in initial cost, longevity, and weatherability.



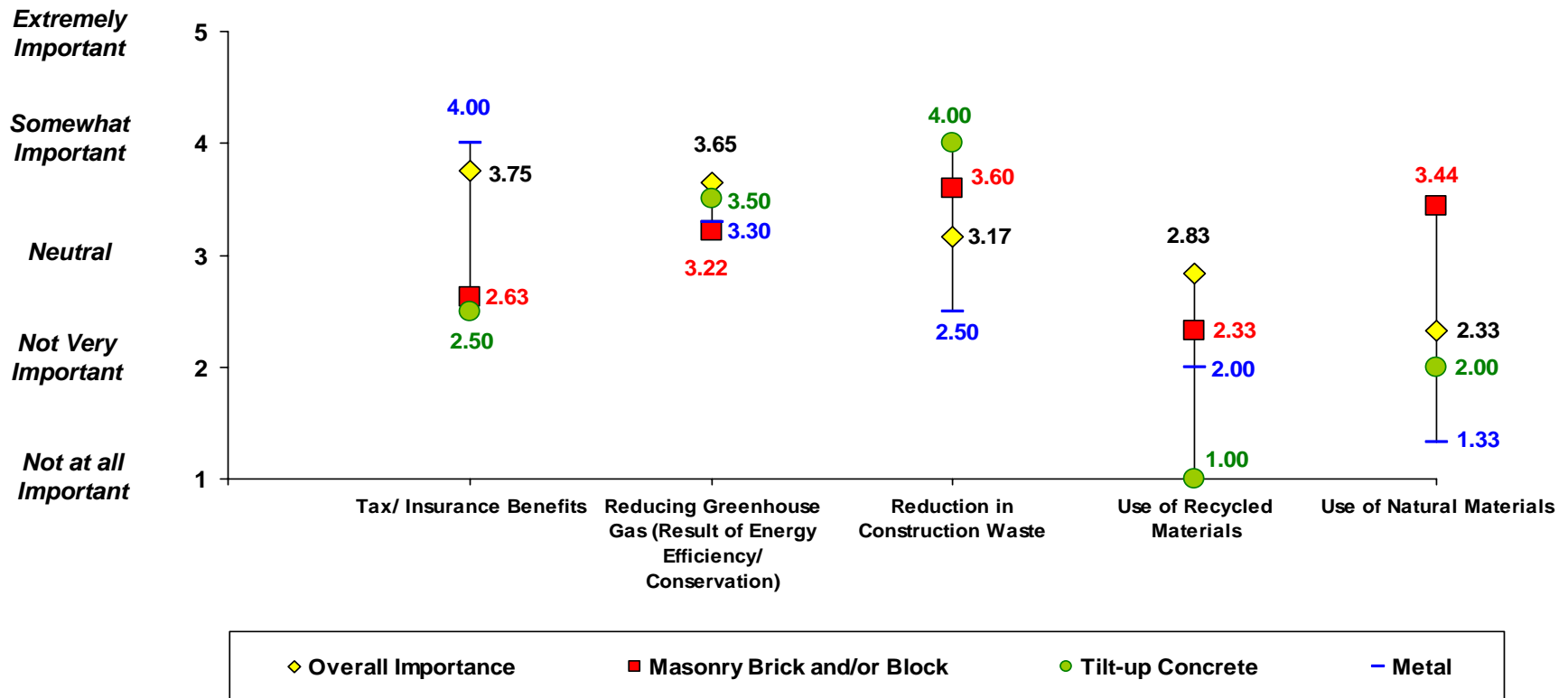
## Purchase Decision Process

### Walls – Importance versus Performance – by Wall Type



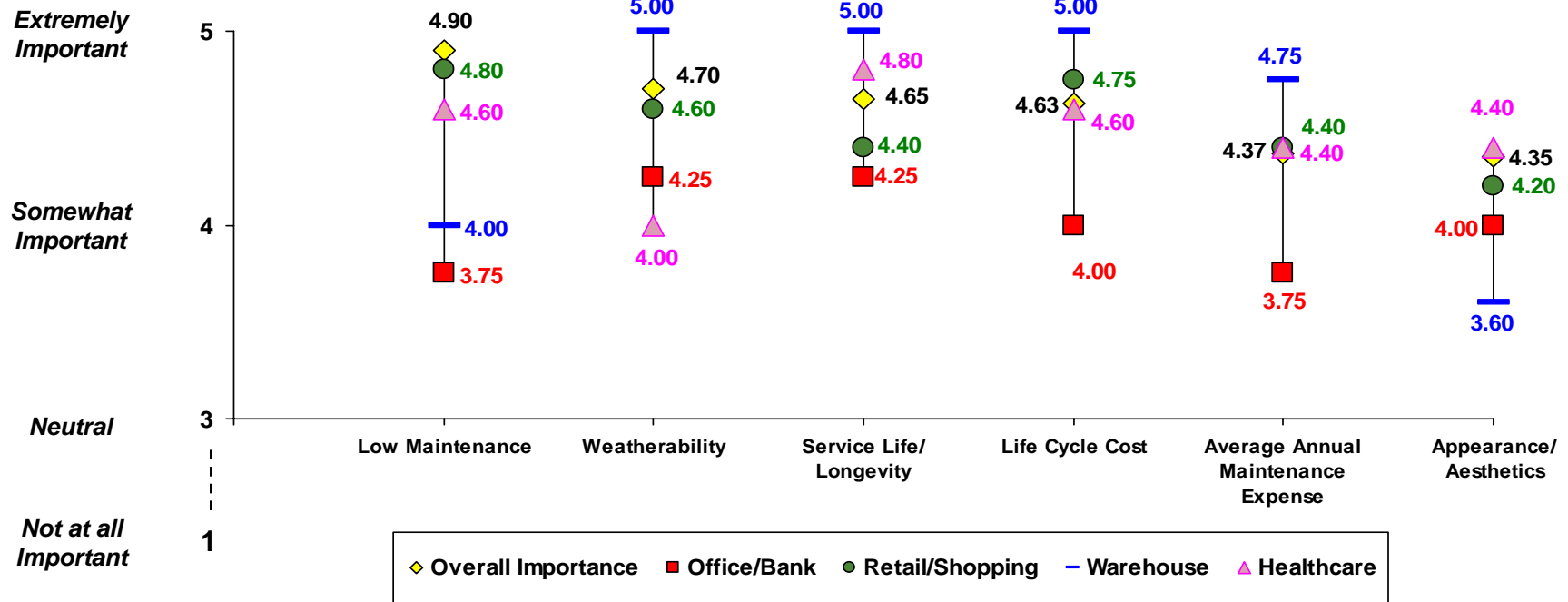
## Purchase Decision Process

### Walls – Importance versus Performance – by Wall Type



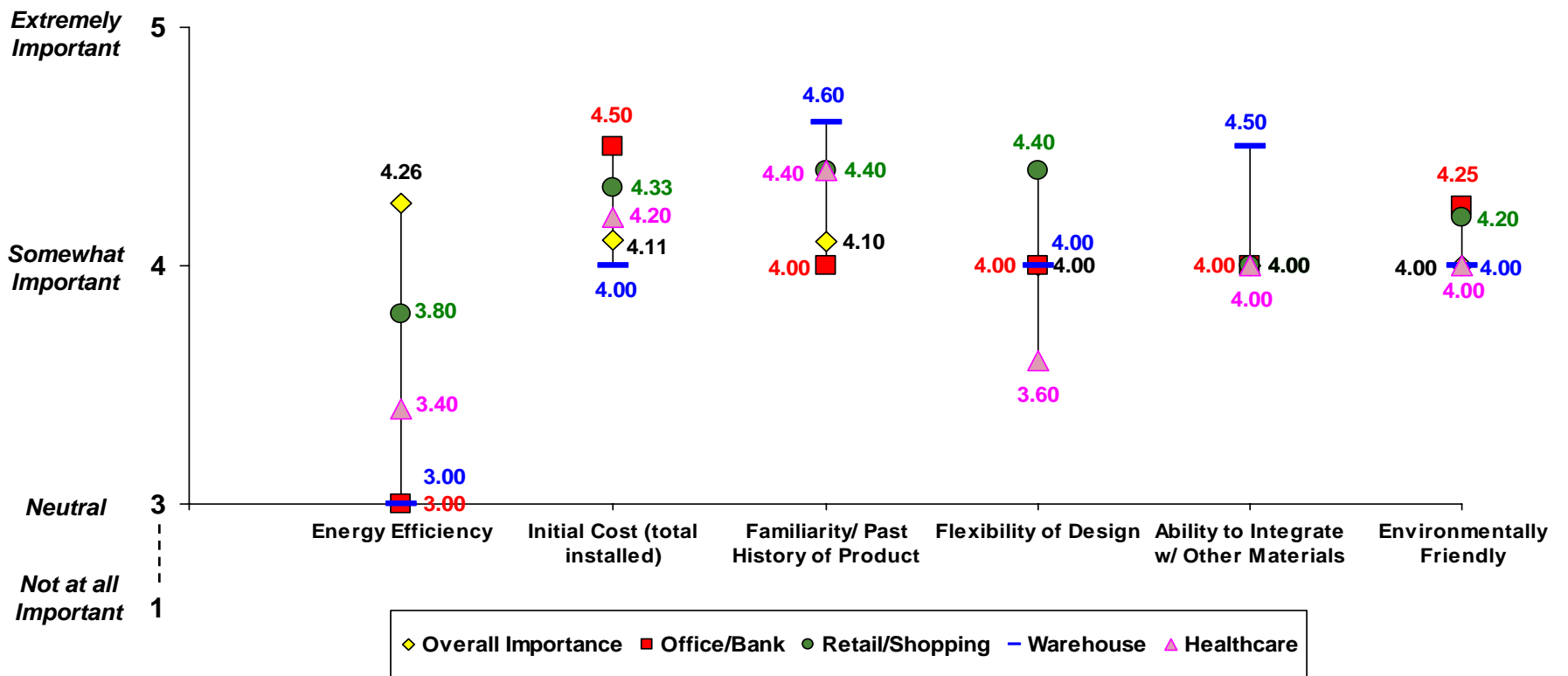
## Purchase Decision Process

### Walls – Importance versus Performance – by Building Category



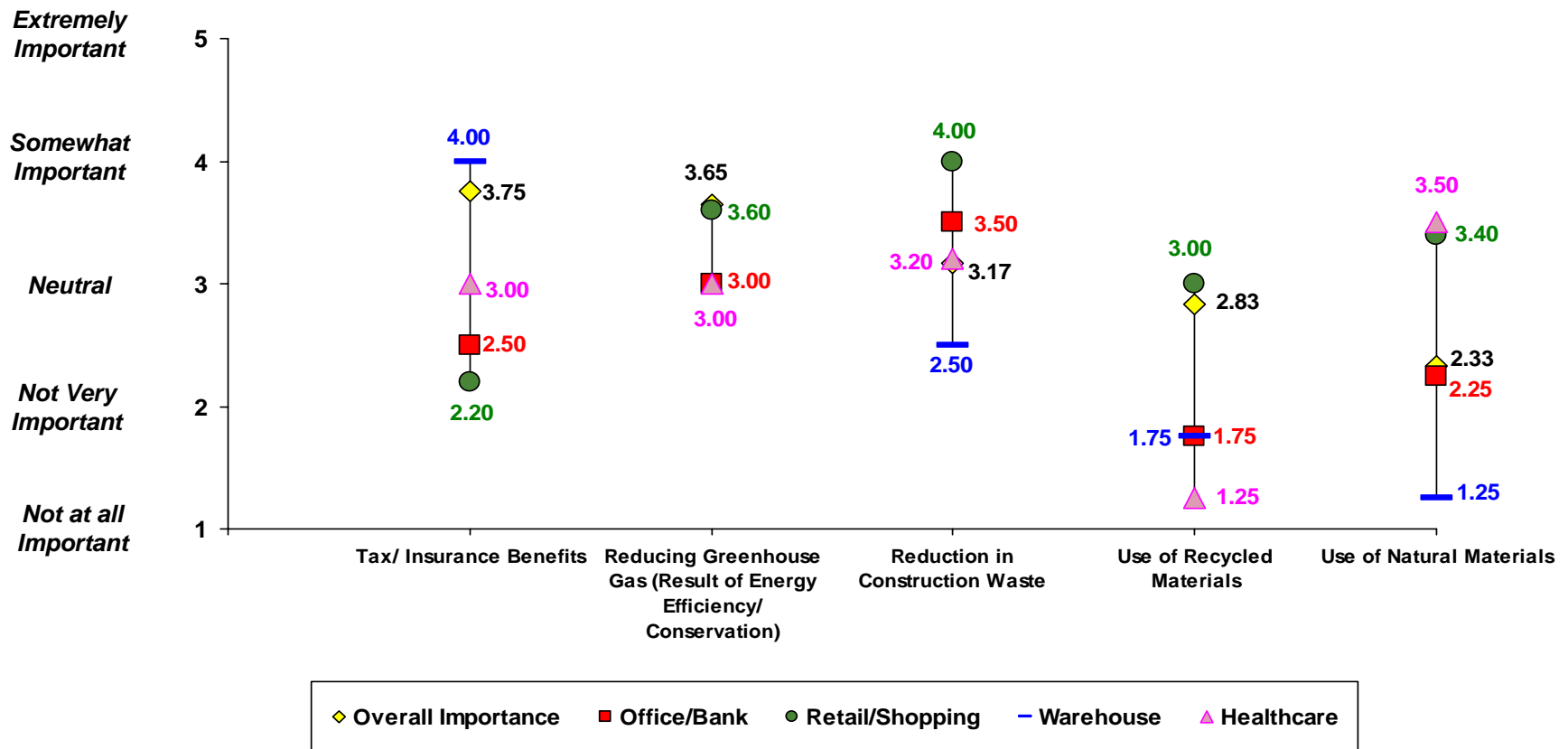
## Purchase Decision Process

### Walls – Importance versus Performance – by Building Category



## Purchase Decision Process

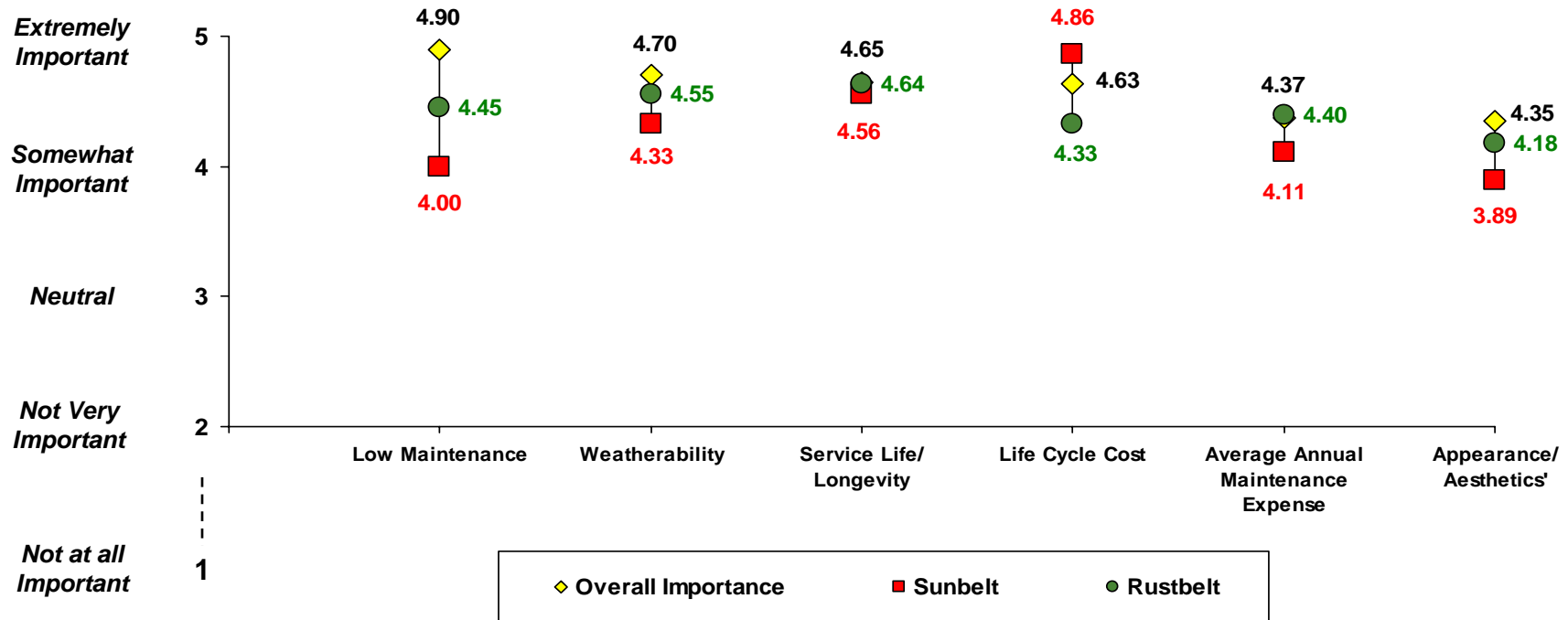
### Walls – Importance versus Performance – by Building Category





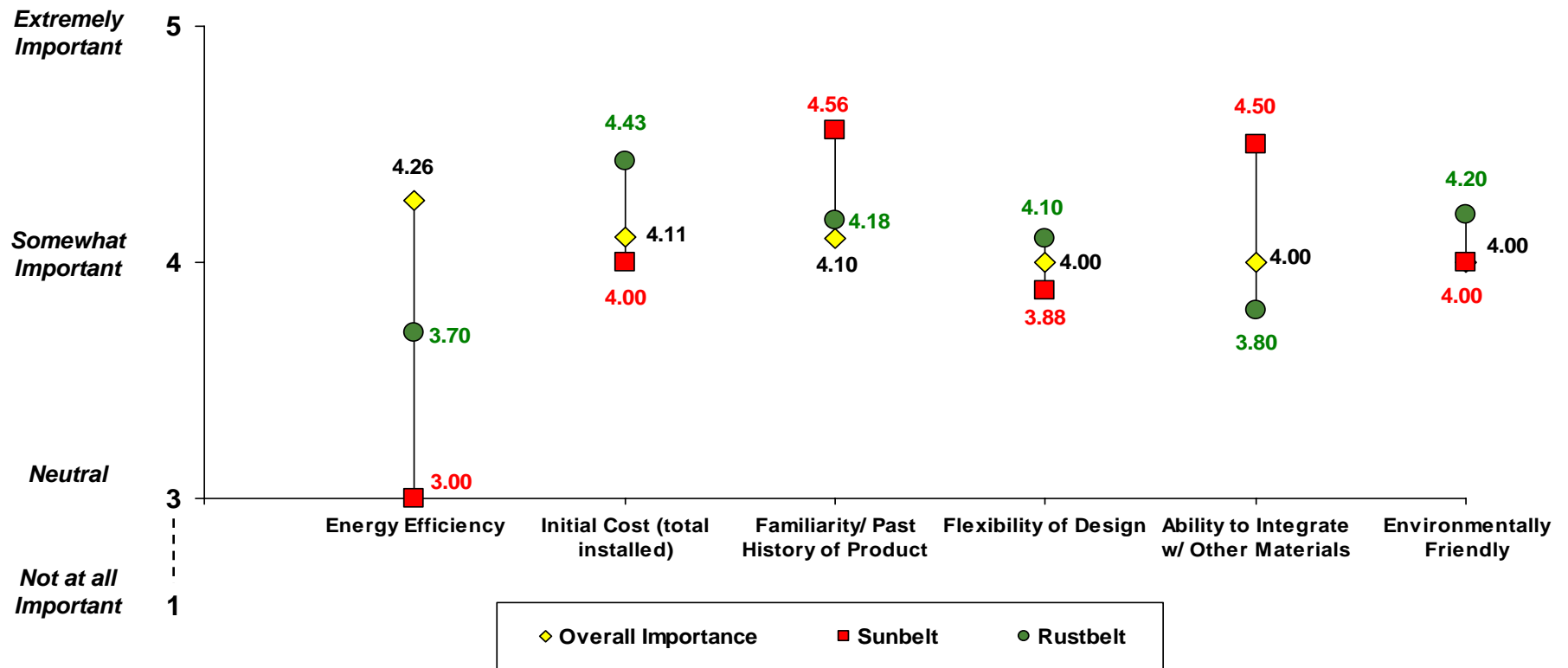
## Purchase Decision Process

### Walls – Importance versus Performance – by Region



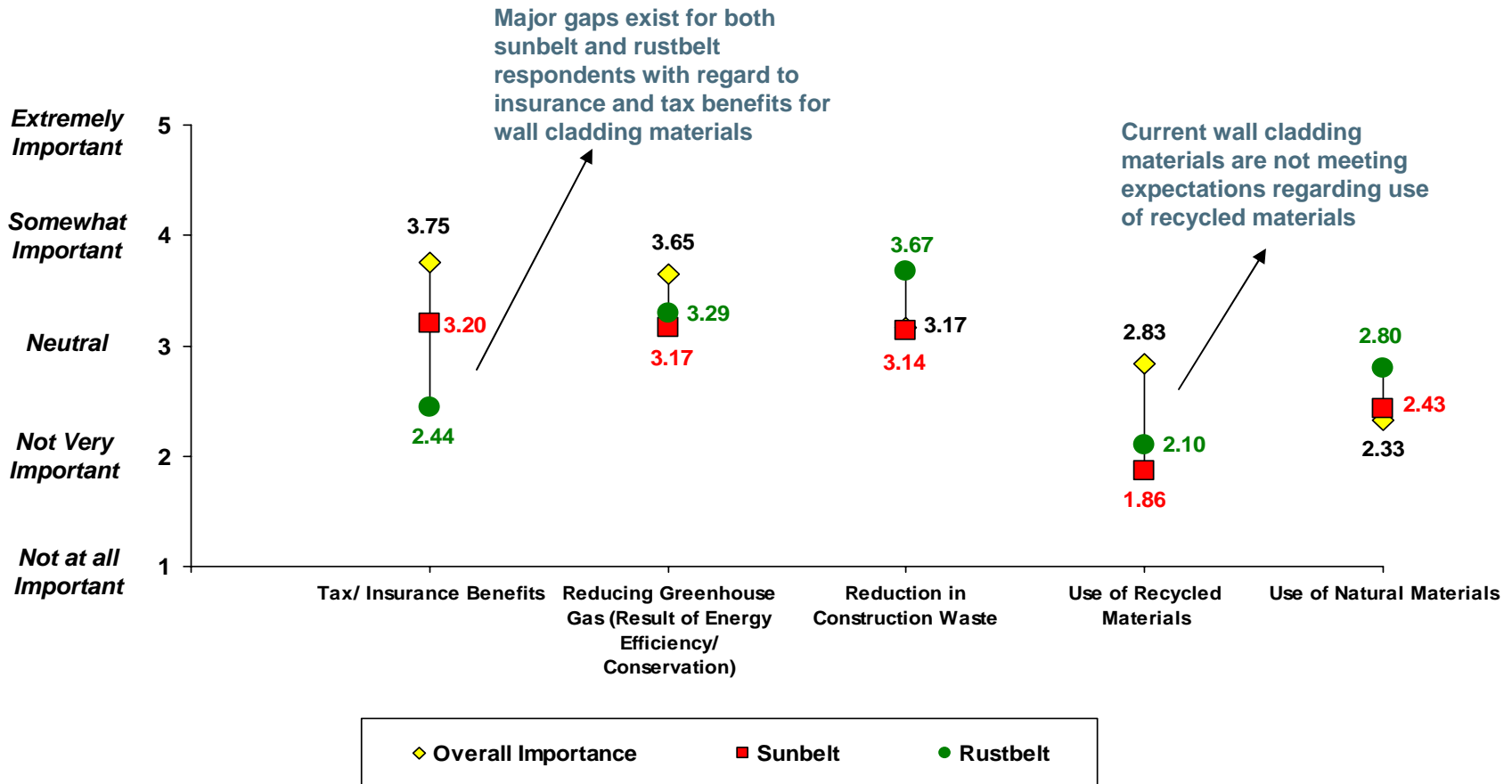
## Purchase Decision Process

### Walls – Importance versus Performance – by Region



## Purchase Decision Process

### Walls – Importance versus Performance – by Region

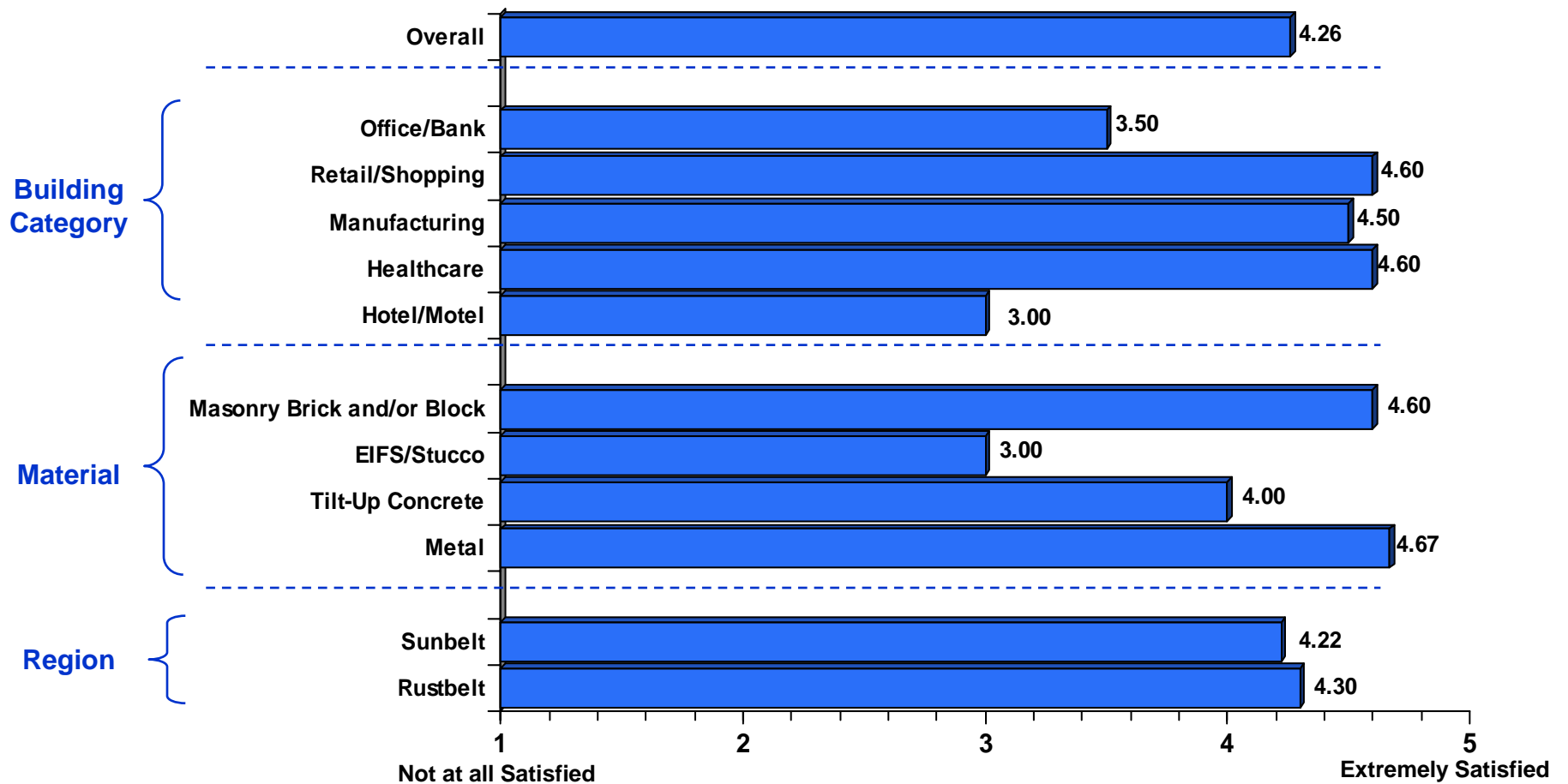


Purchase Decision Process

**Satisfaction with Wall Cladding**

Building owners with metal and brick wall cladding have the highest satisfaction levels.

**Satisfaction Level With Current Wall Cladding**

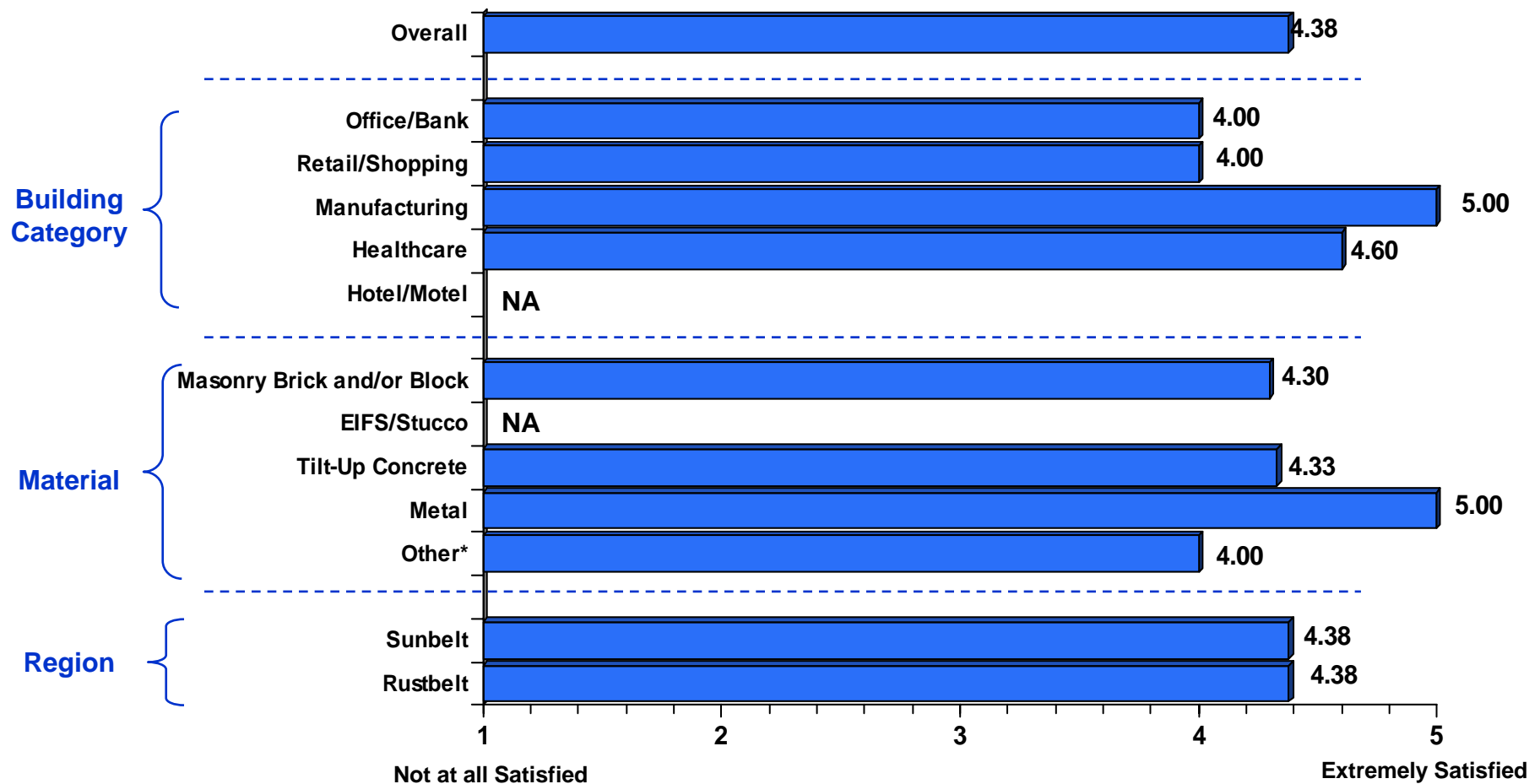


Purchase Decision Process

**Satisfaction with Value for Price Paid - Wall Cladding**

Metal outperforms other wall cladding materials in regard to value for price. Respondents with manufacturing facilities are extremely satisfied with their current wall cladding choices from a value perspective.

**Satisfaction Level With Value for Price Paid**



\*Other includes glass/pre-cast and marble.

## Purchase Decision Process

### Satisfaction with Value for Price Paid - Wall Cladding – Verbatim Comments

*“EIFS is not the most durable material for exterior public walls, it is easily damaged (by people, landscape workers, etc). People (kids) have also damaged it, on purpose, by carving into it. This kind of damage takes time to repair. First, you have to fill in the void by using a mortar like material, then you have to paint it so it'll blend in.” – Sunbelt, Hotel/Motel, EIFS/Stucco*

*“Installation inconsistencies with the footings caused the wall to pull away from the floor. We used a lot of caulk to resolve that problem.” – Sunbelt, Warehouse, Tilt-Up Concrete*

*“I am pretty satisfied with the wall system. We do have some corrosion on the aluminum where it meets the ground. We will have to replace that , it is a 4-inch piece under the glass, we have not done this yet.” – Rustbelt, Office/Bank, Metal*

*“It is just standard construction, but brick is reliable and lasts a very long time, we have not had any problems.” – Rustbelt, Healthcare, Masonry Brick and/or Block*

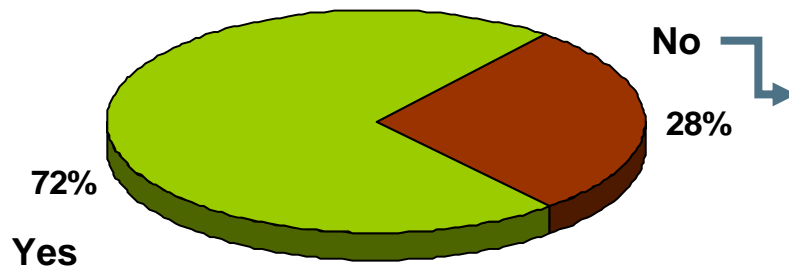
## Purchase Decision Process

### Material Selection For Rebuilding – Wall Cladding

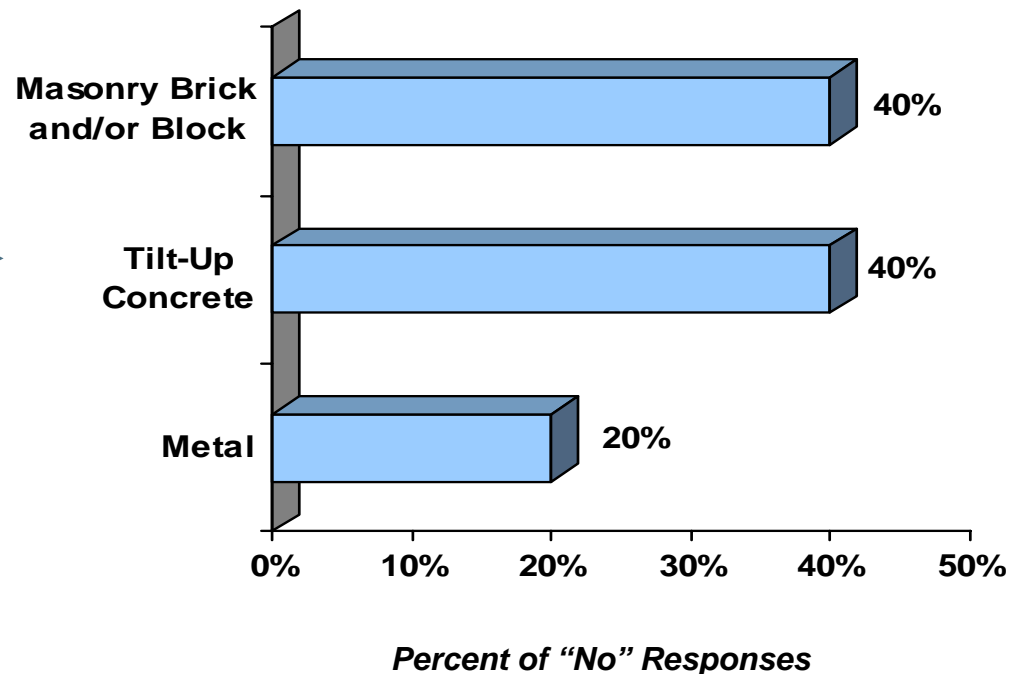
If respondents were to rebuild; nearly three-fourths would choose the same material. Metal rated lowest as an alternative wall cladding; following behind masonry products and tilt-up concrete.

#### Wall

#### If you Were to Re-Build , Would you Use Same Wall Cladding?



#### If No, What Material?



## Purchase Decision Process

### Material Selection For Rebuilding - Wall Cladding – Verbatim Comments

*“CMU looks better than concrete, it can be painted and it has very low maintenance.” – Sunbelt, Retail/Shopping, Masonry Brick and/or Block*

*“I would use concrete because it would look better than steel walls, but it would still be very durable.” – Sunbelt, Warehouse, Metal*

*“There is a price to pay when putting up masonry, but it pays off in the lifecycle because it is virtually permanent.” – Rustbelt, Healthcare, Masonry Brick and/or Block*

*“I believe I would choose steel for the walls because it lasts long and I believe steel would be cheaper than concrete.” – Rustbelt, Warehouse, Metal*





# SUSTAINABILITY AND ENERGY PERFORMANCE

## Sustainability and Energy Performance

### Overview

- With natural resources becoming more scarce, consumers and building owners as well as architects are becoming more aware of building products that perform well with issues such as sustainability and energy performance
- Issues examined include; use of recycled content, embodied energy reduction, energy efficiency, reduction of greenhouse gas as a result of energy efficiencies/conservation, use of natural resources, reduction of construction waste and longer life cycle
- Metal as a roofing material choice outperforms other roofing materials in all areas with the exception of energy efficiency
  - Metal roofs clearly outrank other materials with regard to longer life cycle
  - Reduction of construction waste and use of natural materials are also perceived benefits of using metal roofs
- Masonry/ brick is perceived as the most sustainable wall cladding product; however insulated metal panels rank highly with regard to energy efficiency

Sustainability and Energy Performance

**Sustainability Issues– Roofing Materials**

As a roofing choice, metal outperforms other materials in five out of seven sustainability issues - outperformed only with regard to energy efficiency and embodied energy reduction.

**Roofing Materials Considered Superior Regarding Sustainability Issues**

*- Percent of Respondents -*

Factor	BUR	Modified Bitumen	Single Ply	Metal	Other	Unsure
Use of Recycled Content	26%	0%	11%	32%	0%	32%
Embodied Energy Reduction	11%	5%	16%	16%	5%	47%
Energy Efficiency	32%	0%	26%	11%	5%	26%
Reduction of Greenhouse gas as a result of Energy Efficiencies/Conservation	5%	0%	11%	32%	5%	47%
Use of Natural Materials	5%	11%	11%	26%	5%	42%
Reduction of construction waste	0%	5%	37%	32%	0%	26%
Longer Life Cycle	11%	0%	21%	58%	5%	5%

**Sustainability and Energy Performance**

**Sustainability Issues – Wall Cladding**

From a cladding perspective, masonry products capture high ratings with regard to sustainability issues, followed by insulated metal panels.

**Wall Materials Considered Superior Regarding Sustainability Issues**

*- Percent of Respondents -*

Factor	Masonry Brick and/or Block	EIFS/ Stucco	Tilt-up Concrete	Insulated Metal Panel	Profiled Metal Panel	Metal Comp.	Other	Unsure
Use of Recycled Content	16%	10%	16%	5%	16%	11%	5%	21%
Embodied Energy Reduction	32%	5%	5%	27%	0%	0%	5%	26%
Energy Efficiency	32%	5%	5%	32%	0%	0%	0%	26%
Reduction of Greenhouse gas as a result of Energy Efficiencies/Conservation	35%	5%	0%	15%	5%	0%	0%	40%
Use of Natural Materials	68%	11%	0%	0%	0%	0%	5%	16%
Reduction of Construction Waste	26%	5%	21%	21%	11%	0%	5%	11%
Longer Life Cycle	48%	5%	21%	11%	5%	0%	5%	5%

## Sustainability and Energy Performance

### Sustainability Issues - Wall Cladding – Verbatim Comments

*“In 1996, I know that Butler was using 20% recycled metal in their buildings; I don't know if that is still true or not.” – Rustbelt, Warehouse, Metal, Metal*

*“A lot of steel in this country is now recycled. The more recycled material, the better.” – Rustbelt, Retail/Shopping, Metal*

*“We don't select materials that will be energy efficient for our buildings. Warehouses around here typically use tilt-up concrete walls. That's just what is best to use. We look to other things, like lighting, to save us energy not the building materials.” – Sunbelt, Warehouse, Tilt-Up Concrete*

*“(Insulated metal panel) The insulation would help metal to be more energy efficient.” – Rustbelt, Office/Bank, EPDM, TPO, PVC*

*“PVC is a light color, it's reflective.” – Rustbelt, Warehouse, Metal, Metal*

*“There is no waste with brick or minimal.” – Rustbelt, Office/Bank, Other, Masonry Brick and/or Block*

*“There is no waste with a pre-fab Butler metal building.” – Rustbelt, Warehouse, Metal, Metal*

*“We seem to get about 10-15 years out of our BUR and the brick walls last forever.” – Sunbelt, Healthcare, BUR, Mod Bit, Masonry Brick and/or Block*

*“We have used metal panels in the past, 30 years ago. The only problem was with the paint which didn't last; it has been painted twice.” - Sunbelt, Healthcare, Metal, Masonry Brick and/or Block*

*“The old style coal tar pitch is best. The newer one is a synthetic and could not match it for lifecycle. We have one from 1958 and get very few calls on it.” - Rustbelt, Healthcare, EPDM, TPO, PVC, Masonry Brick and/or Block*

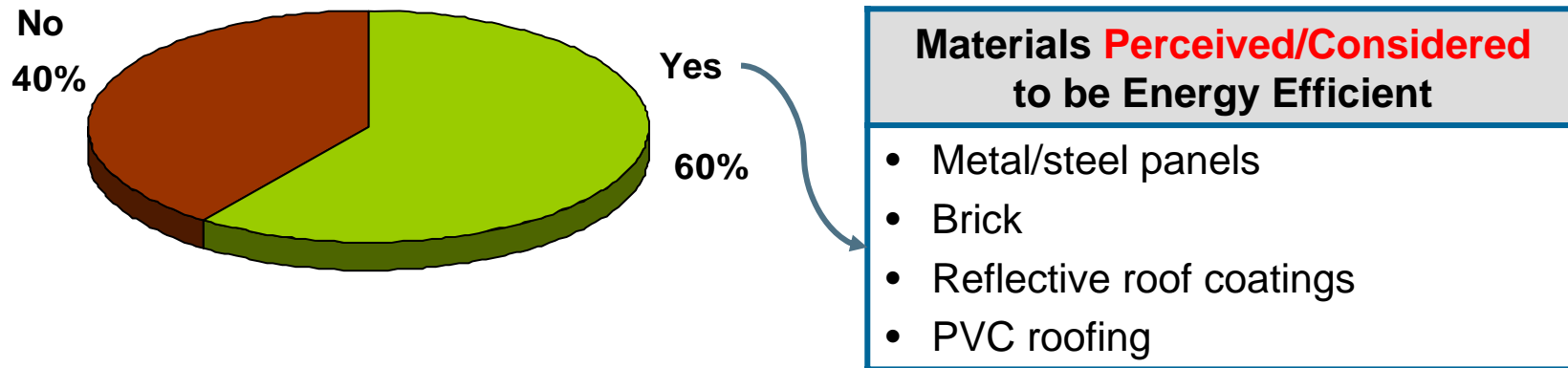
*“Brick lasts forever, so does tilt-up.” – Rustbelt, Office/Bank, EPDM, TPO, PVC, Other*

Sustainability and Energy Performance

**Increase Use of Materials That Contribute to Energy Efficiency/Sustainability**

Respondents were asked if they planned to increase their usage of materials that contribute to the energy efficiency and overall sustainability of the environment. Over half of the respondents indicated they did plan in the future to increase usage of energy efficient building materials with metal building products being cited most often.

**Increased Use of Energy Efficient/Sustainable Materials**



## Sustainability and Energy Performance

### Increase Use of Materials That Contribute to Energy Efficiency/Sustainability - Verbatim Comments

*“Not for the kind of buildings (warehouses) that we have, ours are too big to focus on energy efficiency, energy efficiency costs too much per sq ft.” – Sunbelt, Warehouse, Metal, Metal*

*“Metal is flexible and adaptable in its construction, it can go around corners, etc.” – Sunbelt, Retail/Shopping, Metal, Masonry Brick and/or Block*

*“Whatever is available, it is a custom selection each time. We will go with higher efficiency windows, a thermal board type system behind the masonry, etc.” – Sunbelt, Healthcare, Metal, Masonry Brick and/or Block*

*“We are now using white PVC when we re-roof a building instead of BUR. The white will make the buildings cooler, more energy efficient, we are also looking at more energy efficient management systems.” – Rustbelt, Retail/Shopping, BUR, Mod Bit, Masonry Brick and/or Block*

*“I will try to use whatever I can that is ecologically friendly, make the smallest carbon footprint possible in the manufacture of it and the use of it.” – Rustbelt, Retail/Shopping, Metal, Masonry Brick and/or Block*

*“We have built mostly brick buildings and we feel they are energy efficient. We also have the reflective coatings on our roof.” – Rustbelt, Office/Bank, EPDM, TPO, PVC, Other*

*“Right now I am concentrating on lighting, but the next time we decide to build a store, I will get into doing more research to find out which materials and more energy efficient, the least waste produced, most recycled, etc. I exchange information with my architect and engineer friends, right now on lighting.” – Rustbelt, Office/Bank, EPDM, TPO, PVC, Masonry Brick and/or Block*

*“We just opened a new building, it is a single story structure and a LEED certified building. The walls are standing seam metal, the majority of the roof is Sarnafil and then there is a portion that is a green roof.” – Rustbelt, Healthcare, EPDM, TPO, PVC, Masonry Brick and/or Block*

## This concludes our final presentation. Thank you.

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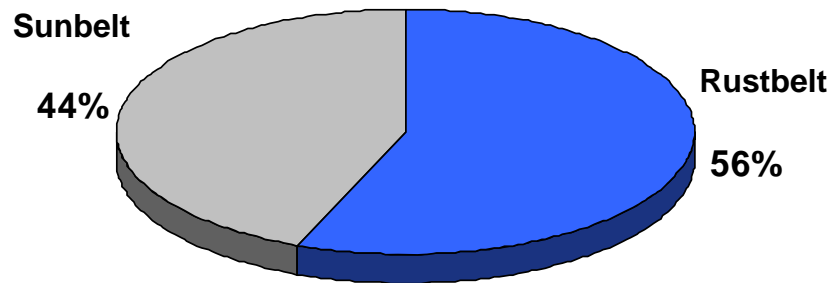
# APPENDIX: RESPONDENT/ BUILDING PROFILE

Respondent Building/Roof Profile

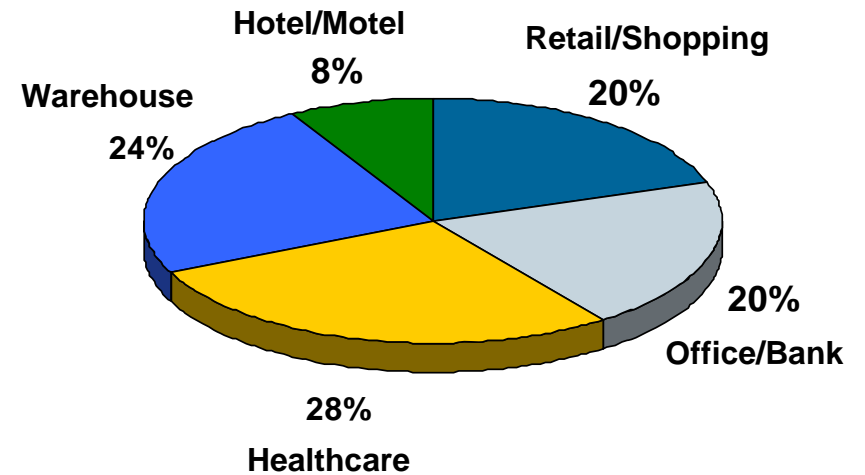
**Primary Low Slope Material/ Building Application**

Ducker targeted and achieved a diverse respondent base, as illustrated below.

Total Interviews Segmented by Region



Total Interviews Segmented by Building Type



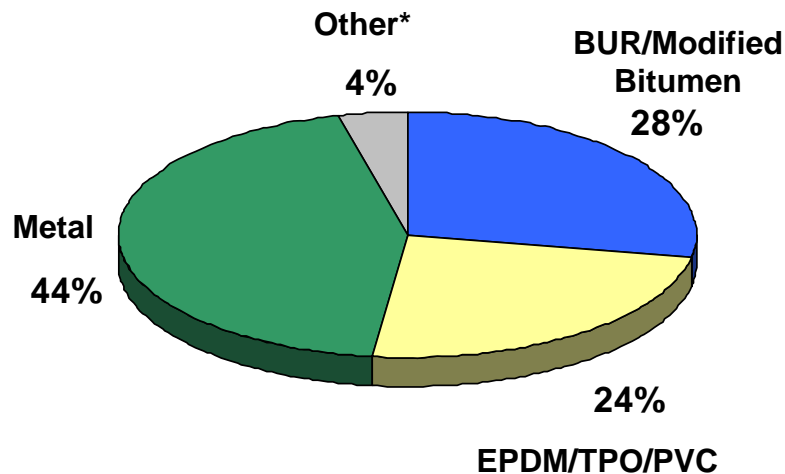
Total = 45

## Respondent Building/Roof Profile

### Primary Wall and Roof Type

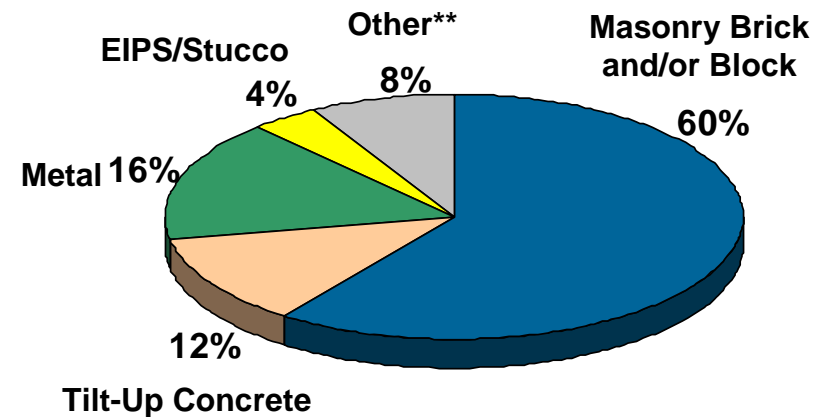
Majority of respondents profiled utilize metal roofs; over half currently use a masonry product for wall applications.

**Total Interviews Segmented by Roofing Material**



\*Other includes slate and single ply membrane.

**Total Interviews Segmented by Wall Cladding**



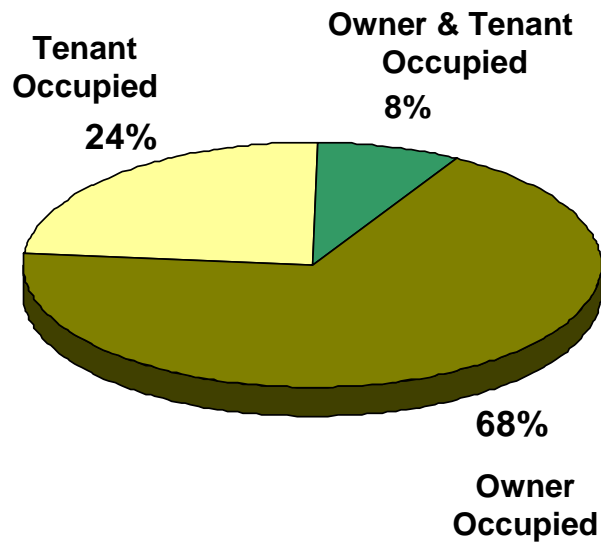
\*Other includes glass and precast and marble.

Respondent Building/Roof Profile

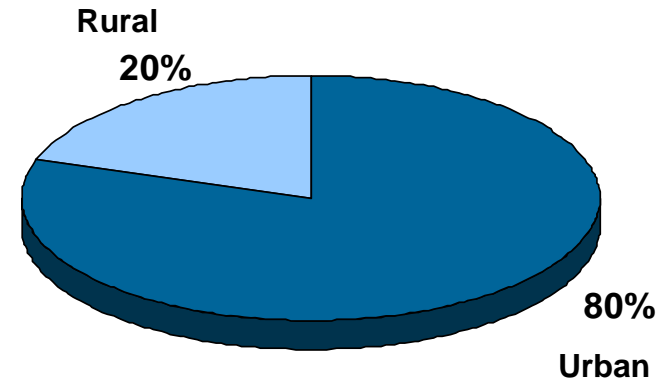
**Building Location and Occupancy Type**

The majority of interviews conducted have been owner-occupied buildings in urban locations.

Building Occupancy Type



Building Location Type

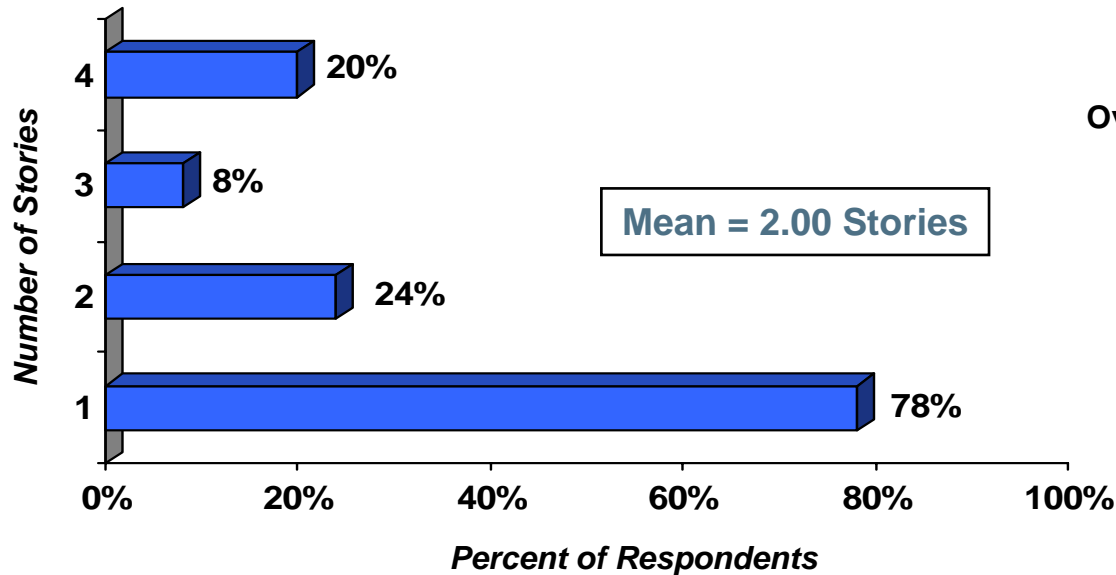


## Respondent Building/Roof Profile

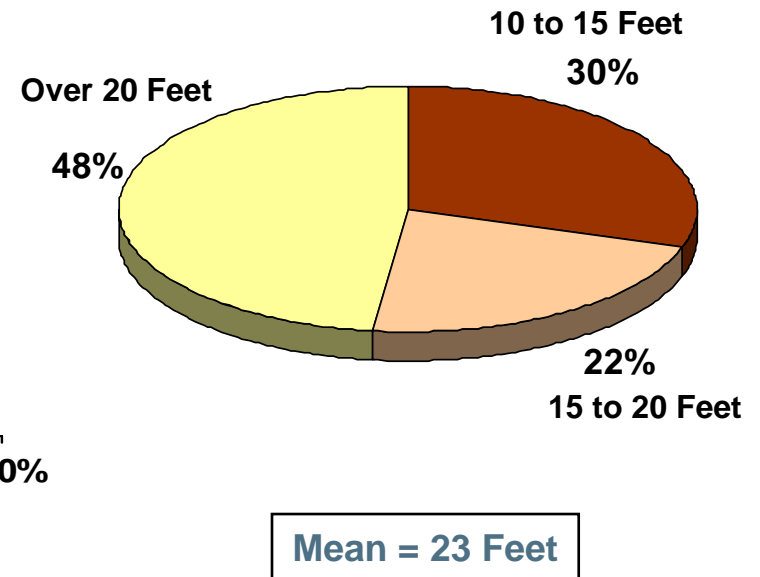
### Number of Stories/Height Per Story

Buildings were pre-qualified to be under five stories. Over three-quarters of buildings profiled were one story with an average height per story of 23 feet.

**Building Number of Stories**



**Building Height Per Story**

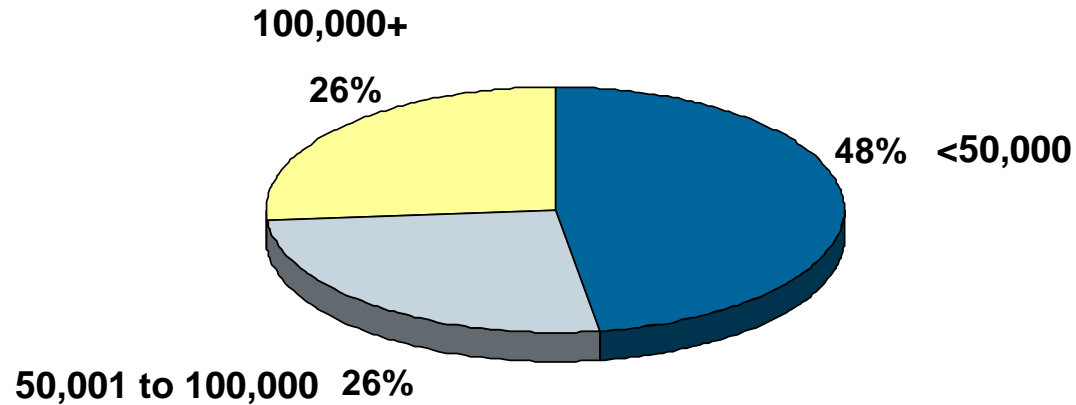


Respondent Building Profile

**Building Size – Square Feet/Footprint**

Nearly half of the buildings profiled were less than 50,000 square feet.

**Building Square Feet – Floor Area**



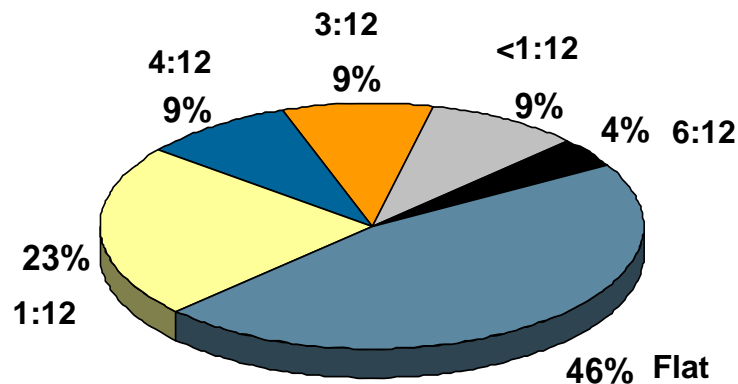
**Mean = 113,050 Square Feet**

## Respondent Building Profile

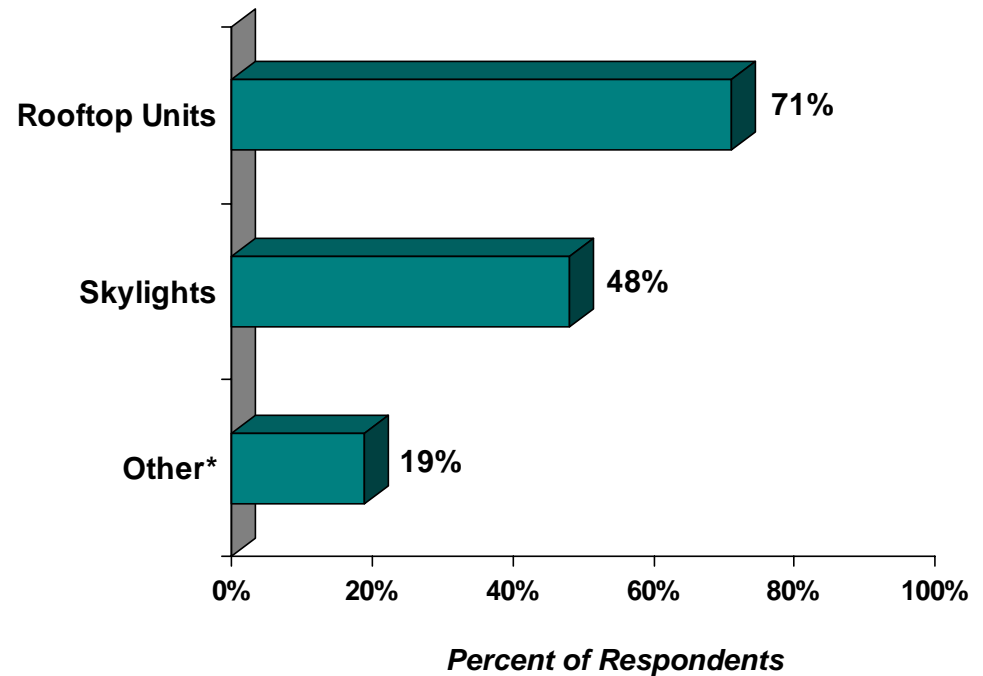
### Slope and Rooftop Products

Roofing slope varied among respondents with nearly half of buildings profiled having a flat roof. Nearly three-fourths of buildings had rooftop units.

Roof Slope Segmentation



Rooftop Products



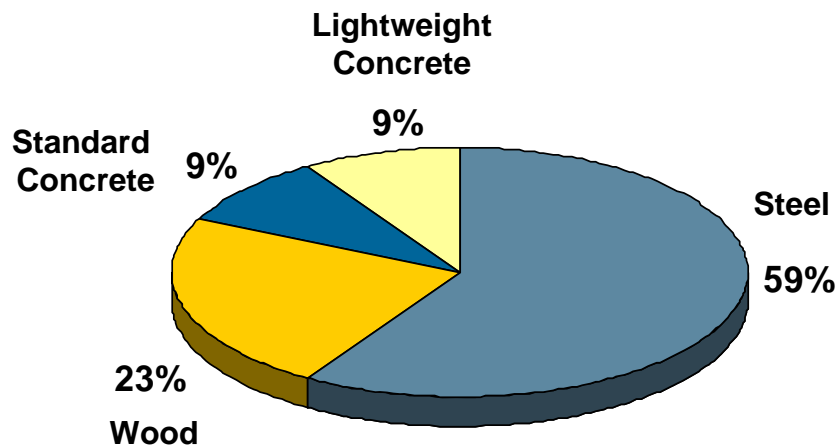
\*Other includes chimnea, solarium, and exterior ventilation.

## Respondent Building Profile

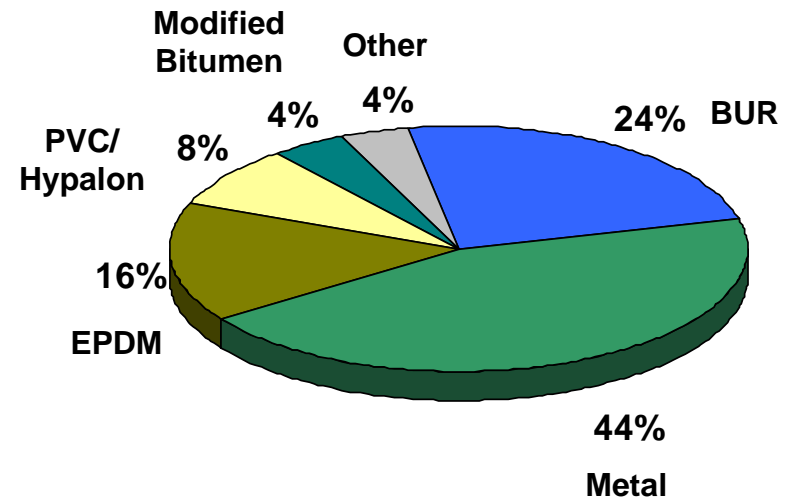
### Existing Deck and Roof Type

Buildings profiled typically utilized a steel or wood deck. Roofing material types include metal, built-up roof systems, single-ply, and EPDM.

Deck Type Segmentation



Roofing Material Type



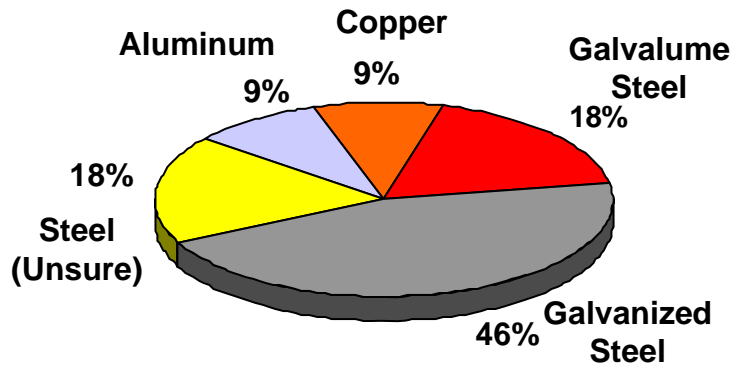


## Respondent Building Profile

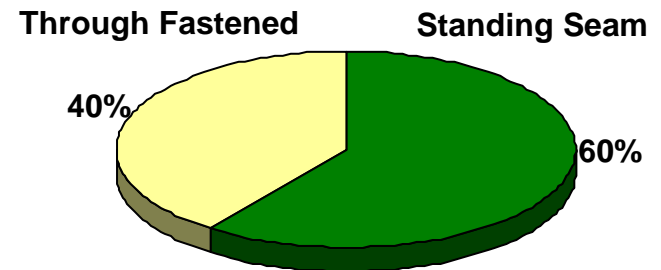
### Metal Roof Profile

Of the metal roofs profiled 60 percent were standing seam; with nearly half utilizing a galvanized substrate. In addition, 64 percent were painted utilizing a PVDF paint system.

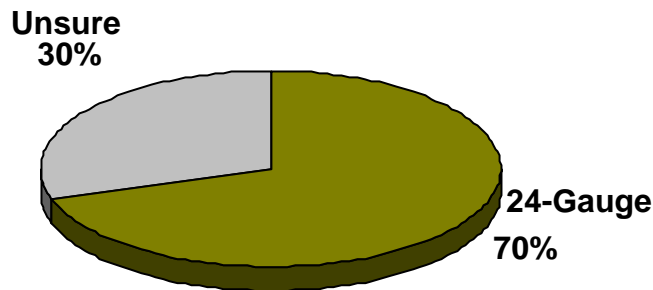
#### Metal Roofs by Substrate Type



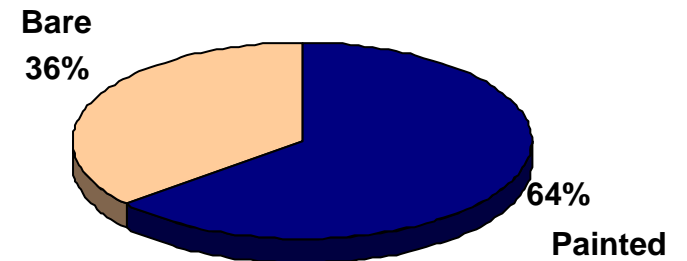
#### Metal Roofs by Panel Type



#### Metal Roofs by Thickness



#### Metal Roofs-Painted/Bare

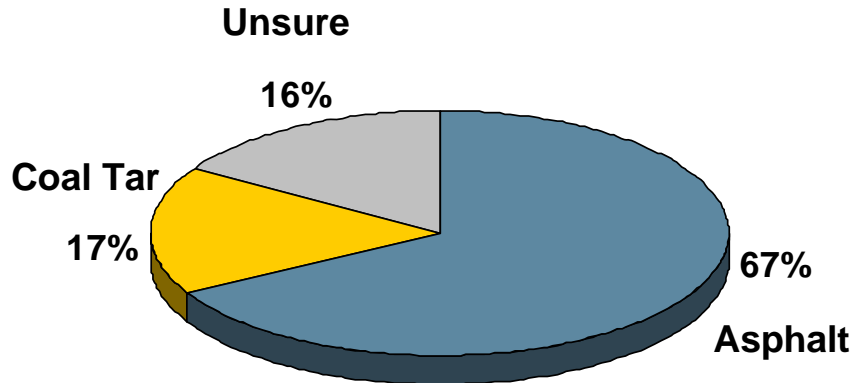


Respondent Building Profile

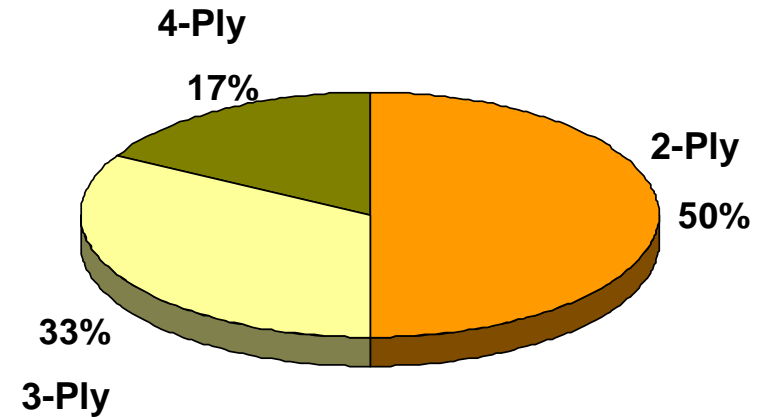
**BUR Roof Profile**

As illustrated below, the majority of BUR roofs were asphalt-based with two or three plies.

BUR Roofs by Type



BUR Roofs by Thickness

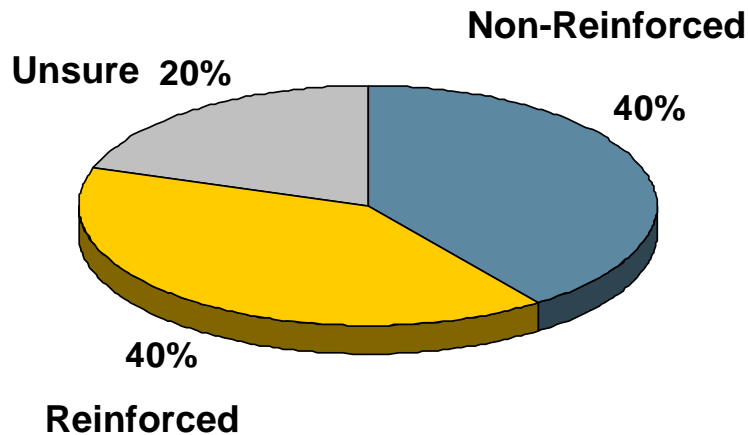


## Respondent Building Profile

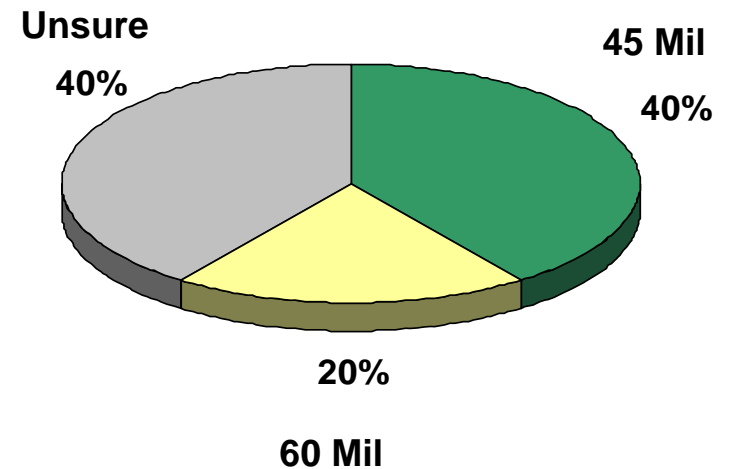
### Single Ply Roof Profile

Respondents indicate that of the single ply roofing systems utilized, an equal number were reinforced vs. non-reinforced; while nearly half used a 45 mil thickness.

#### Single Ply Roofs by Reinforcement



#### Single Ply Roofs by Thickness

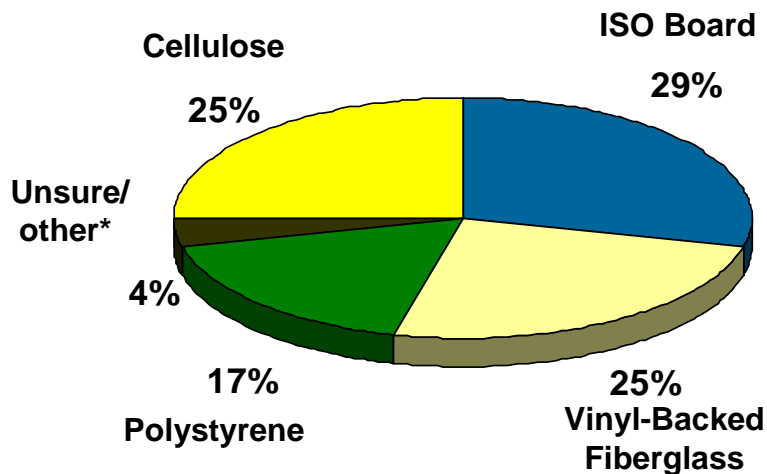


## Respondent Building Profile

### Existing Insulation System

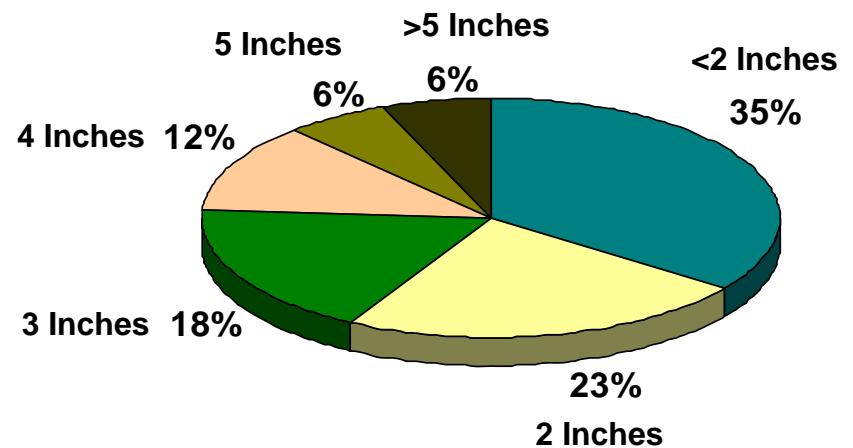
The majority of insulation utilized is ISO board less than 2-inches. Eighty percent of respondents reported insulation cover-board were not used or were unsure of usage. Vapor barriers were utilized by only one-quarter of respondents.

### Insulation Segmentation by Product Type



\*Other includes rigid foam

### Insulation Segmentation by Thickness



## Respondent Building Profile

### Warranty-Related Information

An equal number of respondents had a 10 and 20 year warranty on their roofing system with the majority citing a performance warranty.

Warranty Period – Years (frequency)	Frequency of Mention
5-Year	5%
7-Year	6
10-Year	39
15-Year	11
20-Year	39
<b>Total</b>	<b>100%</b>



Warranty Type	Frequency of Mention- Multiple Response
Performance	77%
Weather Tight	15%
Lifetime	15%

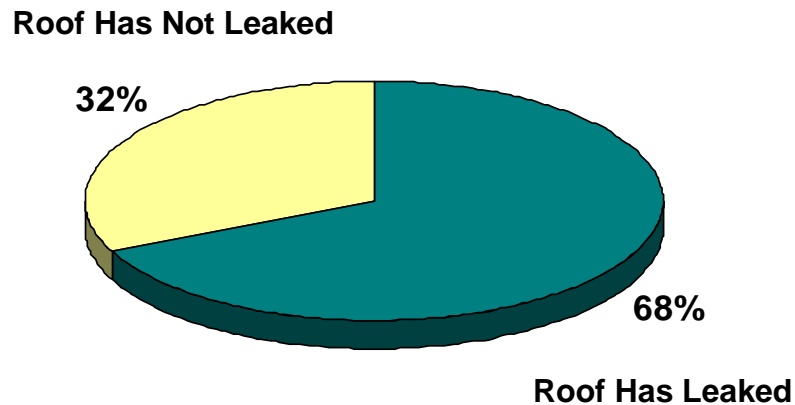
**Mean = 14 Years**

## Respondent Building Profile

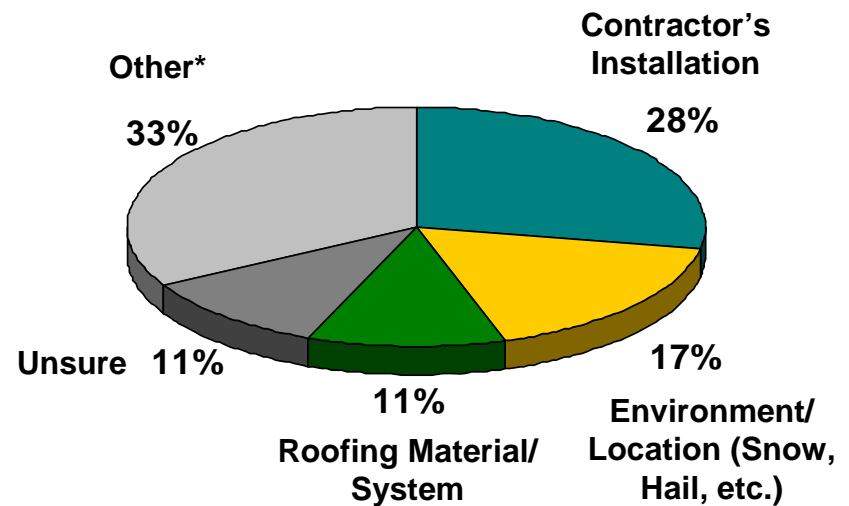
### Roof Leaks

Two-thirds of the owners interviewed have had a roof leak, mainly due to negligence.

#### Percent of Owners Whose Roofs Have Leaked



#### Reason for Leak



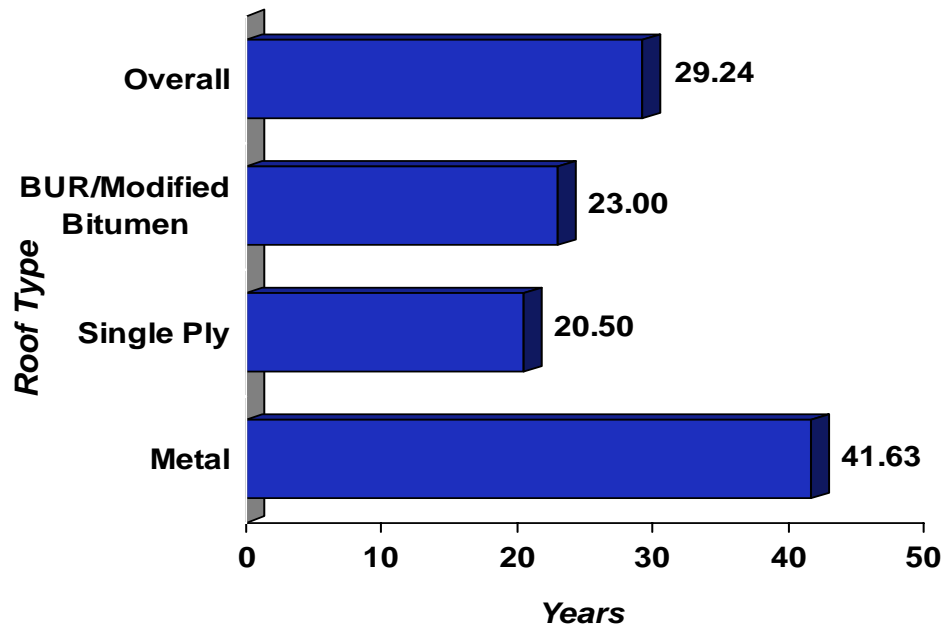
*\*Other includes other people's negligence (e.g., HVAC, window washers, tenant, etc.)*

## Respondent Building Profile

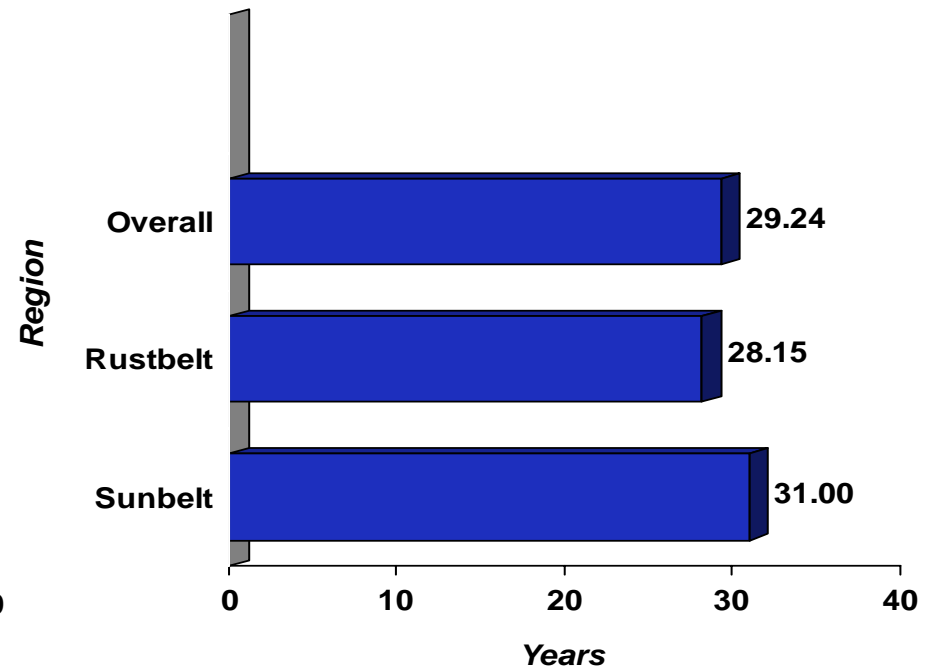
### Expected Material Service Life

Based on the sample interviewed for the purpose of this study, metal is expected to have the longest service life by 17 years, as illustrated below.

### Expected Roof Service Life By Material



### Estimated Roof Service Life by Region



*(Defined: Time from original installation through recover/re-roof)*