Hard Work via Soft Costs: Achieving Ambitious Energy Efficiency Goals

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Research Background and Methodology

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Research Background

Background:

- **April 26, 2018**
  - *New Efficiency: New York* report published
  - Outlined plans to accelerate the state's energy efficiency goal by 40% and called for 185 trillion British thermal units (TBTUs) of cumulative, annual, site energy savings by 2025
- **January 1, 2020**
  - New York's Climate Leadership and Community Protection Act (Climate Act) enacted
  - Codified the 185 TBTU energy efficiency goal into law along with additional order-of-magnitude scale-up of energy efficiency and building decarbonization goals

To achieve these ambitious energy efficiency goals, it is critical to understand and reduce cross-cutting market barriers, such as soft costs associated with energy efficiency project development.

Research Objective

Overarching Objective: Develop a reliable, detailed, New York based understanding of current soft cost categories associated with energy efficiency projects within the Commercial, Multifamily, and Residential sectors

Evaluation Questions:

How are various **soft cost categories defined and prioritized** in each sector?

What are the **most significant soft cost categories** affecting energy efficiency projects in New York by sector? How do **soft costs change over time**?

What **percent of total project costs** is represented by soft costs?

Are there **opportunities to reduce soft costs** and, if so, what are they?

What **degree of variation exists for each major soft cost category** for prototypical EE projects in each sector?

To what extent do **soft costs differ across geographical areas** in NY State? How does this compare to other states or regions?

Overview of Soft Cost Categories

Soft costs were quantified using the following groupings/definitions:

Soft Cost Category	Soft Cost Component
Marketing and Customer Acquisition	**Marketing and/or customer education costs** (hours), including dedicated marketing staff
	Preparation for each bid, including time spent on building assessment and system sizing before the project has been contracted, which may include initial audits to gather necessary building information
	Project signing and contracting
	Other marketing or customer education costs (dollars), such as email marketing, advertising, or trade show visits
Project/System Design and Development	**Designing, scoping, and customizing the project** for an individual, including energy modeling (if needed), after the project has been contracted
Installation	**Installation labor** to install the system and manage the installation, including both the contractor's staff and any subcontractors
Transaction Costs	**Obtaining permits** to complete the work compliant to local, state, and federal regulations
	Obtaining licenses necessary to execute [PROTOTYPICAL PROJECT] installations
	Acquiring and maintaining trainings and certifications necessary to execute [PROTOTYPICAL PROJECT] installations
Quality Assurance	**Quality assurance and quality control activities** to ensure the work has been completed per agreed-upon project design and standards
	Required callbacks to the customer to assist with equipment issues/servicing
Recruiting and Hiring	**Recruiting and hiring employees** with the skills and expertise necessary to execute [PROTOTYPICAL PROJECT] installations

Overview of Prototypical Projects

Each sector is represented by a set of prototypical energy efficiency projects:

Commercial	Multifamily	Residential
• Lighting retrofit • HVAC retrofit: VRF system installation (fuel switch to electric) • HVAC retrofit: high-efficiency RTU (no fuel switch; *removed for 2021 study*) • EE retrofit via performance contract (*removed for 2021 study*) • Energy management project involving system/operational optimization for EE	• Full building energy efficiency retrofit (includes a conversion to minisplit ASHPs, LED retrofit, and air sealing and insulation improvements) • (*New for 2021*) Full building energy efficiency retrofit (installation of upgraded efficient steam system)	• HVAC system replacement (ASHP installation) • Air sealing and insulation improvements • Comprehensive whole-home project addressing HVAC (ASHP installation) plus insulation and air sealing

Example Prototypical Project Specification

RESIDENTIAL SECTOR		
HVAC System Replacement	**Building Type**	Single-family home; family of 3 (2 adults, 1 child) living there year-round
	Building Size	2,000 sq. ft, 2-story home—living and kitchen downstairs with bedrooms upstairs Colonial, 50 years old
	Existing Conditions	Standard efficiency, gas-powered condensing boiler for heating; window AC units for cooling
	Equipment Installed	Ductless heat pump with 1 outdoor unit and 3 indoor heads. Indoor heads will be installed in the kitchen, the living room, and the bedroom (on the second floor). Existing gas boiler retained in place as backup heat.

Key Findings and Conclusions

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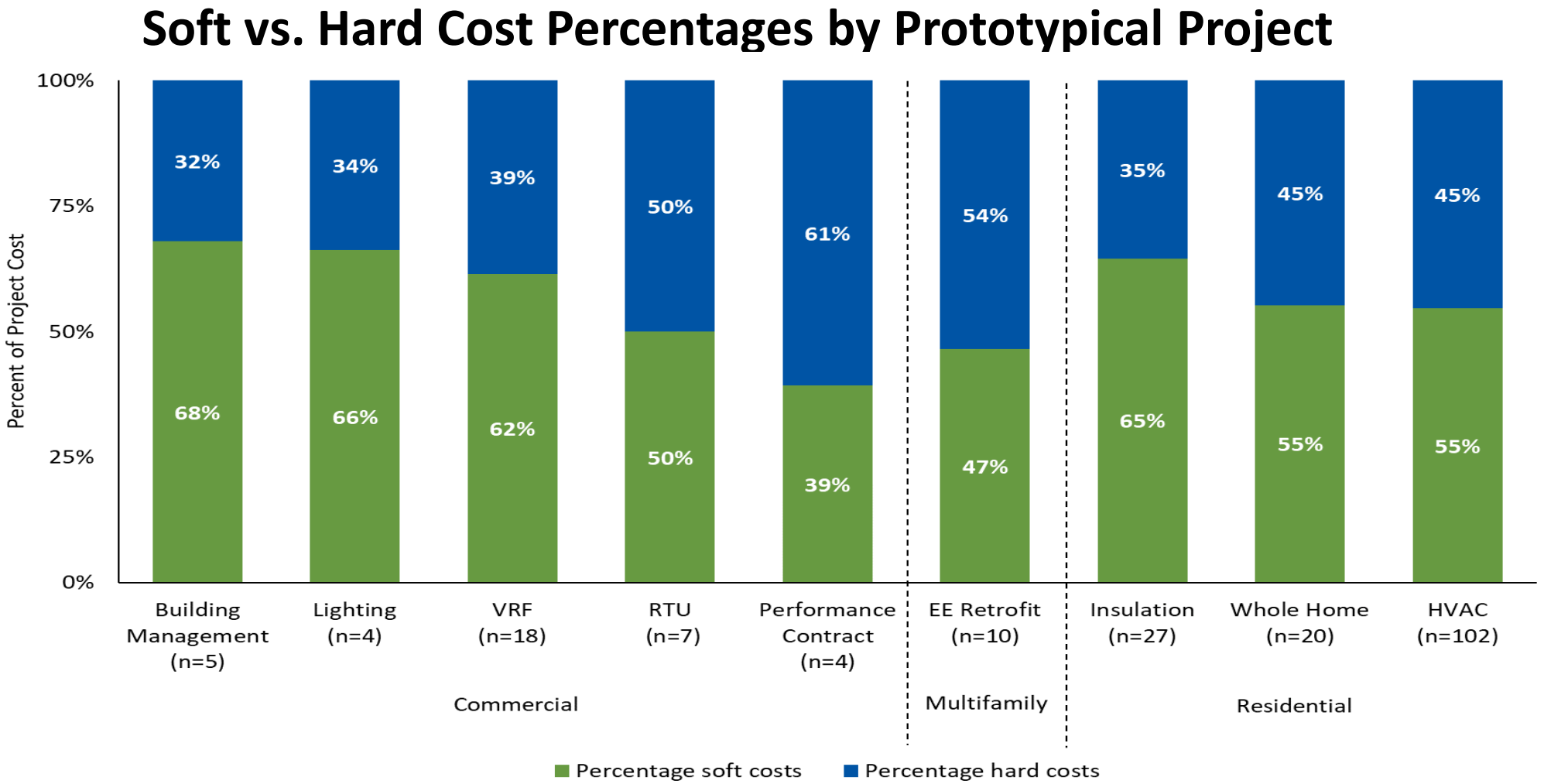
Cross-Sector Soft Cost Results



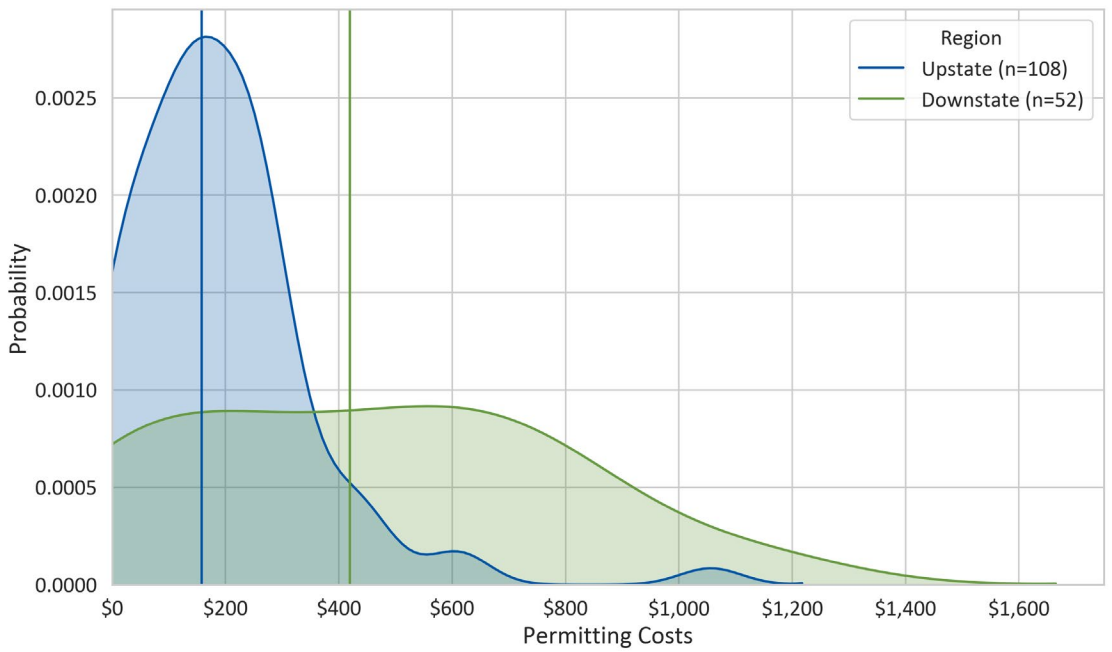
Soft Cost Category Averages and Spread by Sector

SOFT COST CATEGORY	**Residential** (n=129-145)	**Commercial** (n=33-42)	**Multifamily** (n=8-13)
Marketing and Customer Acquisition	**27%** (26%-28%)	**21%** (12%-38%)	**14%** -
Project Design	**5%** (4%-6%)	**7%** (6%-10%)	**9%** -
Installation	**51%** (50%-54%)	**53%** (24%-69%)	**48%** -
Transaction Costs (Trainings, Certifications, Permits)	**11%** (9%-12%)	**13%** (5%-25%)	**20%** -
Quality Assurance	**5%** (3%-5%)	**6%** (3%-9%)	**8%** -
Recruiting and Hiring	**1%** (0%-1%)	**0%** (0%-1%)	**1%** -

Sector Permitting Cost Estimates by Region

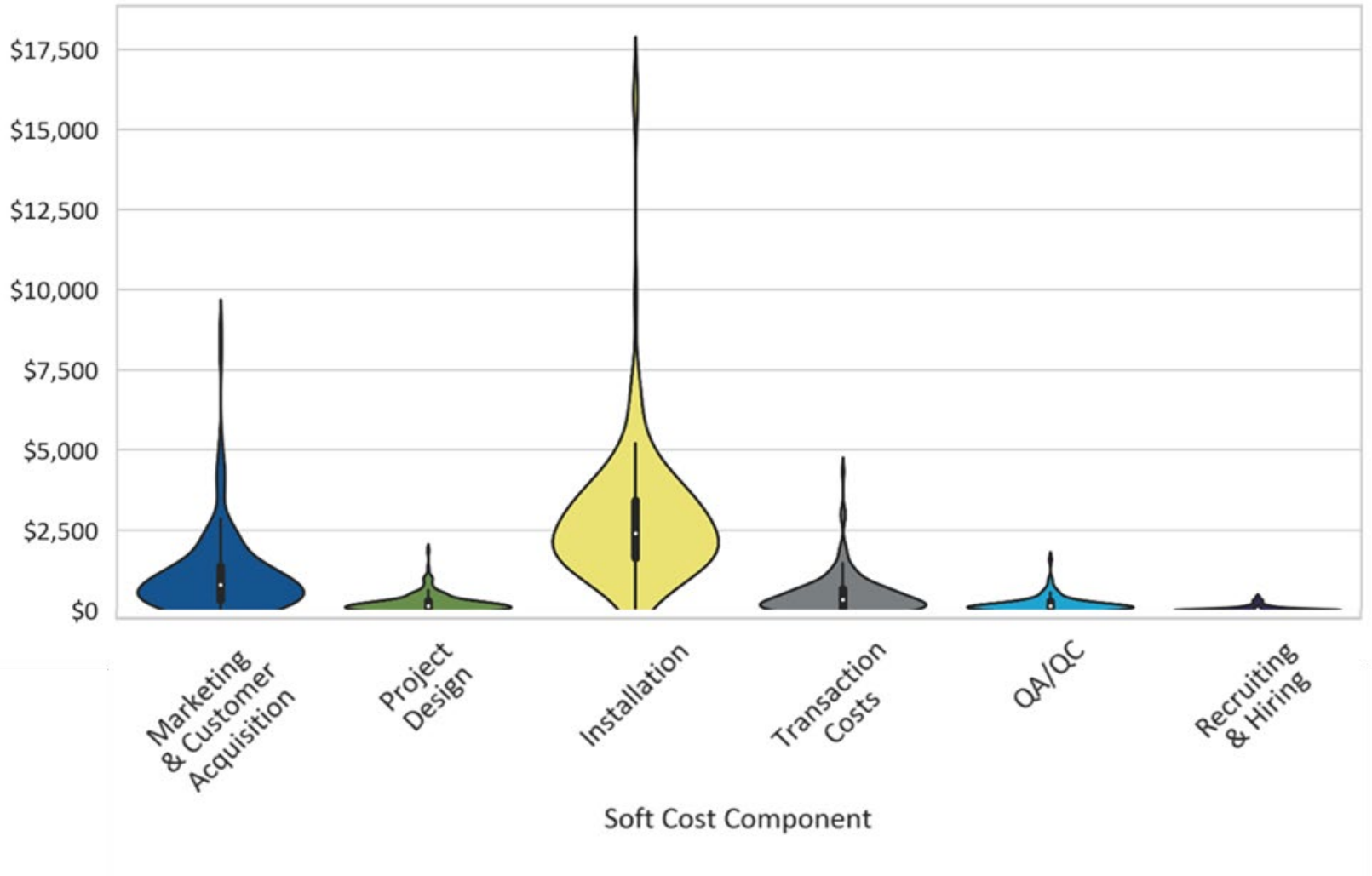
Conclusion: Permitting can be a large driver of variability in project costs, with substantial differences observed across sectors and geographic regions.

Residential



Commercial

Residential Sector Soft Costs Violin Plot



Why It Matters

Given the large distribution of marketing/customer acquisition and installation costs to total project soft costs, NYSERDA initiatives that **assist contractors with finding potential customers and standardizing project design and installations** (where possible) could lead to soft cost savings.

Study Update 2021

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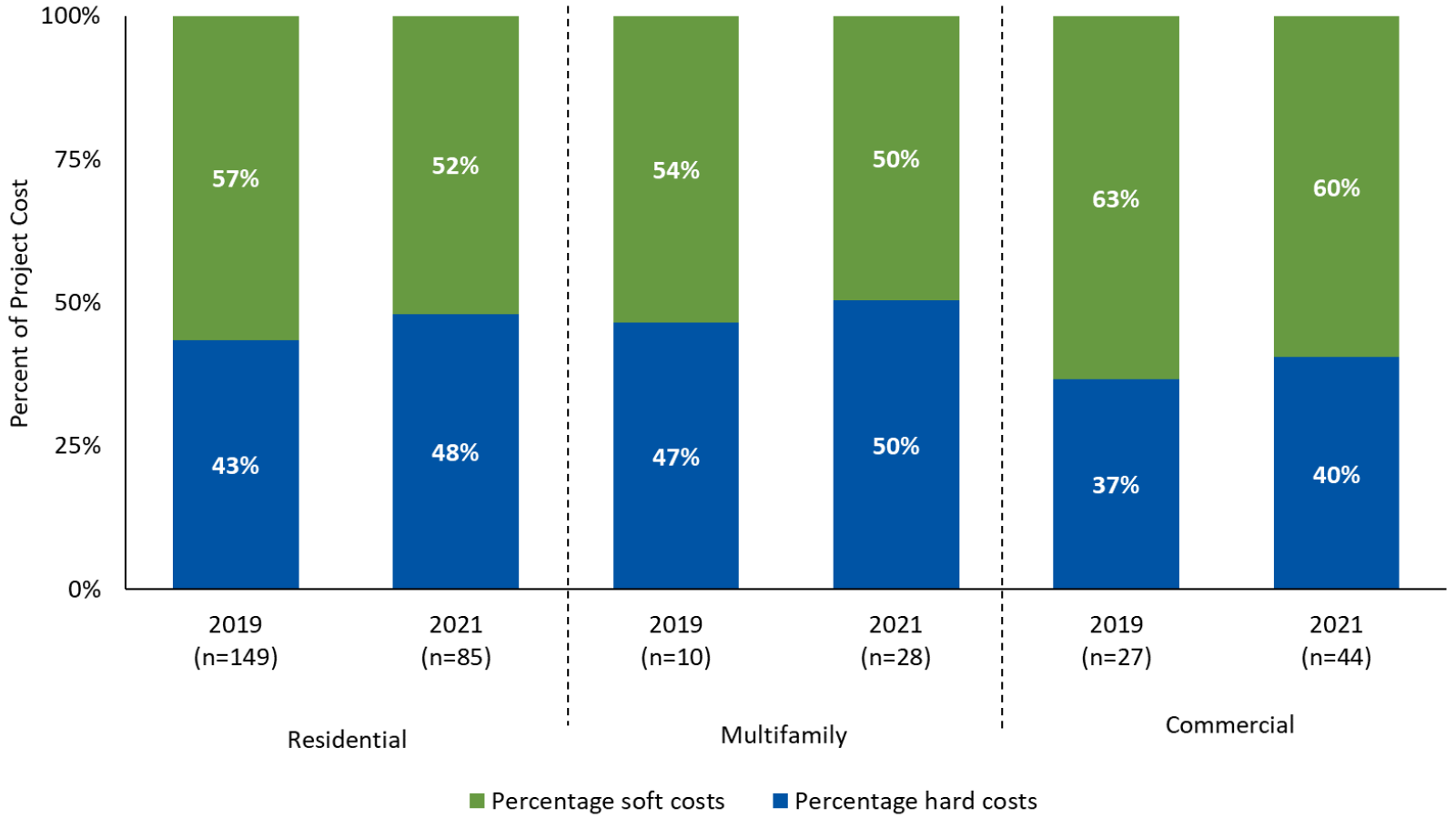
Key Findings 2021

Hard vs. Soft Cost Estimated Breakdown by Sector, 2019 vs. 2021



Market changes have led to contractor cost increases, translating into higher prototypical project cost estimates

Northeast Urban Consumer CPI[1]

Jul-Dec 2019 Average

270.5

+6.3%

Jul-Dec 2021 Average

287.6

Study Labor Rates[2]

Increases from 2019 study between **5.3% to 7.1%**

Producer Price Index, Construction Inputs[1]

Dec 2019

Res: 226.7

Non-Res: 115.8

Res: 24.7%

NR: 26.4%

Dec 2021

Res: 282.7

Non-Res: 146.4

Sources: [1] Bureau of Labor Statistics, 2022; [2] RSMeans, 2021

Soft Cost Category Averages and Spread by Sector, 2019 vs. 2021

	Residential		Commercial		Multifamily	
SOFT COST CATEGORY	**2019** (n=129-145)	**2021** (n=62-94)	**2019** (n=33-42)	**2021** (n=43-80)	**2019** (n=8-13)	**2021** (n=9-32)
Marketing and Customer Acquisition	**27%** (26%-28%)	**31%** (29%-31%)	**21%** (12%-38%)	**16%** (12%-30%)	**14%** -	**21%** (6%-28%)
Project Design	**5%** (4%-6%)	**5%** (3%-5%)	**7%** (6%-10%)	**8%** (5%-21%)	**9%** -	**10%** (6%-12%)
Installation	**51%** (50%-54%)	**46%** (43%-56%)	**53%** (24%-69%)	**63%** (34%-77%)	**48%** -	**50%** (35%-76%)
Transaction Costs (Trainings, Certifications, Permits)	**11%** (9%-12%)	**12%** (7%-14%)	**13%** (5%-25%)	**8%** (3%-11%)	**20%** -	**13%** (7%-16%)
Quality Assurance	**5%** (3%-5%)	**4%** (3%-5%)	**6%** (3%-9%)	**5%** (2%-8%)	**8%** -	**6%** (5%-7%)
Recruiting and Hiring	**1%** (0%-1%)	**3%** (2%-6%)	**0%** (0%-1%)	**1%** (0%-1%)	**1%** -	**2%** (0%-2%)

Recommendations

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Recommended Program Designs

Continue to develop resources and leverage existing relationships to assist contractors with customer acquisition.

- Research shows contractors have to make a significant investment of time and energy—typically around one-quarter of project total soft cost—in customer acquisition.

Provide technical engineering assistance and project development support.

- Substantially increased customer acquisition, design and installation costs arise from inclusion of newer technologies (e.g., VRF in commercial settings where installation cost made up nearly 70% of total soft costs).

Create standardized design and installation procedures and educate contractors on them.

- Nearly 60% of total soft costs across all sectors comes from project design and installation work, with these costs being relatively dispersed indicating possible process inefficiency.

Encourage development of a unified and streamlined permitting process.

- Permitting can be a driver of variation in project costs across sectors and geography, especially in New York with downstate and upstate differences.

Lessons Learned for Future Studies

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Lessons Learned

Focus on a limited and well-defined list of prototypical projects
Choose prototypical projects carefully
Ask questions in a way that service providers can most easily respond to
Accept that results will include data with a mix of statistical and practical significance
Additional enhancements include: • Strategic advisory role expanded • Sample generation sources increased • Fielding timeline lengthened • Addition of study ambassadors