Providing Vision and Leadership for the Future of the HVAC and Sheet Metal Industry

THE HVAC AND SHEET METAL INDUSTRY FUTURES STUDY (2012 UPDATE)

NEW HORIZONS FOUNDATION
A Chance to Grow
An HVAC and Sheet Metal Industry Initiative™

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2012

Prepared By:
FMI

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1 INTRODUCTION

The future never arrives as planned. A degree of uncertainty is always present. Such uncertainty compels efforts to attempt to forecast and predict the future. To that end, the New Horizons Foundation (NHF), an initiative of the heating, ventilating and air conditioning (HVAC) and sheet metal industry, contracted with FMI Corporation to update a prior 2008 study (also by FMI Corporation) to forecast the future of the HVAC and sheet metal industry (FMI Corporation, 2008). The objective of the 2008 study was "to research and analyze potential industry trends that may materially affect the HVAC business and its stakeholders over a five- to 10-year horizon." The objective of the current edition is unchanged from its predecessor. However, the previous report offered a proposed future based on a snapshot of industry trends and drivers that has since become obsolete. Beginning in December 2007, drastic and lasting changes have shaken the foundations of the U.S. economy, significantly and adversely affecting the construction industry. For many, these changes were sudden and unexpected and, as the effects have lingered, raise the question, "What is the new normal?"

The Great Recession's impact in many ways redefined the industry and offered a new perspective from which to look into the future. The benefit of the 2012 update is that it proposes a future with a current snapshot of present trends and drivers that the original study's research in 2007 did not account for. There are new questions to ask amid a pervading pessimism about the future, and the updated study offers answers to such questions.

The findings of this study are the collective voice of industry stakeholders. The report's developmental process included focus groups with HVAC and sheet metal contractors, a survey of more than 400 industry stakeholders and market research and analysis. Therefore, this report is not one voice speaking in isolation from a single perspective, but multiple voices, each offering a unique perspective on the present that aggregately serve to forecast more accurately the potential future of the HVAC and sheet metal industry.

The intent of this study is to identify the potential future state of the industry. The trends discussed within this report will enable the HVAC and sheet metal industry stakeholders to better position their organizations to contend with, and capitalize on, threats and opportunities; describe the future of the HVAC and sheet metal industry; and enable and equip organizations to adopt long-term plans to manage change.

To that end, the methodology used for this report is purposefully reproducible. Because any forecast of the future results from a static snapshot of present conditions, no forecast is infallible. Present market trends and drivers are dynamic, constantly changing and evolving. What was true of the market in 2007 is no longer true in 2012, and what is true of the market in 2012 will most likely not be true in 10 years. Further, trends and drivers on the national level may or may not be present and exerting force at a local level. Each geographic market is uniquely influenced by macro-level trends and drivers and possesses its own unique micro-level trends and drivers. The methodology used for this report is intended to be a tool to adopt and adapt for repeated application in local contexts. It is important that each reader considers the context of his or her own local market as it relates to the findings of this report.

To successfully compete in the HVAC market of the future will necessitate thoughtful consideration of the potential future of the industry. Industry stakeholders are encouraged

to evaluate, challenge and apply the findings of this report for business strategy and change management plan development, while being cognizant that the potential future scenarios outlined in this report are fluid. Further, the cyclicality of the market must be kept in mind. "Things are never as bad as they seem to the pessimist and never as good as they seem to the optimist," once said David Oreck (2009), and that still holds true today. Though the industry has been subject to an extended storm, there are signs that the worst has been weathered, and a break in the clouds is coming. The 10-year horizon holds a new set of challenges, but the organizations that learn to successfully identify and manage change will stand atop the industry as monuments of endurance and adaptability.

2 EXECUTIVE SUMMARY

As stated in the Introduction, no one can accurately predict the future. Does this then suggest that nothing can be known about the future or efforts to do so are done only in vain? No. Sober observations of such things as rising economies, changing consumer preferences, the introduction of new technologies, emerging industry practices and the like can serve the function of guideposts pointing in the direction of likely characteristics of the future.

The depth and length of the Great Recession will have lingering effects on the U.S. economy for many years to come. A return to levels equal to the peak construction spending years of the mid-2000s will not come as quickly as observed in past recoveries; but an eventual return is inevitable. However, focusing solely on forecast volume is misguided. The challenge for many stakeholders will be more so the evolution or redefinition of the HVAC and sheet metal industry into something perhaps unfamiliar to them currently. Those simply waiting for demand for their products and services to increase once more will find it difficult to succeed 10 years from now if they do not pre-position themselves now for the emergence of new markets and methods.

Several of the prominent themes that will most characterize the evolution of the HVAC and sheet metal industry over the next 10 years are continued from those identified by the previous study and are briefly discussed below:

- **The rising costs of energy will significantly impact the future of the industry.** For example, although the role of government as a direct buyer of construction services may diminish, its expected requirement for greater energy efficiency for public and private buildings will result in significant retrofit opportunities, increased change-outs of inefficient equipment and the greater emphasis on the maintenance and servicing of high-performance buildings.
- **There will be an increased emergence of a "solutions-first" approach to the buying of construction services, as building owners no longer feel bound by tradition.** As such, the use of design-build and integrated project delivery will continue to increase their share of the market. Expect to see the merging of design/engineering and construction services among many HVAC and sheet metal firms.
- **Anticipated breakthroughs in technology (e.g., Building Information Modeling (BIM)) will disrupt the HVAC and sheet metal industry by blurring the distinctions between trades and buildings systems, which will open the industry up to new competitors pursuing the rising energy management market.** Further, technological advances will result in the integration of mechanical, electrical and plumbing systems (and controls, in some cases) among the largest HVAC/sheet metal contractors.
- **Integration up and down the supply chain (e.g., engineer, general contractor, original equipment manufacturer (OEM)) will become more active.** At a minimum, the larger HVAC and sheet metal contractors will have to become familiar with related building systems (e.g., electrical) to compete successfully if full integration is not possible. Likewise, depending on the construction segments and customer types, projects owners with large economies of scale may buy equipment directly from the OEM, forcing some HVAC/sheet metal contractors into the role of a labor broker.

- **The prefabrication and modular building trend will intensify as a means to address the continued shortage of skilled labor in the workforce.** However, over time, it will become apparent that management and leaderships skills are of equal need and importance, if not greater. As fewer people are encouraged to pursue a career in the trades, HVAC and sheet metal industry stakeholders will be required to rethink where talent is procured and how it is developed. Moreover, the generational and ethnic shift that will occur in the U.S. population over the next 10 years will force employers to redefine work practices, management styles, benefits and so on.

- **Although demand for HVAC and sheet metal products and services is expected to rise over the next 10 years, it will do so unevenly.** Activity will further concentrate in urban versus rural markets. This is in part due to high energy prices and the desire to live and work in close proximity. In addition, population migration will continue to favor the Sunbelt states. Therefore, many HVAC and sheet metal industry stakeholders may find themselves in geographic markets more or less favorable. This trend continues to erode the current areas that constitute the sweet spot for union HVAC and sheet metal construction.

All HVAC and sheet metal industry stakeholders are encouraged to use this study as a starting point. Whether this starting point is the development of organizational strategies to preposition for the future or to assess local markets, construction segments and customers in greater detail, this study and the analytical frameworks it employs can serve as a guide. However, some things to consider at a minimum include thinking about how to adjust to a more diverse workforce, incorporating technology into the delivery of products and services, developing a formal management succession plan, utilizing just-in-time training (including focusing on management and leadership skills) and selling strategies.

3 REVIEW OF PRIOR STUDY

As previously stated, the purpose of the updated study is to revisit the questions posed in 2008 given the economic turmoil and uncertainty that has marked the country's recent past. An examination of the previous study's key findings/trends will prove beneficial in assessing the potential evolution of those trends, some of which the course of the Great Recession has altered and magnified. The 2008 study offered five key findings. The following is an assessment of the current relevance of these findings from a 2012 perspective; in other words, is what was believed to be true about the future in 2008 still likely to be true given all that has occurred over the past four years. A further detailed explanation of the drivers of and agents for any deviations from the findings of the 2008 study is included in the later sections of this report.

Key Finding #1: Residential and nonresidential building will become heavily focused on energy conservation, sustainability issues and green construction. All of these factors create opportunity for leading HVAC contractors and suppliers.

Despite the economic downturn and resulting restriction of capital investments, energy conservation continues to carry significant momentum into the future. This trend is driven by many forces that in aggregate form ensure energy-efficient and green/sustainable construction will define the future HVAC/sheet metal market. For example, government regulations and incentives for energy-efficient design and construction are increasing. Similarly, economic incentives are driving this trend into the future. Energy-efficient HVAC equipment has generated an economically propelled demand by introducing HVAC equipment that offers quantifiable returns on investment to the market and at an increasingly rapid rate.

Key Finding #2: The demand for retrofit and service work will grow at an unprecedented pace to meet the future building performance expectations and to serve an ever-growing supply of building inventory.

The pervading sense of pessimism concerning the future has caused an industry-wide reconsideration of the priority of capital investments. In tandem with the economic incentives offered by new energy-efficient HVAC equipment, this trend will continue into the future with noticeable force. Building owners unable or unwilling to invest in new construction will continue to favor renovation with smaller investment demands. Further, the economic payback offered by new HVAC equipment will cause many building owners willing and able to invest in new construction to opt for renovation and retrofit instead.

Key Finding #3: Building Information Modeling, Building Information Systems, Lean Manufacturing (Lean) and other productivity tools will be required to successfully compete in the HVAC market of 2018.

The adoption of Building Information Modeling and similar technologies will continue to be rapid and widespread in urban and non-residential markets. Non-urban and residential markets will see significantly slower

and narrower adoption given the lack of perceived benefit by contractors and owners in those geographies and markets. Contractors who can leverage and market the benefit of these technologies in these markets will gain a competitive position. However, in the urban and non-residential markets, productivity tools such as BIM and Lean will continue to be widely employed in the future market, especially in the pursuit of green/sustainable construction goals/targets. As such, these and other productivity tools coupled with the ability to leverage them for the owner's benefit will be necessary to compete in the future HVAC market.

Key Finding #4: The emerging trade of energy/environmental specialists is expected to be a highly desired discipline in the future, with a requirement for a highly skilled workforce to meet future demand.

Though energy/environmental specialists will continue to emerge as a highly desired discipline, Energy Service Companies (ESCO) will increase their presence in the market and pose a threat to the traditional HVAC/sheet metal contractor's market share in the future. Because these firms possess a broader knowledge of building systems and design capabilities, it is expected that HVAC/sheet metal contractors will, with increased frequency, fill the role of installation subcontractor to the ESCO in the energy management market. This emergence of new competition will necessitate many HVAC/sheet metal contractors to forge relationships with these specialists or they will otherwise threaten to drive traditional HVAC/sheet metal contractors out of the market.

Key Finding #5: Energy Conservation + Sustainability (Green) + Consumer Preference = HVAC Industry Opportunity

There is no doubt that the HVAC/sheet metal industry contractor in 10 years will be afforded significant opportunities by the convergence of energy conservation initiatives/goals, sustainable/green construction and market preference for such offerings. Energy conservation efforts and sustainable/green construction methods/materials will continue to permeate the market and increase in frequency, driven heavily by promised economic payback of energy-efficient equipment. The increase in these trends will be reciprocated by an increased consumer preference for energy-efficient HVAC equipment. However, the augmentation of these trends in the future also poses a substantial threat to the HVAC/sheet metal industry. The opportunity afforded HVAC/sheet metal contractors will open the door for new competitors to provide service offerings foreign to the traditional HVAC/sheet metal contractor to meet the growing market demand for energy-efficient services (i.e., mechanical engineers or original equipment manufacturers offering installation services).

The following chart (see Exhibit 1) illustrates the opinions of New Horizons Foundation and industry leaders regarding the major trends identified in 2008. As evidenced in the exhibit, there is a wide-reaching pessimism concerning the imminence of the rebounding of the residential market. On the contrary, there is a strong consensus that technology will pervade the industry landscape in 10 years.

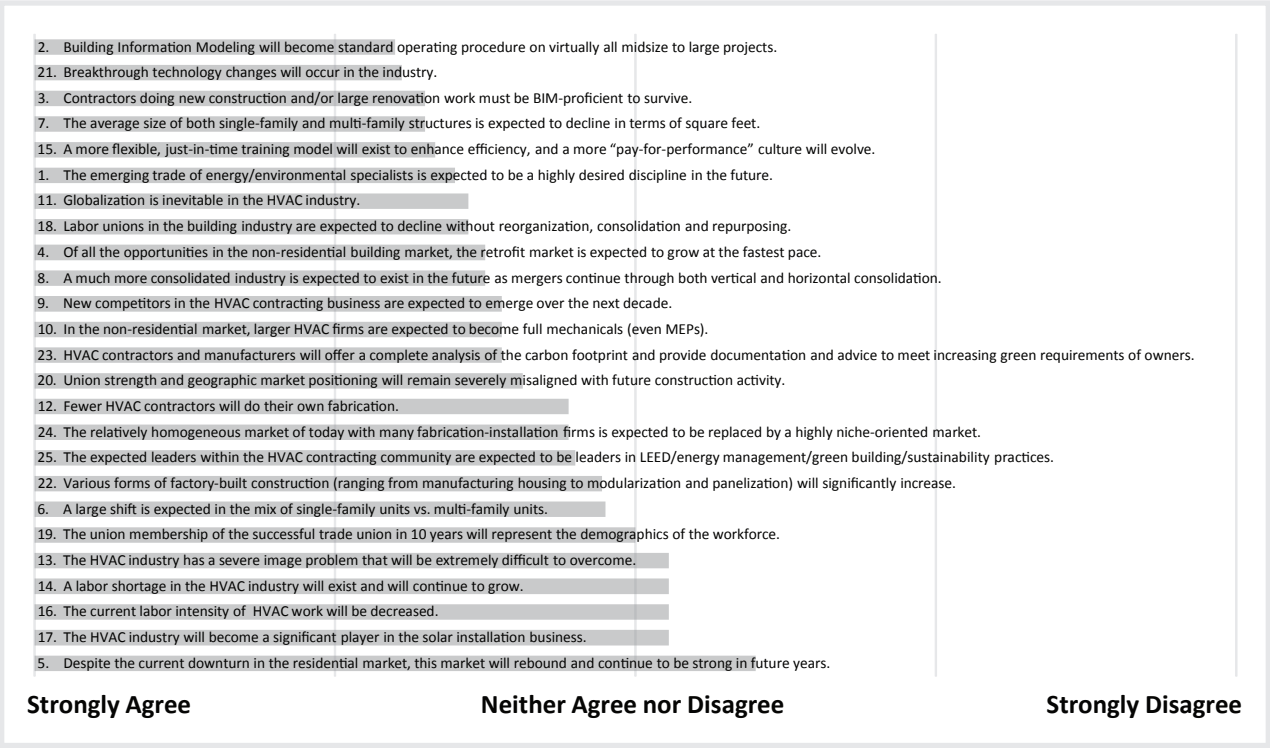


Exhibit 1: New Horizons Foundation and Industry Leaders' Agreement with Emerging Trends

***Source**: FMI survey of New Horizons Foundation and SMACNA Board Members and Executives*

Exhibit 1 key:

1. The emerging trade of energy/ environmental specialists is expected to be a highly desired discipline in the future.
2. Building Information Modeling will become standard operating procedure on virtually all midsize to large projects.
3. Contractors doing new construction and/ or large renovation work must be BIM-proficient to survive.
4. Of all the opportunities in the non-residential building market, the retrofit market is expected to grow at the fastest pace.
5. Despite the current downturn in the residential market, this market will rebound and continue to be strong in future years.
6. A large shift is expected in the mix of single-family units vs. multi-family units.
7. The average size of both single-family and multi-family structures is expected to decline in terms of square feet.
8. A much more consolidated industry is expected to exist in the future as mergers continue through both vertical and horizontal consolidation.
9. New competitors in the HVAC contracting business are expected to emerge over the next decade.
10. In the non-residential market, larger HVAC firms are expected to become full mechanicals (even MEPs).
11. Globalization is inevitable in the HVAC industry.

12. Fewer HVAC contractors will do their own fabrication.

13. The HVAC industry has a severe image problem that will be extremely difficult to overcome.

14. A labor shortage in the HVAC industry will exist and will continue to grow.

15. A more flexible, just-in-time training model will exist to enhance efficiency, and a more "pay-for-performance" culture will evolve.

16. The current labor intensity of HVAC work will be decreased.

17. The HVAC industry will become a significant player in the solar installation business.

18. Labor unions in the building industry are expected to decline without reorganization, consolidation and repurposing.

19. The union membership of the successful trade union in 10 years will represent the demographics of the workforce.

20. Union strength and geographic market positioning will remain severely misaligned with future construction activity.

21. Breakthrough technology changes will occur in the industry.

22. Various forms of factory-built construction (ranging from manufacturing housing to modularization and panelization) will significantly increase.

23. HVAC contractors and manufacturers will offer a complete analysis of the carbon footprint and provide documentation and advice to meet increasing green requirements of owners.

24. The relatively homogeneous market of today with many fabrication-installation firms is expected to be replaced by a highly niche-oriented market.

25. The expected leaders within the HVAC contracting community are expected to be leaders in LEED/energy management/ green building/sustainability practices.

4 IMPLICATIONS FOR INDUSTRY STAKEHOLDERS

In order to create a sketch of the potential future of the HVAC/sheet metal industry and consequent implications and recommendations for industry stakeholders, current macro- and micro-level trends believed significant enough to influence the shape of the industry 10 years into the future were researched and analyzed (this process is detailed later in the report). It is believed that the following five categories represent the major areas in which the HVAC/sheet metal industry would witness the most significant change on the 10-year horizon:

- Market Demand
- Customers
- Products and Services
- Industry Structure
- Competition

A thorough discussion of each of these five categories to which industry stakeholders would be wise to be attentive follows. These implications require careful consideration and thoughtful response by those firms desiring to compete in the future market. To aide in that endeavor, the section that follows presents six action steps considered most critical to future success.

4.1 Market Demand

1. Substantial differences in HVAC/sheet metal construction activity will be evident by geography/market (e.g., urban vs. rural, major metro vs. minor metro).

As the population becomes increasingly urban, so will the location and type of work. The volume of demand will be strongly correlated to population density. For example, the share of total construction spending occurring in metropolitan statistical areas for several states will increase by as much as three to five percentage points from the decade of the 1990s to the decade of the 2010s. This translates to several hundred million to more than a billion dollars of construction activity occurring in the metro areas that may have previously been located in rural markets. In addition, population migration will continue to favor the Sunbelt states.

2. Volatile energy prices significantly increase demand for HVAC/sheet metal construction solutions.

The cost of energy will escalate due to such things as peak oil, growing demand in emerging markets (e.g., Brazil, China, Indian) and new federal regulations (and limitations) on coal-fired power plants. Similarly, there will be increased pressure from government agencies like the Department of Energy towards the attainment of net-zero-energy and related initiatives. Rising energy prices and regulation will therefore raise demand for energy efficient buildings. Since buildings represent approximately 40% of energy consumption in the United States, HVAC/sheet metal contractors will play an important role in providing energy efficiency solutions, whether they be new equipment or improved operations and maintenance.

3. Equipment change-out rates will accelerate as increasingly energy-efficient technologies are introduced.

As energy-efficient equipment delivers greater returns on investment, demand will increase. As such, the decision to replace less efficient equipment may occur on a more regular basis. In addition, it is expected that renovations of existing buildings will increase in line with sustainable practices (e.g., recycling,

repurposing) and market demographics. With increased building renovation activity, equipment change-outs will increase as well.

4. **Demand for high-performance/ sustainable buildings will create a surge in retrofit business opportunities.**

It is expected that the increase in government-directed procurement of energy retrofit will more than offset the decline in new public building construction. As noted above, this trend follows the expectation that consumers, business and governments will seek to renovate and repurpose existing buildings rather than build new when possible. Building renovation and retrofit construction can often be more challenging than new construction, driving an increased demand for skilled technicians. Further, the development of high-performance buildings will create a demand for technology savvy people to run, operate and maintain sophisticated building systems.

5. **Service and repair work will expand to include metering and verification (M&V) as a means of confirming and managing efficiency of equipment operation and energy savings.**

This will be driven by the market's adoption and pursuit of greater energy efficiency targets. Such requirements will be levied by investors as a means of protecting their assets and measuring the achievement of monetary savings. This is related to the expected use of performance contracting for much of the equipment change-outs. HVAC/sheet metal contractors will therefore find this to be an important part of their service offerings, along with Testing, Adjusting and Balancing (TAB), commissioning and Indoor Air Quality (IAQ) services.

4.2 Customers

1. **Public-private partnerships (i.e., PPP, P3) will become a major source of public building construction, replacing traditional government customers.**

HVAC/sheet metal contractors that have traditionally done a lot of work for public owners (i.e., federal, state and local governments) may find fewer project opportunities emanating from these individuals. Many government entities will turn to public-private partnerships to acquire and improve their facility needs. The team orientation of public-private partnerships will redefine the bidding and contracting methods these HVAC/sheet metal contractors have been accustomed to. In addition, should the construction managers and/or general contractors (CMs/GCs) that are part of these public-private partnerships have preferred trade contractors, some firms may find themselves on the outside of these future opportunities. An alternative view is that public-private partnerships increase the amount of work and bring many foreign contractors that are familiar with the process in the home countries, but lack the trade contractor connections in the United States. Therefore, opportunities could expand just as easily.

2. **A shifting customer base will create HVAC/sheet metal construction buyers that do not exist today (e.g., insurance companies acquiring hospital/health care systems).**

The expectation is that HVAC/sheet metal contractors must now begin the process of pre-positioning themselves with the remaining and new buyers of their services in the markets and segments of concentrated demand.

This is driven in part by the merger and acquisition trends that have been witnessed over the past several years as foreign firms gain greater presence in the United States. However, it also applies to the project owner as well. Consider the recent health care reform legislation. Some have argued that the ultimate goal of this legislation is to eliminate private health insurance. Therefore, it may be possible that these insurers (e.g., Aflac, Blue Cross/Blue Shield) redefine their businesses by acquiring health care/hospital systems and becoming direct patient services providers.

3. Sophisticated buyers will seek HVAC/sheet metal construction service providers that can provide solutions first.

Project owners will show preference for HVAC/sheet metal contractors that can provide solutions for their building needs, particularly as it relates to energy efficiency. Product quality, speed of installation, etc., will be difficult for HVAC/sheet metal contractors to differentiate on due to the introduction of new technologies that level the playing field. It is further believed that this implication will favor the larger HVAC/sheet metal contractors that can draw on more resources to offer effective solutions. Therefore, HVAC/sheet metal contractors will have to become more sophisticated sellers of their services, including adopting more aggressive business development efforts.

4. Buyers with economies of scale will purchase equipment directly, forcing many HVAC contractors into a labor broker role.

Some large buyers of construction will seek project savings by purchasing HVAC equipment directly, by leveraging the volume of their consumption with equipment manufacturers (thereby eliminating markup). HVAC/sheet metal contractors that work with these types of owners (e.g., national retailers, hospital systems, financial institutions) may be relegated to a provider of installation labor only. The results will include the OEM holding the HVAC contract and subcontracting the labor, the reduction of project revenue/profit and the increasing challenge to small, local contractors to compete.

4.3 Products and Services

1. A significantly growing proportion of HVAC/sheet metal construction will be delivered via prefabricated assemblies/modular buildings.

This implication is driven by both the demand for a higher quality product and the response to less skilled labor in the future. Technology and prefabrication/modularization will lower the labor intensity currently required by the average HVAC/sheet metal contractor, as more can be produced in a manufacturing environment with greater quality control. Successful HVAC/sheet metal contractors will therefore bring these specialties in house or be required to have partnerships with those who provide these products and services. In addition, the modularization trend suggests that HVAC/sheet metal contractors must broaden their familiarity and expertise to other trades/building systems (e.g., electrical, plumbing) in order to deliver a complete package.

2. BIM and field technology will gain increasing momentum and become a requirement to compete for many HVAC/sheet metal contractors.

Use of these technologies will vary by geography and building type. For example, it may be less intensive in the single-family residential segment and more so in the

industrial segment. However, BIM and similar construction planning and management technologies will be commonplace for many. The expectation of owners, architect/engineers and CMs/GCs is that all project team members are on the same platform, particularly as it relates to coordination and communication. HVAC/sheet metal contractors that are able to adopt and incorporate these technologies into their businesses will be preferred project partners.

3. **HVAC/sheet metal contractors will perform the functions currently under the responsibility of the mechanical engineer and vice versa (i.e., the convergence of design and construction).**

As contractors (general or trade) race to better position themselves with project owners and decision makers, participation in the design phase has become an increasingly critical point. Over the next 10 years, it is expected that this trend will continue and the merging of mechanical engineering and mechanical construction companies into a single entity will become more common. Not only is this reflective of competitive positioning, but it also reflects the anticipated growth in design-build and integrated project delivery. The HVAC/sheet metal contractors without in-house design/engineering capabilities may find it difficult to find mechanical contractors with engineering capabilities willing to subcontract their design services to a competitor.

4. **The ongoing shift toward a higher percentage of retrofit work will reduce the duct fabrication and duct installation intensity of the total HVAC market.**

In addition, it is expected that greater fabrication shop efficiencies will lower the shop labor intensity. This shift will be offset by a greater use of prefabricated and modular construction, which increases the amount of work done in fabrication shops. The overall expected effect is an increase in the fabrication shop labor and decrease in field installation labor.

5. **Commoditization (or perceptions of commoditization) of HVAC/sheet metal construction services will become more prevalent, driven by technologies that eliminate advantages offered by size and/or specialization.**

This implication is true in the absence of selling solutions. Sophisticated technologies such as prefabrication, modularization and BIM offer a level competitive playing field by reducing manpower and technical skill requirements to complete traditional tasks. Barriers to entry will be reduced in many ways, affording buyers more options as it relates to product and service providers. For HVAC/sheet metal contractors unable or unwilling to change, they will find themselves competing on price alone.

4.4 Industry Structure

1. **Many of the current HVAC/sheet metal contractors will fail to make successful generational transitions (due to no ownership transfer/management succession plan).**

The current number of HVAC/sheet metal contractors will be significantly less in 10 years. This will be driven in large part by the failure of many to plan for and manage ownership succession. Those that can and do will likely acquire those that can't and don't.

2. **Merger and acquisition activity will increase among HVAC/sheet metal contractors and periphery stakeholders seeking to establish increased presence (e.g., mechanical engineers, OEMs, other trades) in the building efficiency market.**

As demand for energy efficiency drives demand for future HVAC services and spending on related services becomes significantly larger, new providers will attempt to enter the market and establish control. This is similar to what was already discussed about the merging of design and construction and consolidation among the remaining HVAC/sheet metal contractors. However, this will also be evidenced by the number of OEMs seeking to expand their services in order to sell more equipment and other trades expanding their capabilities (e.g., integrated MEP model). HVAC/sheet metal contractors in 10 years will be forced to consider their role as either an acquirer or an acquired.

3. **The middle-market HVAC/sheet metal contractor will be challenged to exist in current form.**

Merger and acquisition activity will result in the large HVAC/sheet metal contractors becoming larger. Those unable to become larger will find themselves better positioned to compete in specialized/niche markets. This trend particularly impacts the family owned HVAC/sheet metal contractors that may lack the financial resources to move up in scale. Therefore, reduction in volume and staff will follow should they decide to remain independent.

4. **The HVAC/sheet metal contractor will be forced to become proficient in other related trades in order to offer solutions (e.g., electrical, plumbing, fire/life/safety).**

As mechanical, electrical and plumbing systems continue to merge, whether as a result of prefabrication/modularization, integrated project delivery or similar, HVAC/sheet metal contractors will find it increasingly difficult to compete with a singular focus. Moreover, in order to provide the building systems solutions that buyers will seek, knowledge of (or least familiarity with) tangential building systems will be required. This is due in part to the convergence of various systems occurring with new technologies and controls (e.g., building automation).

5. **Union membership declines will likely continue absent a significant change in their business model.**

The perception that union HVAC/sheet metal construction is superior to non-union is being increasingly challenged and diminished by technologies and processes that level the playing field. Despite significant improvements in many areas of the labor-management relationship, serious barriers still must be overcome to reverse the share loss trends. Pension liability issues, work rules, legacy training practices and variable wage packages are a few areas of focus to improve the union construction value proposition.

6. **Full integration of the design, installation, monitoring and service of the equipment will be the preferred model, for the larger, more sophisticated public and private owners.**

A larger share of construction will be delivered in an integrated manner (meaning HVAC contractors will have to function as a team member). HVAC/sheet metal contractors will therefore have to be able to adapt to a variety of roles and responsibilities from project to project and customer to customer.

4.5 Competition

1. **The HVAC/sheet metal contractor will often fill the role of installation subcontractor to the ESCO in the energy management market.**

Energy service companies (ESCOs) are becoming positioned to provide the majority of energy efficiency/management solutions

over the next 10 years. This is a result of these firms having the knowledge of total building energy consumption and design expertise (e.g., holistic approach). Therefore, HVAC/sheet metal contractors pursuing these opportunities will find themselves often subcontracting their services to an ESCO. Identifying the leading ESCOs and developing partnerships/ relationships will prove a competitive advantage.

2. HVAC/sheet metal contractors will compete against the OEM for installation and service work.

Manufacturers will perform more installations of equipment and controls in 10 years. In addition, they are more likely to provide service work in order to remain close to their customers and ensure that equipment change-outs utilize their products. HVAC/sheet metal contractors will be challenged to compete and articulate the benefits of selecting them to perform these services vs. the OEM.

5 FUTURE SUCCESS CONSIDERATIONS

The implications for the HVAC and sheet metal industry discussed in the previous section raise certain considerations for stakeholders as they prepare to position themselves for the next 10 years. Different HVAC and sheet metal industry stakeholders will find some of these considerations more critical to their success than others, and some may draw additional conclusions based on the findings and analyses presented in this report. As such, the most important takeaway is to use this report and the analytical frameworks presented to assess your own markets, customers and organization, and incorporate them into your strategic business planning.

1. Understand your customers and sell solutions instead of products and services.

In many cases, solutions will be provider-led. This is especially true in the energy efficiency/management market. HVAC and sheet metal industry stakeholders must be able to identify who their likely customers will be and the unique needs that they will possess. As previously stated in this report, customers will seek solutions first and therefore be open to a larger number of potential providers. Traditional roles and responsibilities will be challenged. As a result, many HVAC and sheet metal industry stakeholders will find it necessary to broaden their knowledge of building systems, construction methods and technologies in order to deliver the solutions their customers demand.

2. Acquire in-house energy management design capabilities.

HVAC/sheet metal firms need to possess energy management design competencies to serve the ever-increasing inventory of high-performance buildings. Organizations with these design skills will control the determination of systems selected and installed in new construction and retrofit work. Absent these skills, HVAC firms will move to a lower-tier, commodity-oriented position.

3. Anticipate and adopt new processes and technologies to achieve competitive advantage.

First-mover advantage will be critical in the future market. This covers such issues as the convergence of design and construction, trades/building systems and the introduction of software and equipment that achieve improved building results and performance. In addition, partnering with other organizations that complement and enhance your product and service offerings will prove a successful strategy for increasing awareness of potentially new developments.

4. Utilize just-in-time training techniques to quickly prepare new field staff to capture emerging opportunities.

The rate of change and future market demand in the HVAC/sheet metal industry will require the development of individuals to accelerate. This may be witnessed in the use of e-learning, module training and on-the-job training that is delivered in a concentrated fashion to address a specific training need. Some will be threatened by these practices, particularly those that followed a more traditional route. Therefore, HVAC/sheet metal contractors will be faced with the added challenge of managing the interactions between the old school and new school.

5. Develop a formal management succession plan.

Firms will need to focus organizational training on management and leadership skills as much as technical skills to address the deficit of

these skills in the HVAC/sheet metal industry. This is influenced in part by fewer qualified individuals able to make the transition from field to management. Without these skills sets, many HVAC/sheet metal contractors will find themselves unable to sell solutions to their customers and effectively compete. In addition, it will become more common to find individuals that did not "grow up" in the construction industry moving into these positions.

6. Address the looming skilled labor shortage by creating a more diverse workforce and utilizing technologies that alleviate certain deficiencies.

The market will not produce the required number of skilled individuals to meet anticipated market demand, either in volume or type. HVAC/sheet metal industry stakeholders will be required to adopt technologies that will make up for the shortage of skilled labor, including prefabrication and modular building. In addition, non-traditional labor sources will need to be tapped, including individuals from other industries.

In addition, HVAC and sheet metal industry stakeholders must become more diverse. This requires rethinking the idea of a "one size fits all." Sensitivity to cultural differences will potentially redefine thoughts regarding benefits, work processes, communication, etc. Those that can master these skills will find themselves in a much better market position with a more productive workforce.

6 DEFINING THEMES FOR THE 10-YEAR HORIZON

The implications and considerations presented in the preceding sections were developed by examining the cumulative impact of macro- and micro-level trends on the future of the industry. For example, to determine the potential future of the HVAC/sheet metal industry, the trends that are in each of the categorical silos (e.g., political, economic) need to be analyzed in aggregate. The future of the industry will be shaped not by political or economic trends in isolation; rather, the interplay and intersecting of political trends with economic, social and technological trends will craft themes that will define the 10-year horizon on a macro-level. Likewise, the mingling and convergence of procurement, approach, labor and material (and equipment) trends will construct certain themes that will pervade the 10-year horizon on a micro level. These macro- and micro- level themes define the future of the industry and influence the development of the implications for the HVAC/sheet metal industry.

6.1 Macro-Level Themes

Three primary themes were identified from the trends observed in the political, economic, social and technological categories. These three are identified and defined as follows.

1. A Struggle for Stability

It is not believed that within 10 years' time that anticipating business developments, trends and forecasting demand opportunities will become easier. Rather, a struggle for stability will permeate the marketplace. Disruptions will come quicker and be more pronounced due to several factors, including the transition of the generations and the acceleration of technological evolution. For the older generations who viewed technology (particularly communication and social media technologies) as a tool or entertainment introduced later in adulthood, it will be difficult to comprehend and respond to the pace of change compared to the younger generations that grew up with this technology and perceive no world in which it is not ever-present and self-defining. The identified trends suggest that the marketplace for HVAC and sheet metal contractors will be considerably different 10 years from now and perhaps alien to younger generations.

- Those things taken for granted or considered constant will change or be challenged (e.g., the "new normal").
- The rate of change will accelerate.
- Traditional business strategies and tactics will have to be adjusted on a more frequent basis, which requires greater awareness of and response to emerging trends.

2. Changing Expectations

The major generational transition, which is defined as the transition from Baby Boomer to Millennial, marks a noticeable shift in cultural identification and personal values. Views on such things as marriage, home ownership, career choice and work environments will be challenged and likely be counter to traditional norms. The "American dream" of owning a house in the suburbs may be the "American memory" 10 years from now. Preferences for urban and urban-esque lifestyles may raise demand for multi-family buildings, perhaps to historic highs that may rival the single-family market. In addition, to the generational transition, the demographic makeup of the population is becoming more heterogeneous. For an industry such as construction that is male-dominated and employs minorities in percentages less than representative of the general population, there will be a steep

learning curve related to expectations.

- The generational transition will usher in completely new approaches, thoughts, values, etc.
- Not only will there be completely new approaches, thoughts, values, etc., there will be a greater diversity of them.
- The idea of a contractor (e.g., who he/she is, what he/she does) will change, and contractors will be challenged to manage such broad expectations (i.e., the case for either a very large generalist or small niche specialist).

3. New and Fewer Buyers

As wealth becomes more concentrated among the few over the next 10 years and access to capital within the private sector remains limited for most, capital investments in construction and construction-related activities will be approached more deliberately and with greater scrutiny. The further and increasingly distinctive separation of the "haves" and "have nots" will redefine the opportunities available to HVAC and sheet metal contractors in the future. Therefore the expectation is that firms must now begin the process of pre-positioning themselves with the remaining and new buyers of their services in the markets and segments of concentrated demand. For those HVAC and sheet metal contractors that find themselves in markets and/or segments of limited demand or unable (or unwilling) to pursue new markets and/or segments, the alternative is that many will likely be forced to scale back their businesses or become relegated to a second or third tier position.

- The government may buy less, but its influence via regulation may increase demand (e.g., attaining minimum energy efficiency standards for public buildings).
- The bifurcation of the market into ever larger and smaller companies (i.e., customers) is similar to what is happening throughout the construction industry.
- Similar to the above, there will be winners and losers in terms of markets, whether geographic or segment-oriented (i.e., concentration/polarization will become more evident).

6.2 Micro-Level Themes

As with the macro-level analysis, three primary themes were identified from the trends observed in the procurement, approach, labor and materials/equipment categories. These three are identified and defined as follows.

1. Redefining Roles and Responsibilities

The manner in which construction services are bought and delivered in the future will become increasingly blurred for those actively engaged in the industry today. Separations of roles and responsibilities between architect and contractor and trades will be challenged and difficult to define. This change will be driven in large part by buyers seeking solutions first and facilitated by the advent of new technologies. The influence of new technologies will be inextricable from the delivery of construction services. Integrated project delivery, building information modeling and the use of modular/prefabricated assemblies and components will be commonplace 10 years from now. Not only will these developments address the buyer's desire to "build it better," but the adoption of modular/prefabricated assemblies and components as normal construction practice will alleviate some of the stress caused by a lack of individuals with necessary technical skills.

- Interaction between project team members increases.
- The lines between project team members will be blurred (as technology removes some barriers).
- Successful HVAC/sheet metal contractors will be required to expand their roles and responsibilities.

2. Non-traditional Competition

As the construction industry is no longer bound by tradition, HVAC and sheet metal contractors may likely find competition from non-traditional sources, whether it is the engineer expanding into construction, or energy services companies and the general contractor deciding to self-perform these activities or other trades "expanding territories of responsibility." Therefore it will be incumbent upon the successful HVAC and sheet metal contractor to not only be fully versed in its products and services, but also the relationship and interaction with other systems. Competition for control will be fierce.

- Buyers will rethink who they buy from.
- Competing trades may now be able to challenge the products and services traditionally provided by HVAC/sheet metal contractors.
- Upstream and downstream integration will occur, especially as various construction industry stakeholders attempt to establish presence in the energy management market.

3. Measureable Results

A solutions procurement approach will bring with it a greater awareness of value. Buying simply on the lowest cost will diminish. With proposed solutions will come greater expectations for demonstrable results. Although "green" or sustainable construction will no longer be considered novel 10 years from now, its influence will be felt in the increased requirement to confirm such things as product origin and "green"/sustainable construction definition compliance. Similarly, demand for energy-efficient mechanical systems will require the HVAC and sheet metal contractors to be able to verify performance and savings. This trend will likely open an entirely new business to many of these contractors, into monitoring and verification alongside operations and maintenance functions, and create opportunities to expand their presence in the emerging energy management industry.

- Customers buy solutions.
- Customers will prefer contractors that can provide solutions.
- Contractors must be able to substantiate the claims of their solutions.

7 EMERGING TRENDS DISCUSSION

As presented in the Methodology section, the macro- and micro-level analytical frameworks employed for this study are means to simplify the identification and categorization of macro- and micro-level trends that are believed to have significant influence on the future business environment. Multiple approaches and frameworks could have been employed, but for the sake of simplicity and repeatability, these two were selected for this particular study. Whereas the macro-level analytical framework is generic in nature and has widely been adopted across industries, the micro-level analytical framework was developed for this study and is specific to the construction industry. What follows is a brief description of the frameworks employed and a detailed categorical discussion of the macro- and micro-level trends that undergird the findings and recommendations of this report.

7.1 Macro-Level Analysis

The macro-level analysis describes a four-pronged approach to and categorization of macro-environmental factors. This analytical approach is commonly used in the environmental scanning component of strategic management. The categories included in the macro-level analysis and example factors for each category are included below.

Political factors include government type, government stability, freedom of press, rule of law, bureaucracy, corruption, regulation/ de-regulation trends, social/employment legislation and likely political change.

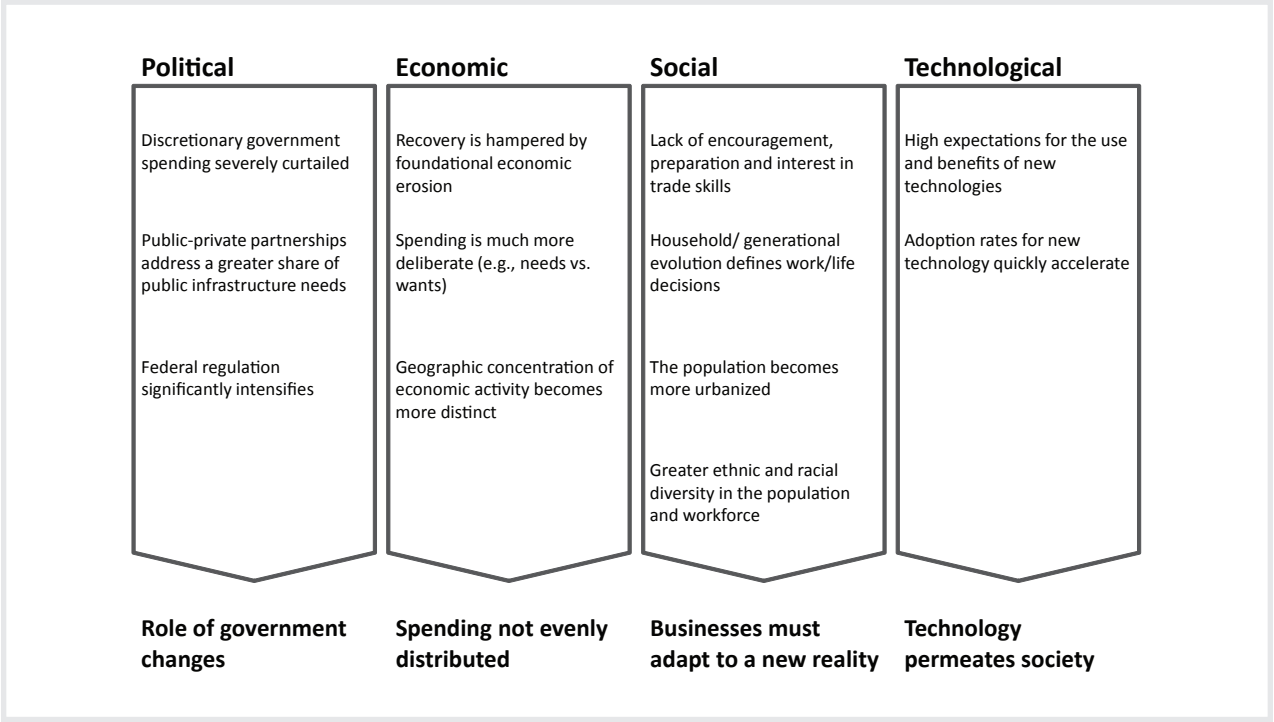


Exhibit 2: Macro-Level Analytical Framework

***Source**: FMI analysis of multiple data and information*

Economic factors include business cycle stage; growth, inflation, and interest rates; unemployment; labor supply; labor costs; disposable income/distribution; globalization and likely economic change.

Social factors include population growth/age profile, health, education, social mobility, employment patterns, attitudes to work, press, public opinion, attitudes and taboos, life cycle choices and likely socio-cultural change.

Technological factors include impact of emerging technologies, impact of internet and reduced communication costs, R&D activity, impact of technology transfer and likely technological change.

Political Trends

Theme	Role of government changes
Primary observations	■ Discretionary government spending severely curtailed ■ Public-private partnerships address a greater share of public infrastructure needs ■ Federal regulation significantly intensifies

The role of government is expected to change. It will become less of a financier and more of a regulator. Spending for government construction at all levels, especially infrastructure construction, is expected to decline, possibly sharply, as budget battles and changes in power continue to rage in Washington and eventually spill over to every state and local government in the nation. Although federal spending for construction represents only a small percentage of total annual construction put in place, the government sets the tone for private spending and development as well. Government spending also helps generate needed infrastructure funding for the betterment of national transportation by providing better ports, airports and highways to keep people and goods flowing throughout the economy. While government debt/deficits will remain a significant threat, public-private partnerships (P3) have the potential to offer increased financing options. However, at this point, talk surrounding this topic far outweighs actual active projects, but the market is ripe for this mechanism to really take off, similarly to what has occurred in Europe and Canada. Finally, government spending may be down, but federal regulation will intensify and become a significant component of the ability to conduct business. This will impact not only the manner in which HVAC and sheet metal industry stakeholders' products and services are delivered but the manner in which their organizations are managed and run on a day-to-day basis. For example, these may include rules governing disadvantaged and minority participation rates, recycled content requirements, restrictions on hiring practices and the effect of new health care legislation on employers.

America's national debt has skyrocketed to $14.6 trillion over the last four years, a 62% increase from the $9.0 trillion it owed at the end of 2007. With an additional $1.2 trillion of debt at the state level and an estimated $1.8 trillion at the local municipality level, total government debt is fast approaching $18 trillion. The nation is faced with a bulging national deficit and falling federal budgets. As a result, the U.S. construction market now faces

not only depressed private investment but also proposed cuts from the federal government. This is alarming, especially for contractors focused on government work or many other companies recently looking to federal spending for new project opportunities because private sector projects have been sparse. Several large government agencies, including the Department of Defense, Department of Veterans Affairs and the General Services Administration are bracing for significant decreases in their construction programs. In total, there is a proposed 12% reduction in federal construction spending for fiscal year 2012. This trend will most likely continue in the near future given the market dynamics.

Much like federal construction, state and local construction spending has declined more than $25 billion in 2011. While some of this decline is due to decreased federal distributions to state programs, reduced spending also ties to the way state budgets operate, how state and local construction is funded and why a stable economy is needed to maintain a working balance between the public and private markets. Twenty-nine states have projected or have addressed shortfalls for next year (see Exhibit 3). The total state budget shortfall in fiscal year 2012 is $106 billion (see Exhibit 3). The sharp falloff in state and local government spending leaves contractors scratching their heads and asking themselves where the public projects that have kept them afloat for the past three years have gone.

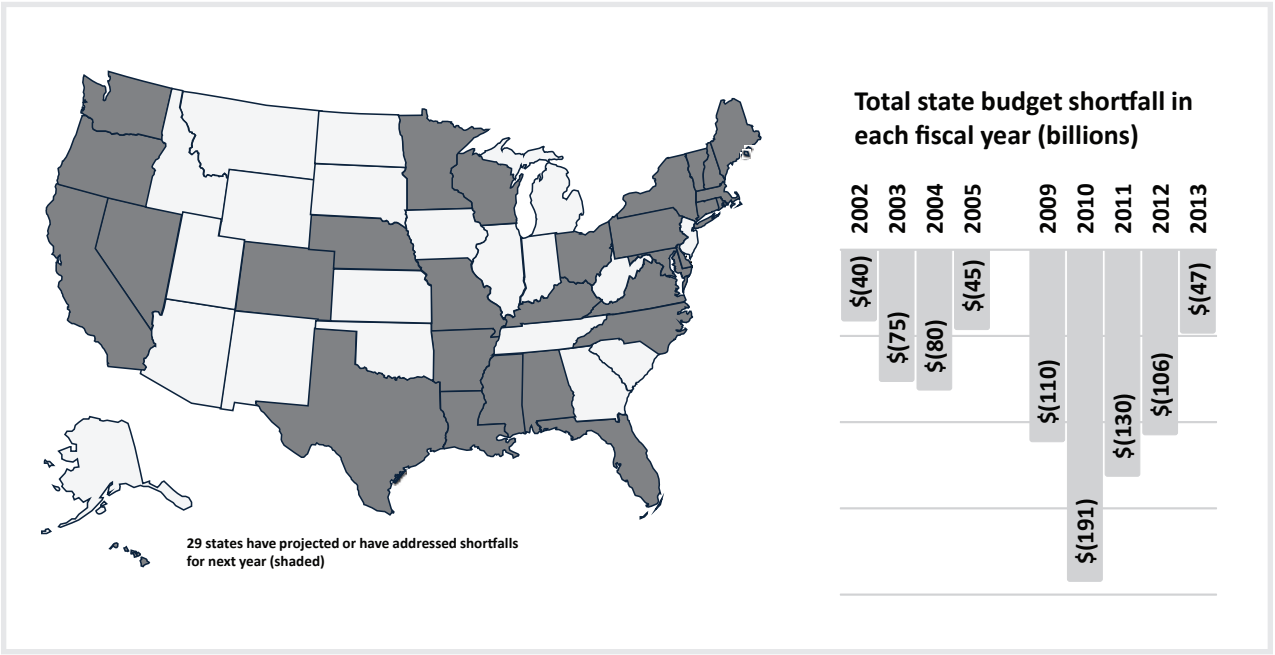


Exhibit 3: Recent and Forecast State Budget Shortfalls

***Source**: Center of Budget and Policy Priorities*

Public-private partnerships (P3) will become more prevalent as municipal and state agencies become more familiar with this funding mechanism (see Appendix 3 for P3 definition). The move to a greater use of P3 project funding methods will be slow, but the concept and its many permutations are beginning to gain traction in the U.S., as witnessed by a large number of projects approved or in process around the country. It is common for many people to associate P3 with civil infrastructure projects only. While this has definitely defined the majority of P3 in recent years, in the future, P3 will not be confined to civil infrastructure projects. Public building construction is increasingly making use of P3 as well. The term most often used is "social infrastructure." Growth in the use of P3 for building construction will begin to exceed that of non-building construction segments over the next 10 years. This financing approach has been used for the construction of such things as courthouses, student dormitories, and other government administration and public higher education facilities. Several states have been identified by FMI as more favorable toward the use of P3 (see Exhibit 4). Assuming that the current and planned projects go well, the next logical step will be to take this model and apply it to other markets in need of financing.

To rank the individual state's regulatory environment, each state's P3 laws were analyzed and assigned values based on their alignment with FMI's business and clientele. States were each assigned a weight based on fiscal health as a measured by a study by the Pew Center on the States (less fiscal health was interpreted as a greater need to engage in P3, hence assigned a greater weight). These weights were then applied to the raw legislation totals to arrive at the final number, which describes the likelihood of a P3 match.

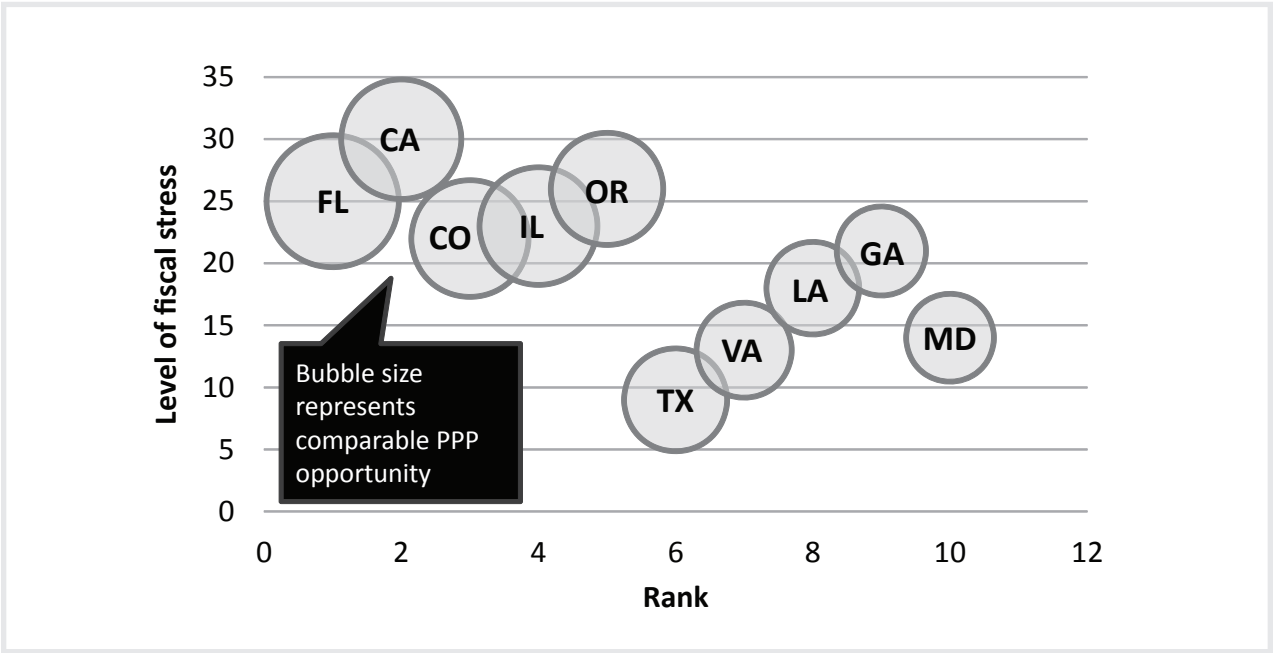


Exhibit 4: 10 Most Favorable States for P3

***Source**: FMI*

Over the next 10 years, it is expected that federal regulation will continue to intensify. The federal government published the first issue of the Federal Register in 1936 to report new regulations. The Federal Register (the daily newspaper of the federal government) is a legal newspaper published every business day by the National Archives and Records Administration (NARA). It contains federal agency regulations, proposed rules and public notices, executive orders, etc. The first Federal Register was 2,355 pages in length and reported about five regulations per year. Since then it has grown to 75,000 pages in 2011, adding more than 7,000 regulations per year (see Exhibit 5). Any successful contractor active in the business is aware of this increase and will continue to monitor these ever-changing actions.

For those companies and employees who depend on government funding for most, if not all of their livelihood, this is not an easy time. The challenges are great and the solutions will need to be equally great. The role of the government will evolve to become more heavily involved on the regulation side and potentially less involved on the financing end. The big question remaining is how long will it take for public-private partnerships to gain enough traction and momentum to fill the void for project financing. The projected market conditions point to public-private partnerships making significant strides over the next 10 years. As a result, we foresee a greater use of private financing and a changing role for government.

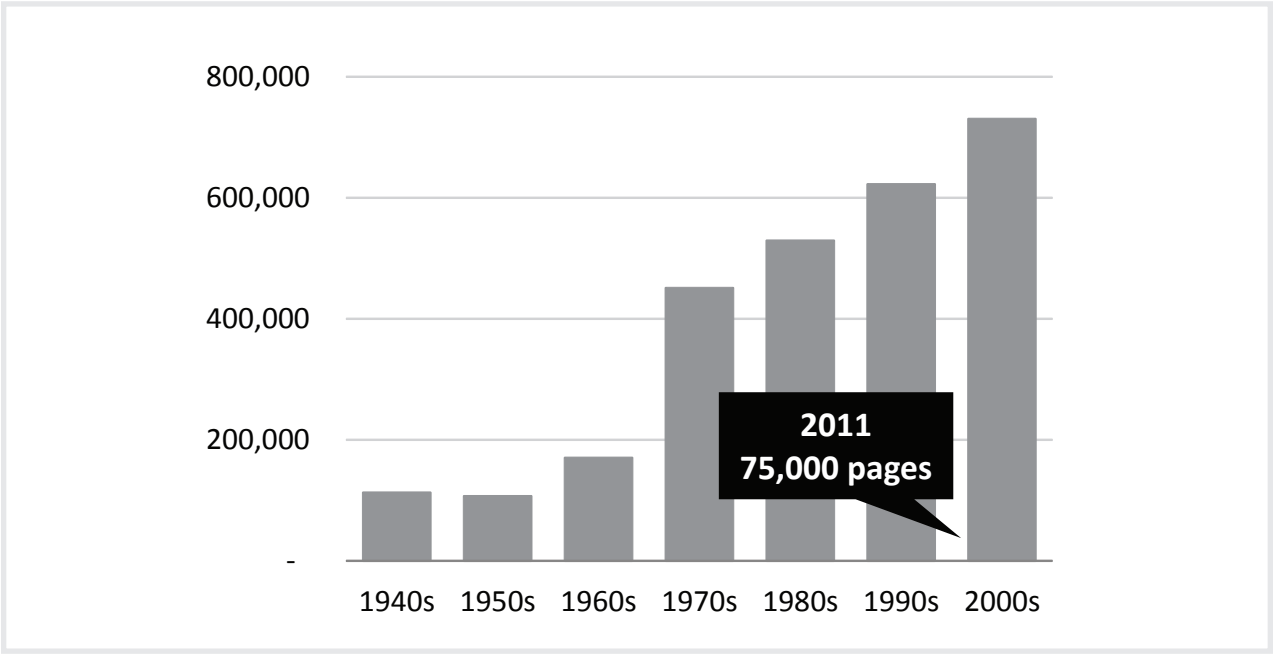


Exhibit 5: Federal Register Pages by Decade

***Source**: National Archives and Records Administration, Office of the Federal Register*

Economic Trends

Theme	Spending not evenly distributed
Primary observations	■ Recovery is hampered by foundational economic erosion ■ Spending is much more deliberate (e.g., needs vs. wants) ■ Geographic concentration of economic activity becomes more distinct

While economists do not always agree on the future of the economy, one thing is certain. Although the Great Recession is officially over, the turbulence of 2011 offered few signs of relief for the nation's households and businesses, whose interconnected stories are the building blocks of the economy. Many of the same structural challenges facing the U.S. economy at the end of the recession remain roadblocks to recovery. Unemployment is too high, banks continue to hold onto money, and the housing market is still a mess. As a result, total U.S. construction put in place was $1.1 trillion in 2007 and is forecast to be roughly the same in 2015, leading some to label this time period as "The Lost Decade" (see Exhibit 6). The recovery from the previous recession of this century resulted from strong consumer spending and a robust housing market. This time around, neither of those sources appears ready to lead us forward. Instead, we have a recovery that is hampered by foundational economic erosion. The Baby Boomers drove the U.S. economy for the last few decades, but those days are essentially over. With the unemployment rate stubbornly fixed at around 9%, spending is now much more deliberate

	2007	2011	2015
Buildings			
Total Residential	$ 499,650	$ 271,053	$ 438,601
Total Nonresidential	462,635	346,177	440,184
Total Nonbuilding Structures	174,866	217,564	278,331
Total Put in Place	$ 1,137,151	$ 834,793	$ 1,157,116

Exhibit 6: The Lost Decade, Total Construction Put in Place 2007, 2011 and 2015 (millions of current $)

***Source**: FMI*

with people using available funds for their "needs," (e.g., food, shelter, health care) as oppose to their "wants." It is anticipated that this trend will continue as will a more geographic concentration of economic activity that will result in pockets of heightened investment across the country.

For the past few decades, the U.S. economy has been driven by the spending habits and consumption of the Baby Boomer generation. According to the work of demographic trend expert and economic researcher Harry Dent, individuals typically hit their peak spending between the ages of 46 to 50. Older generations contribute significantly more to economic activity than younger generations. In fact, roughly 50% of annual expenditures are made by people between the ages 36 and 65 (see Exhibit 7). These expenditures include food and drink, transportation, house and home, shopping, health and family and travel and leisure. However, as this group nears retirement — a process that will play itself out over the next 18 years — their incomes, savings, investments and consumption will all decline. The giant Baby Boomer population will contribute a combination of less savings and less spending to the economy. Since savings are generally a requisite for local and national investment, the result will significantly alter our economy.

The rate of unemployment consistent with "full employment" varies from one economist to the next, with a range of approximately 4% to 6%. According to the Bureau of Labor Statistics (BLS), the average rate of unemployment in the U.S. from 1993 to 2007 was 5.2%, just more than half of what it has been throughout most of the recession and into 2011. With that in mind, a target unemployment rate for a "normal" labor market in this economy would be below 6%. What will it take to accomplish less than 6% unemployment? First, as the population is increasing, there must be enough job creation to keep up. With an overall population growth rate of approximately 0.9%, a population of approximately 311

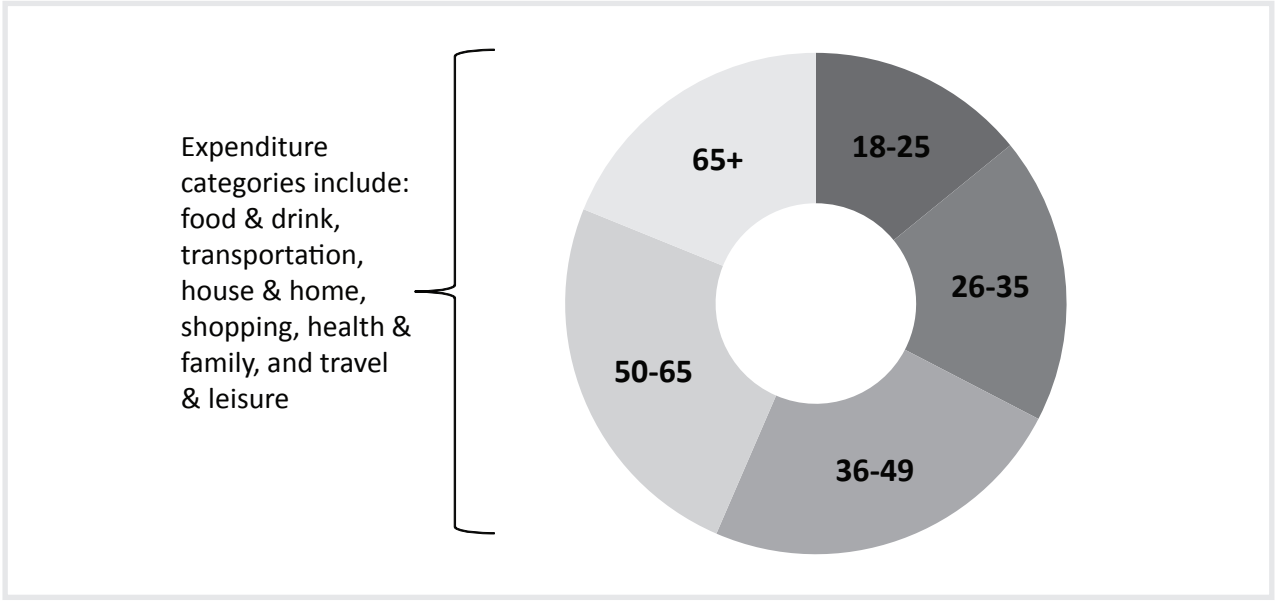


Exhibit 7: U.S. Economic Contribution (annual expenditures by age group)

***Source**: The Bundle Report, 2010*

million (based on the 2010 U.S. Census), and a workforce of approximately 150 million (according to the BLS), the U.S. economy must create approximately 1.35 million jobs per year, or 115,000 per month, just to keep the unemployment rate constant. Further job creation is then necessary to reduce unemployment toward and below 6%. The BLS shows the average monthly job growth from January 2010 to July 2011 was only 98,000. High unemployment has contributed to a changed mindset where people may think twice before spending on those items that are deemed, "wants," not "needs." The question is whether this mindset will revert back to pre-recessionary times should the economy eventually turn around.

The entire nation has felt the downturn, but some regions have been hit harder, such as the Midwest. Manufacturing job loss and its share of GDP is deep and will be difficult to recapture near-term. During the years 2008 and2009, Michigan, Indiana and Ohio lost between 17.5% and 25% of its manufacturing jobs. Rebuilding will certainly be a challenge. In contrast to the Midwest, the Sunbelt, which stretches across the South and Southwest, has not been hit as hard. The Sunbelt has seen substantial population growth in recent decades (1960s to recent) fueled by milder winters, a surge in retiring Baby Boomers who migrate domestically and the influx of immigrants, both legal and illegal. According to the U.S. Census Bureau, approximately 88% of the U.S. population growth between 2000 and 2030 will occur in the Sunbelt. Therefore, over the next decade, the geographic concentration of economic activity may become even more distinct, which will influence the demand for construction services.

Spending is not evenly distributed, across age, income groups and geographic regions in particular. This will continue and become even more heightened as we traverse the next 10 years. As a result, spending patterns will continue to change and reflect the demographic make-up of the country. If the economy continues to follow the overall decline in spending, the country is in for another lean decade, as the next peak spending pickup is not scheduled until 2022, which is when the next "baby boomlet" should hit its peak spending stride.

Social Trends

Theme	Business must adapt to a new reality
Primary observations	■ Recovery is hampered by foundational economic erosion ■ Spending is much more deliberate (e.g., needs vs. wants) ■ Geographic concentration of economic activity becomes more distinct

Change is inevitable. As we move toward 2020, we see change all around us. During the last five years, construction spending has decreased and so has the number of workers in the industry. Prior to the recession, there was a lot of talk regarding the "war for talent" or upcoming shortage of labor in the industry. A lot of this discussion was muted while the amount of work was lower. However, as the market returns, it is anticipated that the labor shortage will still be there and perhaps heightened as many that left the industry may never return. Where will the people required to design and construct buildings and infrastructure come from? It is certain that the

next generation of workers will look and work much differently from the previous generation. The industry must be ready to embrace these fresh faces. In order to survive, business must adapt to a new reality.

Bringing the brightest young people into the design and construction industry is a challenge. During the downturn, talented young professionals left engineering and architecture professions to never return. There may be people available, but they are not necessarily the top talent that firms need to succeed. In addition, the number of annual graduates in engineering and architecture who do not actually enter the professions is believed to be high. The National Society of Professional Engineers (NSPE) says that "only 20% of those who graduate with a B.S. in engineering in the U.S. go on to become licensed professional engineers." Beyond simply meeting staffing needs today, there is a significant challenge in the industry to understand why a greater number of graduating engineers and architects are choosing other careers, and how to bring the best and brightest minds of future generations into these professions.

A generation's ages or birth years serve as the primary guidelines when defining the characteristics of its members, but the true divisions lie in cultural differences. In addition to common influences, economic and political events that take place during a generation's critical development stages have a significant effect on the way that generation works or views employment. Generational characteristics influence lifelong decision-making, including marriage, family size and which career to choose. The Millennials, birth years 1980-2000, are the quickest-growing segment of the workforce (see Exhibit 8). It is the largest demographic bulge since the Baby Boomers. Millennials are noted as a group that embraces accountability, organization/project management, service organization, technology, valuing diversity and working collaboratively.

Generation	Birth Years	% of Workforce	Work Values
Veterans/ Traditionalists	1922-1945	10%	Company Loyalty
Baby Boomers	1946-1964	44%	Live to Work
Generation X	1965-1979	34%	Work to Live
Generation Y/ Millennials	1980-2000	12%	Work my Way

Exhibit 8: Shifting Generational Work Values

***Source**: Boston College Center for Work & Family*

Drawbacks of this group include communicating informally with text messages, problem solving deficiencies, little or no loyalty to the organization or lack thereof and the reliance on technology as integral to lifestyle. It will be critical to be aware of the applicable strengths and weaknesses of this generational group moving forward.

Moving forward, the population also will become more urbanized. Additionally, there will be the emergence of 10 U.S. mega-regions (see Exhibit 9), which are increasingly contiguous spaces of high-density development and population, capturing a high share of U.S. economic activity. These indicate areas of concentrated construction activity that are likely to occur over the next 10 years. The mega-region idea owes much to Jean Gottman's Megalopolis of 1961, which described the nearly unbroken pattern of urbanization that had emerged in the northeastern United States by that date. It is also inspired by the work of Benton MacKaye, among other pioneering regional planners of the 1920s and 30s, who, in his proposal for the Appalachian Trail and other innovations, saw the importance of affirmatively planning for the natural systems surrounding the expanding metropolitan areas of the country. In its potential role within a national framework, the mega-region concept has been informed by American, European and Asian precedents. In addition to the overall increase in the raw population number, regional population migration patterns will greatly influence where future construction activity is most likely to occur.

As the population grows, there will be greater ethnic and racial diversity in the population and workforces. According to the Pew Hispanic Center, between 2000 and 2020, the Hispanic population will account for 46% of total population growth, increasing by 25.1 million,

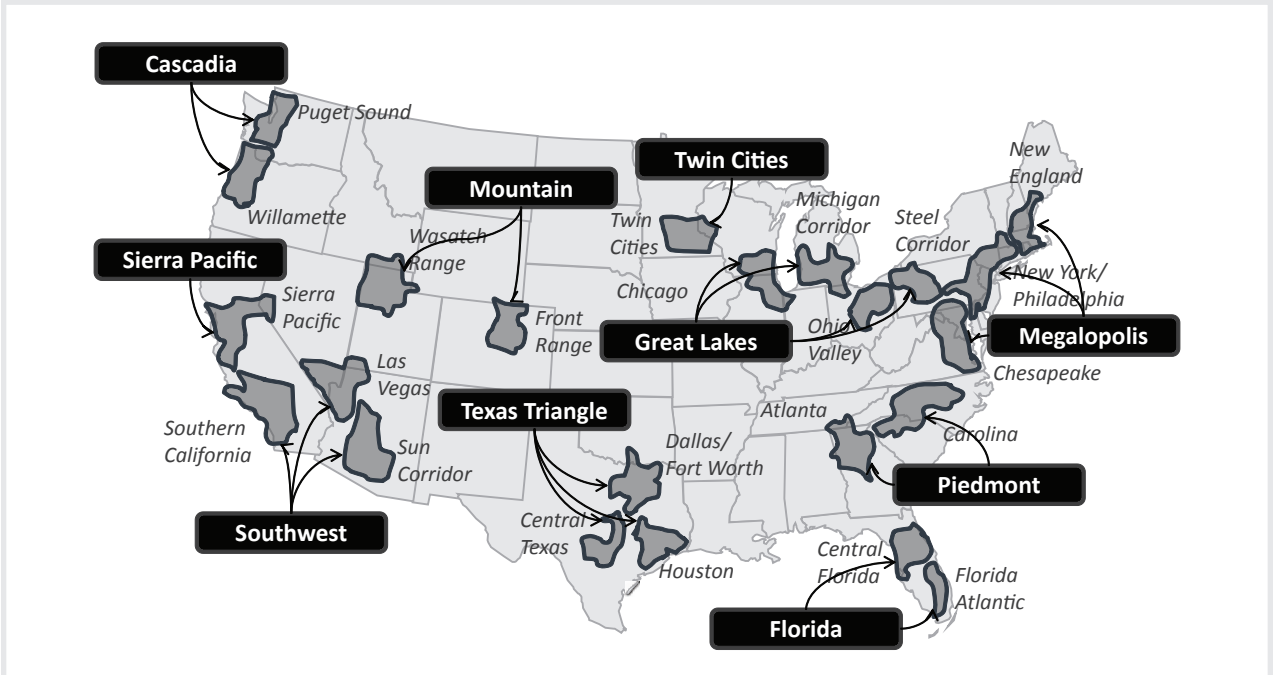


Exhibit 9: Population Migration and Concentration

***Source**: University of Utah's Metropolitan Research Center and Brookings Mountain West*

from 35.3 million to 60.4 million. Furthermore, the Hispanic population will increase from 12.5% to 18.0% of the total U.S. population (2000-2020). Births to Hispanic immigrants, rather than immigration itself, will be the key source of population growth of this group over the next few years. Immigration practices will significantly influence the labor pool for construction companies.

In a diverse industry, the value of each generational and ethnic/racial cohort provides unique value based on its specific traits and characteristics, expectations, values, strengths and weaknesses. Industry stakeholders must adapt to this diversity and embrace it. Perhaps different, maybe even radical ways of thinking will be required for companies to be successful with the new generation of workers. Given the demographic challenges of an aging industry workforce and the relative unattractiveness of construction as a career (see Exhibit 10), attracting and retaining the very best people will provide a lasting competitive edge.

Technological Trends

Theme	Technology permeates society
Primary observations	▪ High expectations for the use and benefits of new technologies ▪ Adoption rates for new technology quickly accelerate

- High school shop class programs were widely dismantled in the 1990s as educators prepared students to be "knowledge workers"
- The residual effect has been a societal devaluing of the trades and a shortage of skilled labor
- However, there have been several new initiatives to encourage construction such as the "Go Build" programs in Alabama and Georgia
- High school students who have taken skilled trade vocational classes are more apt to consider a career in a skilled trade—14% compared to 6%
- In less than 20 years, the percentage of U.S. students graduating with math-based degrees has been cut in half from 8% in 1992 to 4% in 2009
- The World Economic Forum ranks the U.S. #48 in the quality of math and science education
- China and India are each producing nearly 1,000,000 engineering graduates annually compared to 120,000 graduates in the U.S.

Exhibit 10: Reduction of Shop Classes, Vocational Training and Engineering Graduates in the US

***Source**: Engineering News Record (ENR), New York Times, Forbes, Kansas State Collegian, RIDGID*

In recent years, new technologies have contributed to the revolution of the design and construction industry, fundamentally changing the way business is conducted. Like almost all businesses these days, contractors have learned that technology is more than just an accounting issue, and, where not long ago the discussion was whether or not to provide PDAs to field managers, now every smartphone and tablet computer can provide significant project information, communications and even project photos. The IT department is no longer a couple of smart kids with PCs trying to keep a few computers networked, it is a central part of the business, requiring complex decisions and top officers who know how to make it all work.

A recent survey conducted by ENR showed that industry stakeholders want continued improvements in collaboration tools, software, mobile devices, project information models, training and social media. There are high expectations for the use and benefits of these new technologies, such as BIM. Building Information Modeling has and continues to play a key role in this transformation, advancing better design and project delivery methods. It potentially represents one of the most influential changes to construction moving forward. The adoption rates for new technologies such as BIM, mobile devices and social networking sites will continue to quickly accelerate. It can be said that technology permeates society.

Contractors are embracing BIM at an ambitious rate (see Exhibit 11). Some owners and others are requiring it because of the demands of an overly complex project. Whether for site planning, clash detection, 4-D drawings or conceptual design and budgeting, contractors are deploying a BIM methodology and procuring tools like Revit, DProfiler, NavisWorks, Tekla and Vico at a rapid rate. Many smaller and mid-sized contractors that need the technology but cannot afford all of the initial investment are taking advantage

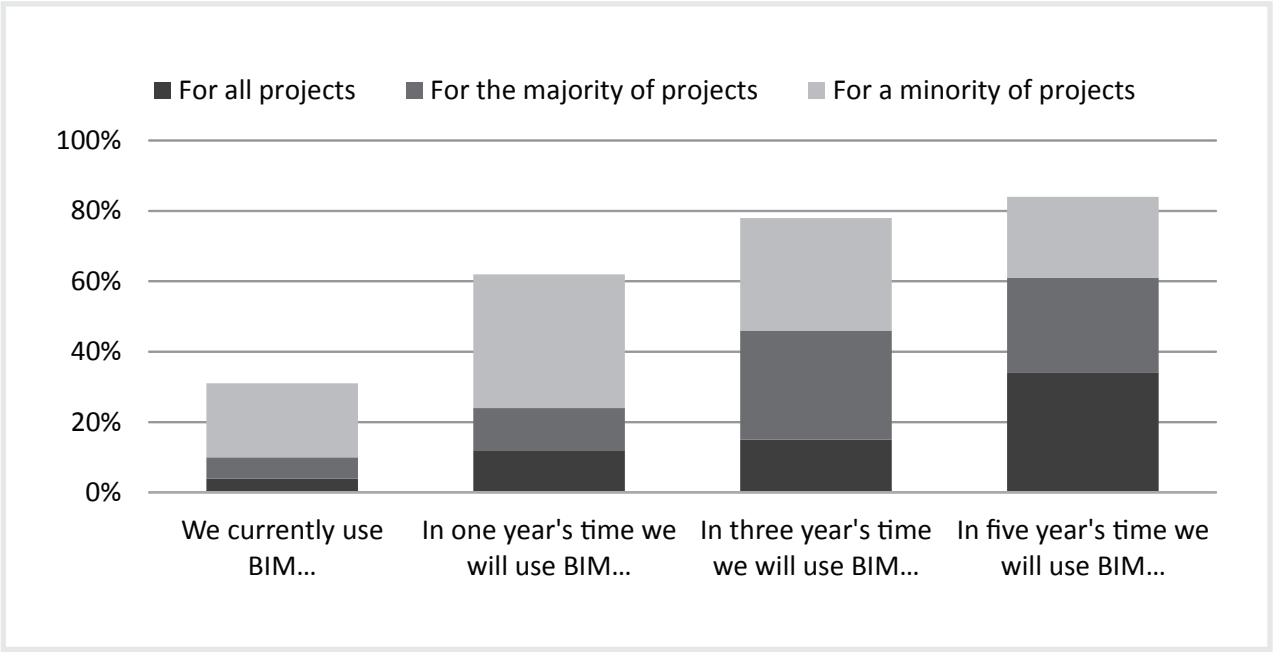


Exhibit 11: Building Information Modeling (BIM)

***Source**: National Building Specification (NBS)*

of the outsourcing companies who provide BIM tools as a service. In markets where BIM is not prevalent, it is often a case of contractors either not fully knowledgeable of its capabilities and/or not actively marketing its benefits to building owners. Once these two factors are realized, its usage should become more widespread.

Technological advances in communication in particular are rapidly expanding, with many new forms taking hold. While it took the radio 38 years to reach 50 million people, it took only two years for Facebook to reach the same magnitude (see Exhibit 12). There are conflicting views of the value of social networking in the workplace. Although there are many businesses that believe Facebook is only for the young and used only for social purposes, the truth is that roughly 70% of people age 30-49 use the site (see Exhibit 13). Those who believe that social networking is a waste of time may be missing the point; people engage in social networking for a purpose. Its benefits include building teamwork, organizing around a project and organically building a knowledge base. Each of these activities is a key success factor for most businesses, and each can be greatly improved by the use of social networking principles. As these benefits are realized, adoption rates for these technologies as well as others will continue to quickly accelerate.

In any time period, there will be technological innovations that disrupt the market for service providers. In today's economic climate, contractors seem to be of two minds relative to technology change and innovation. One camp is holding tight, taking a more conservative position. The other is adopting a more aggressive position by investing in software, hardware and training to bring its lagging systems up to speed. Some in the industry believe there should be less focus on perceived needs for new technology and

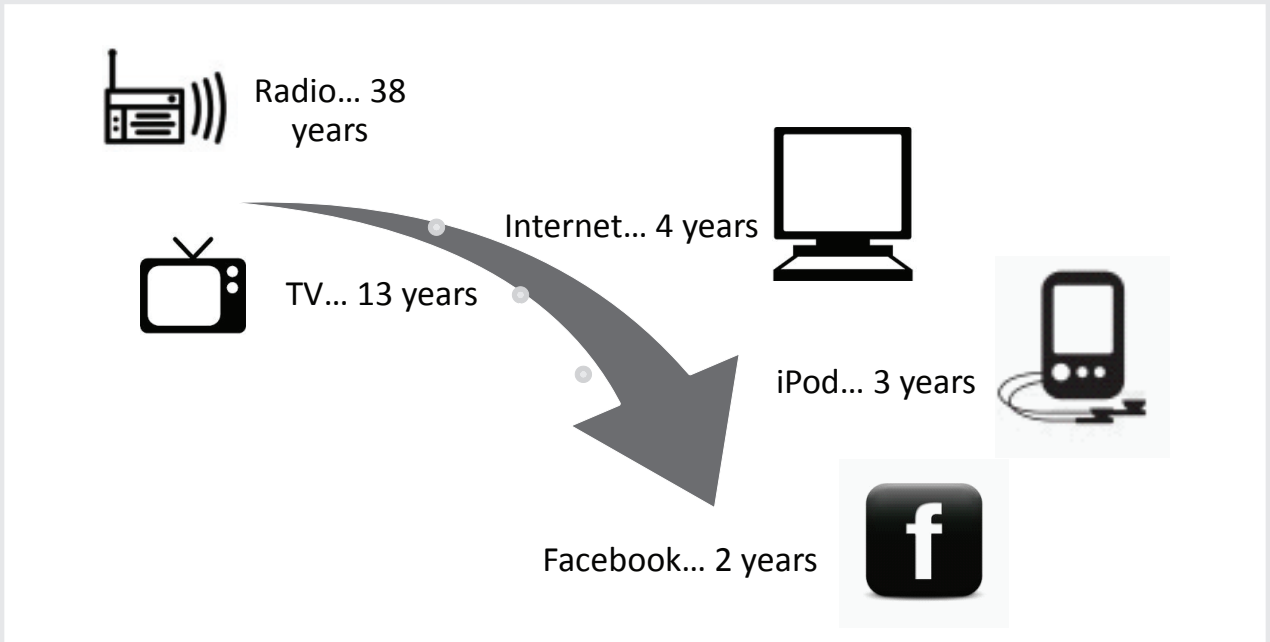


Exhibit 12: Time Spent to Reach 50 Million People

***Source**: Digital Stats*

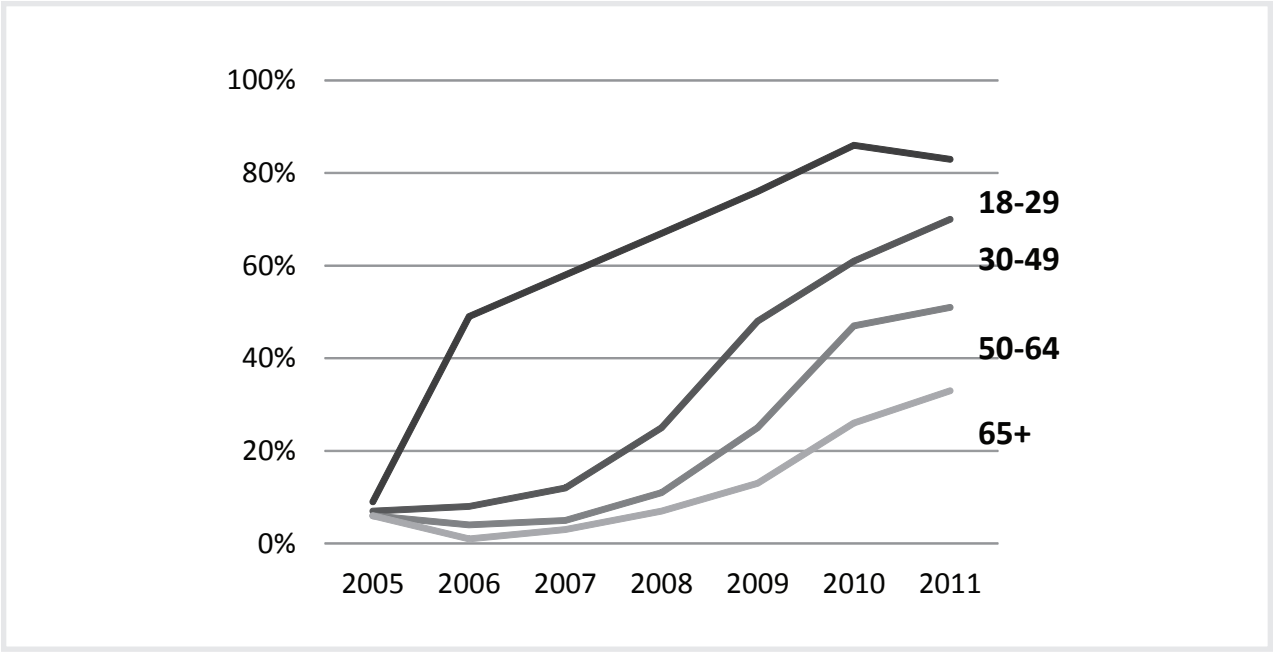


Exhibit 13: Social Networking Site Use by Age Group, 2005-2011

***Source**: Pew Research Center's Internet & American Life Project Surveys*

more on how to work with what already exists. It may be that the greatest potential for technology lies in the better use of existing investments. Either way, technology adoption rates are accelerating and will continue to permeate all levels of society.

7.2 Micro-Level Analysis

Similar to the macro-level analysis, the micro-level analysis describes a four-pronged approach to and categorization of environmental factors but is narrower in scope, identifying and categorizing industry-specific trends. This analytical approach was developed for the purpose of this report. The categories included in the micro-level analysis and example factors for each category are included.

Procurement factors include Contracting methods, Contractor selection criteria and influences, Buying practices and preferences and Parties involved in the construction services buying process and degree of involvement.

Approach factors include Delivery methods, Presence of joint ventures, Preferred service providers (competitors) and Use of technology.

Labor factors include Availability of skilled individuals, Union membership, Diversity of the workforce, Employee characteristics and values and Productivity.

Materials (and equipment) factors include Material prices, Technological improvements and Material availability and preferences.

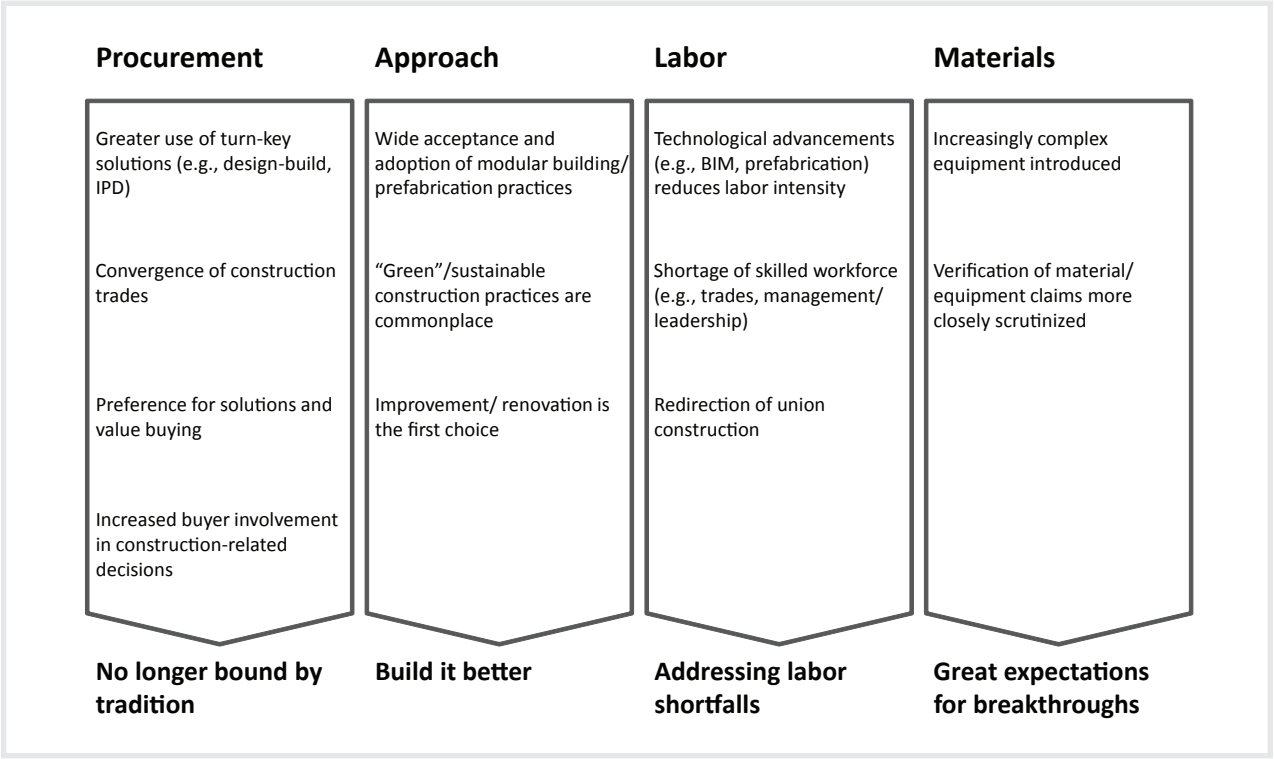


Exhibit 14: Micro-Level Analytical Framework

***Source**: FMI analysis of multiple data and information*

Procurement Trends

Theme	No longer bound by tradition
Primary observations	▪ Greater use of turn-key solutions (e.g., design-build, integrated project delivery (IPD)) ▪ Convergence of construction trades ▪ Preference for solutions and value buying ▪ Increased buyer involvement in construction-related decisions

There is a fundamental shift occurring in the way products and services are purchased and sold within the HVAC/sheet metal industry. The long-established way of tradition is being passed up for new, efficient paths. A push towards turn-key service offerings is becoming increasingly normative as evidenced by the increasing implementation of alternative delivery methods such as design-build and IPD, and the convergence of various trades under one roof. Further, buyer involvement will continue to increase, and the basis for purchase will shift, becoming more solutions- and value-centric.

The use of alternative delivery methods such as design-build and IPD is not a new trend, but nonetheless a significant one that will continue in the future. According to The Design-Build Institute of America (DBIA), design-build

will continue to increase market share over the more traditional delivery methods design-bid-build and CM at-risk by 2015 (see Exhibit 15). Increased use of design-build and IPD is driven by a market-wide push towards efficiency—cost efficiency, schedule efficiency and environmental efficiency. Achieving these efficiencies necessitates the turn-key benefits design-build and IPD promise to offer. Therefore, the frequency of these solutions will continue to increase in the future. As the industry moves into the future, the involvement of CGs/CMs and key specialty trade contractors—including HVAC/sheet metal contractors—in the design phase will become increasingly prevalent. This trend will force HVAC/sheet metal contractors that lack design and engineering capabilities to equip for a future that will desire those services. Firms who possess in-house design and engineering capabilities will enjoy a competitive position in the future market.

As the expectations of the market turn to turn-key offerings, a convergence of various trades will become increasingly popular. The ability for firms who possess mechanical, electrical and plumbing capabilities to offer turn-key services will secure a significantly competitive advantage in the future market. This convergence of trades will be facilitated not only by the demand of the market for turn-key services, but also by the introduction of new technology that increases the ease with which the MEP systems are integrated. The convergence of trades will require firms to increase both technological sophistication and system knowledge in order to provide quality design, construction and O&M services for the various systems.

Purchasers of MEP services and equipment have become increasingly sophisticated. As purchasers have increased in sophistication, so have the products and services they demand

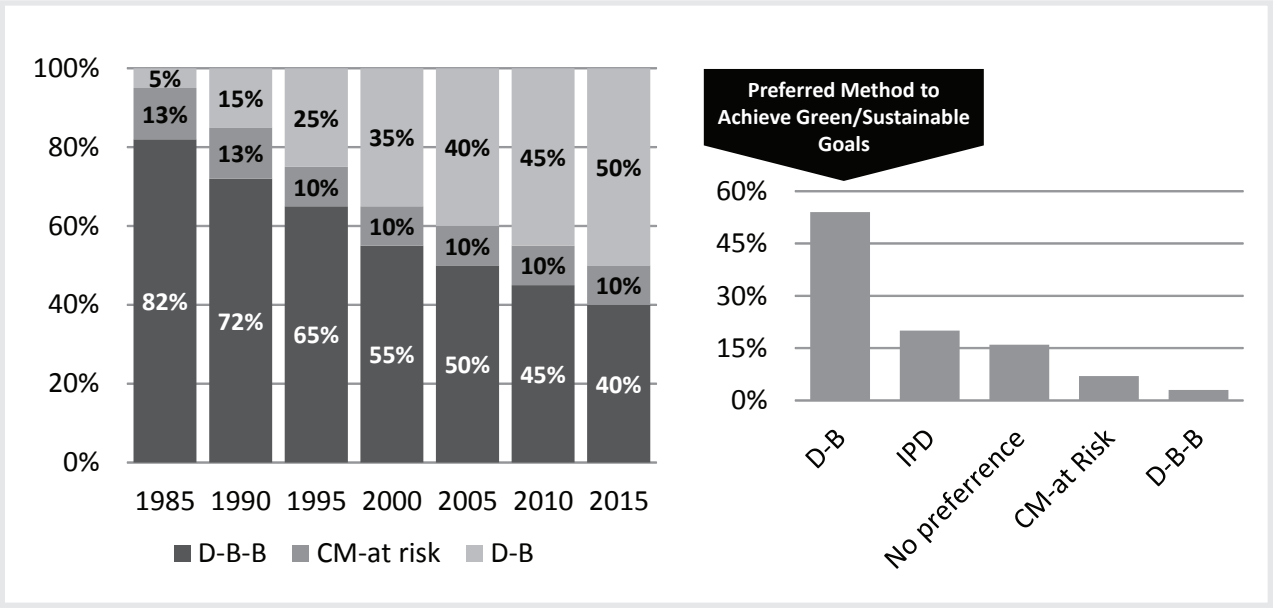


Exhibit 15: Design-Build's Market Share Growth and Role in Achievement of Green/Sustainable Goals

***Source**: The Design-Build Institute of America*

(e.g., energy-efficient equipment). The terms "whole building design" and "life cycle cost" are assimilating into the industry vernacular. Building owners are, with increasing regularity, desiring products and services that offer long-term cost savings over short-term, up-front savings. In other words, purchasing preferences are shifting to a solutions and value basis. Moving into the future, firms will be required to offer services, including design, and products that offer "life cycle cost" savings benefits. Firms unable to clearly articulate these benefits will be at risk of being squeezed out of the market.

Because purchasers have become increasingly sophisticated and have developed a specific demand for high-value and energy-efficient equipment and systems, purchaser involvement in construction-related decisions has likewise increased. The procurement of materials will become increasingly centralized in the future as owners' taking control of purchasing power will serve as a front-end quality and value control measure. This will encourage an intimacy of buyer/influencer relationships that firms in the future will need to cultivate.

These trends suggest a fundamental shift in the way products and services are procured. Though on the fringes of the industry now, these trends will become the new norm as the industry moves into the future. The implementation of turn-key solutions, convergence of separate trades, preference for value-based purchasing, and purchaser involvement in construction decisions will all increase on the 10-year horizon. Such fundamental changes bring significant implications that firms must consider in order to compete in the future. Most significantly, procurement will shift from cost-driven to value-driven, and firms must be equipped to provide value (e.g., turn-key solutions, life cycle cost benefits) in all areas of the design, construction and operation and maintenance phases.

Approach Trends

Theme	Build it better
Primary observations	■ Wide acceptance and adoption of modular building/ prefabrication practices ■ Green/sustainable practices are commonplace ■ Improvement/ renovation is the first choice

Over the centuries, construction methodology has failed to advance at any sort of impressive rate. However, several major trends have the potential to increase the efficiency of, or replace, current methodologies. There is an increasing acceptance and adoption of modular building/prefabrication practices and green/sustainable applications. Both will gain even wider acceptance and greater market share in the future. Further, improvements/ renovations are frequently preferred over new construction. This trend will not reverse until building owners' accessibility to capital and confidence in the market returns. Given the cost and value benefits offered by renovations, particularly of HVAC systems, this trend has likely gained a secure foothold moving into the future. These trends aggregately are pushing industry stakeholders to build more efficiently—cost-efficiently, time-efficiently and risk-efficiently—and add sustainable value.

The employment of modular building/ prefabrication practices is gaining market share. In a survey conducted by FMI, 25% of respondents said more than 20% of their work was done using prefabrication. Of those who did not currently own their own prefabrication facilities, 57% were planning

to add that capacity in the near future (see Exhibit 16). Further, according to the Modular Building Institute, at least 40% of owners in five market sectors—health care, higher education, manufacturing, low-rise office and government—have employed modular/prefabrication methods. Modular/prefabrication practices are proving a time-efficient and hazard-efficient solution. While the scale of these approaches may not yet be project-wide, modular/prefabrication trends have gained enough traction in the market that the size and scale of these approaches will increase moving into the future.

There is also a rapidly expanding use of green and sustainable practices. The number of green and sustainable projects has ballooned despite the economic downturn, suggesting that green and sustainable practices will become increasingly normal in the future (see Exhibit 17). Green and sustainable approaches have proven to offer life cycle cost savings that are becoming increasingly desirable for building owners. Further, government support including legislation and financial incentives supporting building energy efficiency will help to drive both the supply and demand for green building in the 10-year horizon. For example, the U.S. Department of Energy (DOE) is investing $40 million to various industry organizations to develop net-zero-energy homes that consume 50% to 70% less energy than conventional homes. Coupled with the ever-increasing cost of energy that is strangling the growth of the economy, the demand for energy services will drastically increase moving into the future (see Exhibit 18).

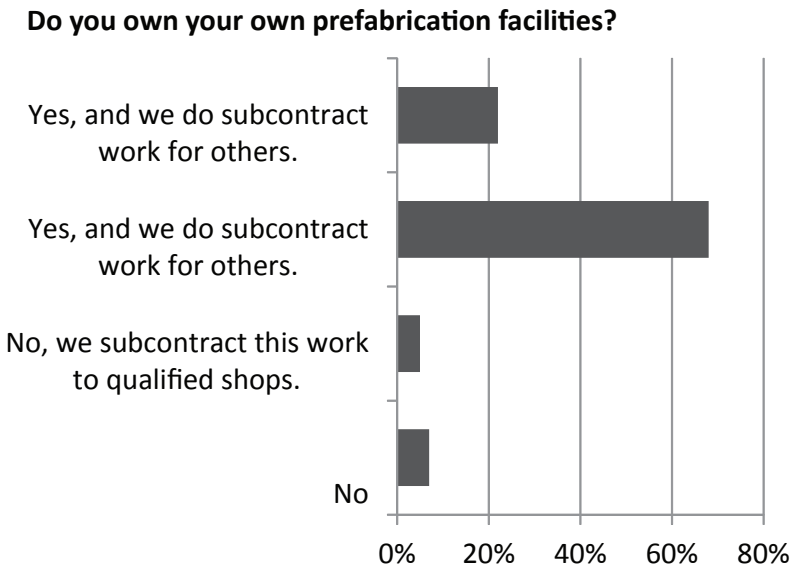


Exhibit 16: Current and Planned Use of Prefabrication

***Source**: FMI's 2010 Contractor Prefabrication Survey*

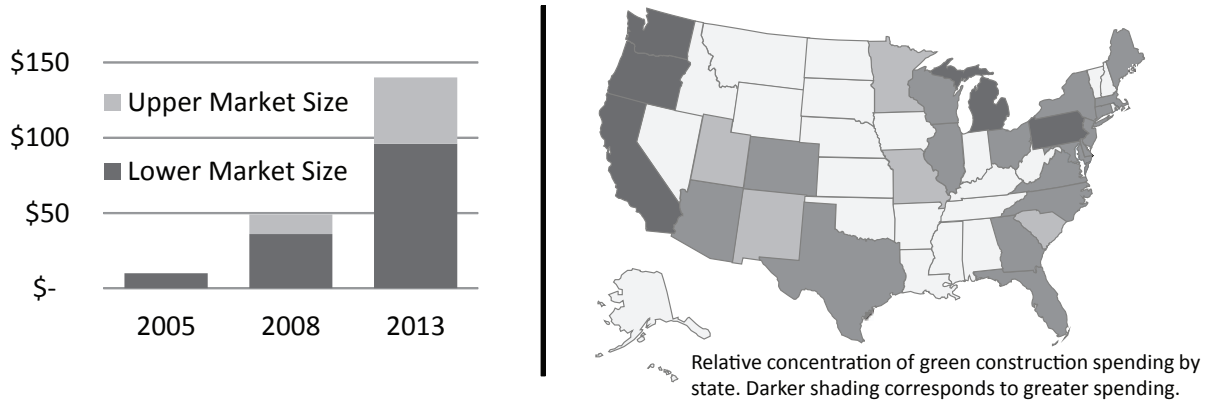


Exhibit 17: Green Construction Market Opportunity (billions of current $)

***Source**: McGraw-Hill Construction, FMI*

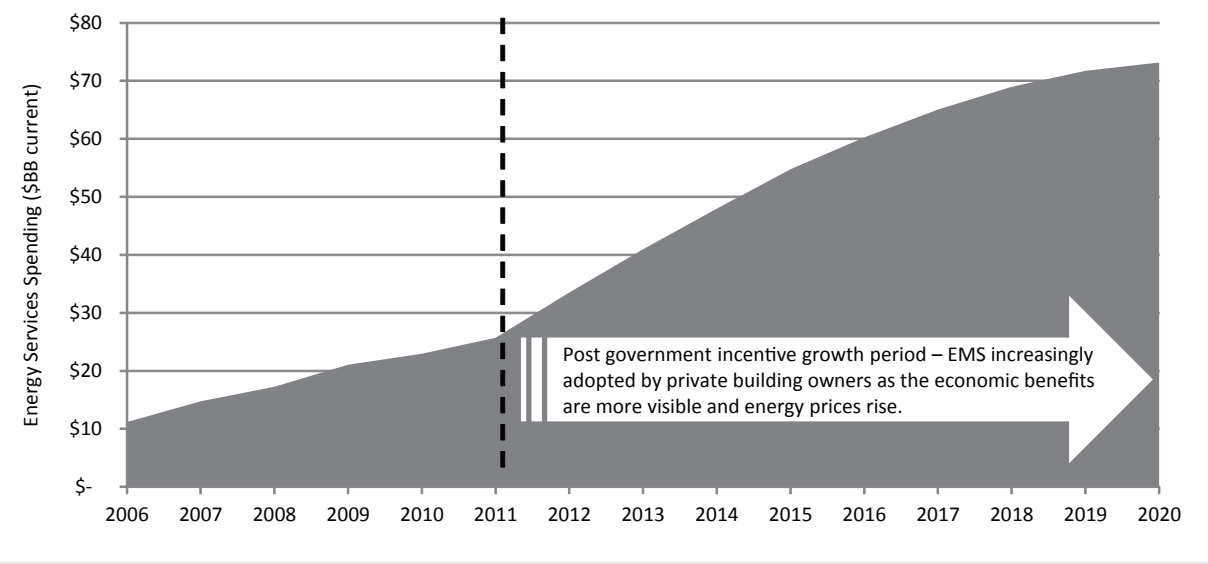


Exhibit 18: Energy Services Spending Forecast

***Source**: Ernest Orlando Lawrence Berkeley National Laboratory, FMI*

Intersecting with the limited access to capital in an uncertain and volatile economy, green and sustainable construction also supports a spur of renovation and retrofit work types. Renovation and retrofitting offers building owners a more cost-efficient, energy-efficient solution compared to new construction. A recent survey of hospitals conducted by Health Facilities Management and American Society for Healthcare Engineering found that a greater percentage of capital budgets are being allocated to renovations compared to new construction. The same study indicated that 33% of hospitals have plans to upgrade major HVAC equipment within the next two years. Likewise, higher education institutions are allocating an increased percentage of capital budgets to renovations. Given the instability of the market and the cost-efficient value addition of renovations, this trend is likely to continue moving towards the 10-year horizon.

Each of the trends discussed have gained a foothold in the market, and the influence they bear on the market will become increasingly intense. Several variables are pushing the market toward industry-wide efficiency. The push towards cost efficiency is evidenced by the expanding preference for improvements/renovations over new construction and for life cycle cost savings over initial savings (time efficiency). Schedule and safety outcomes improve with the implementation of modular/prefabrication practices that allow construction of building systems to occur earlier in the project schedule and in a safe, controlled environment. As these trends continue to exert an increased force on the industry, firms must arm themselves with efficiency-adding products and services that add quantifiable value to the owner.

Labor Trends

Theme	Addressing labor shortfalls
Primary observations	■ Technological advancements (e.g., BIM, prefabrication) reduce labor intensity ■ Shortage of skilled workforce (e.g., trades, management/leadership) ■ Redirection of union construction

There is a dynamic complexity to the industry's labor situation, and the industry has been forced to innovatively address and manage the labor shortage. While the advancements in technology offer productivity increases without increased manpower, there is nonetheless a pressing problem facing the construction industry, and specialty contractors in particular, of attracting skilled labor to the industry, especially in light of the imminent retirement of much of the industry's trained workforce. This issue is most acute for union contractors that depend on skilled labor as a competitive advantage offering and is therefore driving re-examination of the current business model by both management and labor jointly.

The U.S. Census Bureau estimates that demand for HVAC labor will increase 29% by 2014. FMI estimates a deficit of more than 200,000

construction laborers by the same year (see Exhibit 19). Constricting the supply of labor and exacerbating the labor shortage is the growing disinterest in specialty trade and construction-related occupations among high school and college students. In a recent study conducted by RIDGID, a scant 6% of high school students surveyed indicated an interest in a career in skilled trades. Coupled with a relatively low number of college graduates from construction-related fields of study (see Exhibit 20), the industry is looking at a bleak labor supply outlook in the coming years. This has already created residual effects in the industry, as many senior and upper management personnel are delaying retirement due to the shortage of personnel in the management pipeline. However, the growing trend of repurposing traditional shop classes and initiatives such as Go Build in Alabama and Georgia offers potential solutions to the labor shortfall if momentum builds at the local level. Still, the success of these programs is uncertain, and any benefits afforded by these programs will likely be beyond the 10-year horizon.

The introduction of new technologies such as BIM and prefabrication has offered the industry significant leverage to mitigate the adverse consequences of the current labor shortage. BIM and modular building offer a wide variety of advantages, including the reduction of field labor due to prefabrication techniques, easier installation of pipe and/or ducts and the minimizing of rework afforded by more precise design coordination.

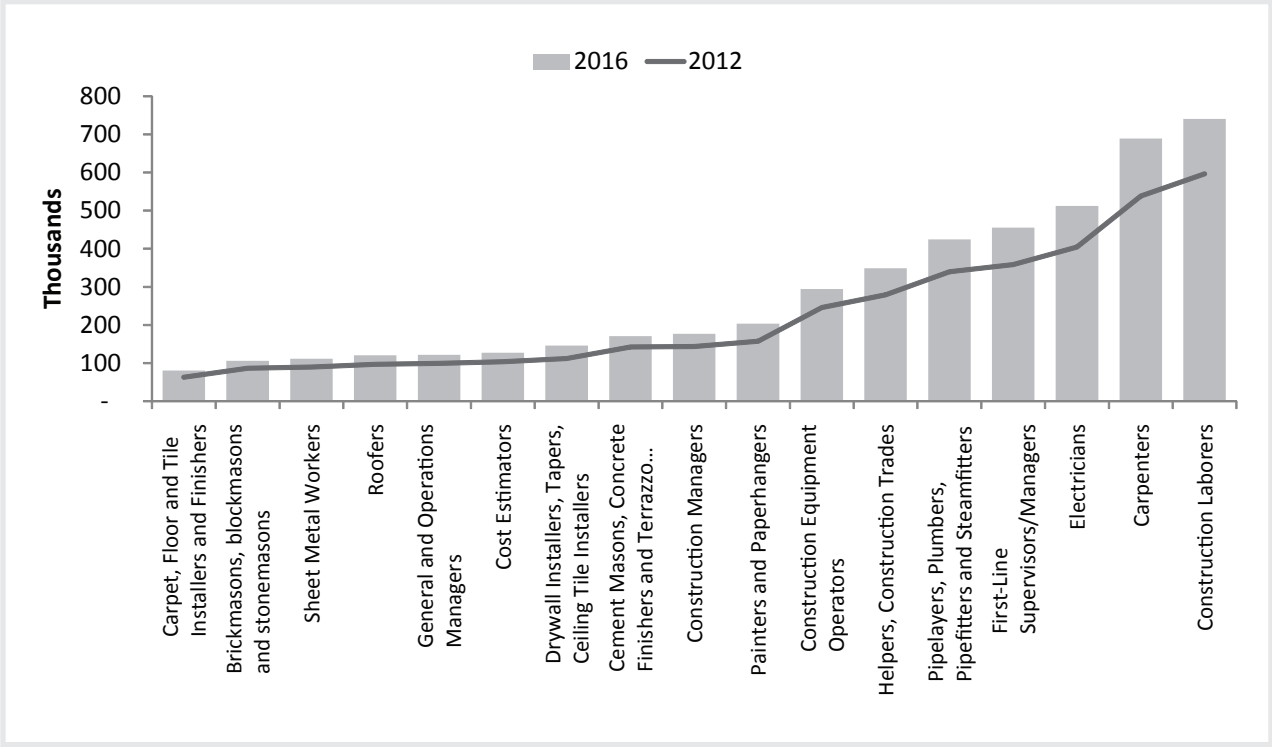


Exhibit 19: Forecast Change in Full-Time Employment Demand (total employment, union and non-union)

***Source**: FMI*

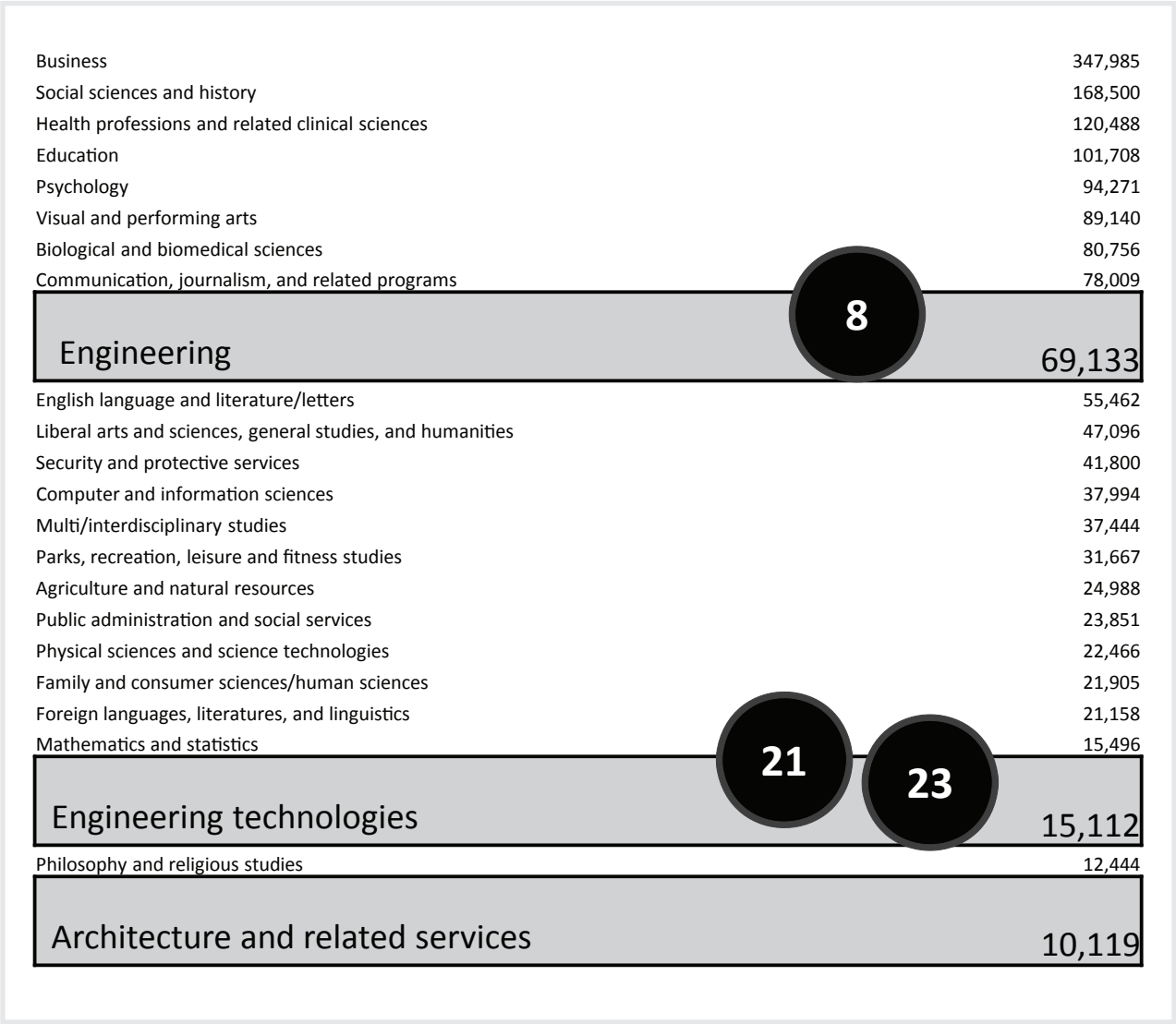


Exhibit 20: Undergraduate Degrees Awarded by Field of Study (2009)

***Note**: Circumscribed numbers indicate ranking (i.e., Engineering is #8)*

***Source**: U.S. Census Bureau, National Center for Education Services*

As technology continues to advance, the industry will be armed with increasingly powerful tools to partially mitigate the labor shortfall by increasing labor productivity and efficiency. While softening the effects of the labor shortage, technological advances will also restrain demand for labor in the future, as technology increases productivity and reduces the industry's labor intensity.

Union contractors will likely realize the greatest challenge from the labor shortage. Union membership among construction workers fell to 14% in 2011, from 40% in 1973 (see Exhibit 21). Faced with increasing technological advances, decreased membership and the diminishing of their traditional competitive advantage of a highly skilled labor force, union contractors must find alternative approaches to

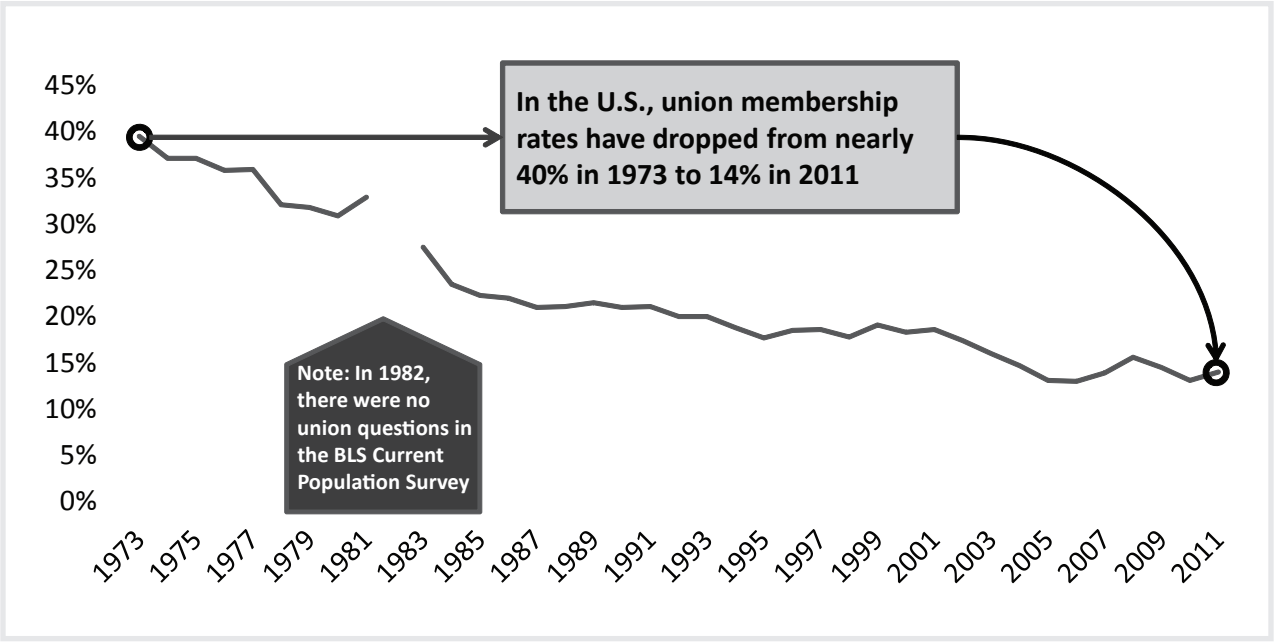


Exhibit 21: Union Membership of Private Construction Workers, 1973-2011

***Source**: U.S. Bureau of Labor Statistics*

remain competitive. Because union contractors lie at the crossroads of these trends, they will need to make significant changes to remain viable in the market as the future climate and demands of the market evolve.

There is no short-term fix for the pending labor supply shortage, and technological advances will continue to curb the demand for labor. The convergence of these trends will force contractors to quickly adopt new technology and leverage technological tools to mitigate labor shortages. Given that these trends directly challenge union contractors' value propositions, union contractors will be hard pressed to adapt to changing labor market conditions. Progressing into the future, a shrinking of both the labor supply (labor shortage) and demand (increased productivity resulting from technological advances) will persist resulting in a more efficient and less labor-intensive industry.

Materials (and Equipment) Trends

Theme	Great expectations for breakthroughs
Primary observations	▪ Increasingly complex equipment introduced ▪ Verification of material/ equipment claims more closely scrutinized

Owners and purchasers of construction and/or building products are levying great expectations on the supply side of the market. As previously discussed under Approach Trends, green building practices will become the rule and are no longer the exception in

the market. The market has a sustained and increasing demand for energy efficiency. Such demand has resulted in the introduction of increasingly efficient equipment capable of adding life cycle value. However, it is not sufficient merely to provide complex equipment without verifying it is in operable compliance with purported value-add claims. In tandem with the increased sophistication of equipment is the demand to empirically verify and quantify its value.

In an age of instant access to information, owners have developed great expectations for the products and systems they demand. Because the equipment of old was often expensive to operate and maintain, demand was generated for equipment that would add real value by means of life cycle cost savings. The size and complexity of such equipment can vary significantly depending on additional measures taken in the design phase to reduce energy costs. For example, if the building envelope is designed to be energy efficient and maximize natural light, the building may require significantly less cooling capacity that will consequently affect the size of equipment needed. Additionally, innovative HVAC systems (e.g., geothermal) are already introducing new systems and equipment to the industry. Moving into the 10-year horizon, HVAC equipment and the assembly of systems will become increasingly specialized and cost-effective to operate.

For example, advancements in multi-disciplinary design platforms (e.g., BIM) will promote tailored energy design based on a specific geography and building design. This new equipment has standardized systems that afford centralized and integrated controls of multiple systems with simpler controls and interfaces. This standardization also allows for remote monitoring through central stations for startup and ongoing service. Additionally, duct installation is with increased frequency using prefabricated assemblies, and plug-and-play systems are becoming more prevalent. In the future, the assembly process may use BIM in conjunction with computer chips installed on each system component, to minimize interferences and enhance installation efficiency. The expectation in 10 years is to see more duct installation using automated layout tools that prefabricate many of the assemblies and spot hangers to improve hanging, connecting and sealing.

There is also a demand from purchasers and from regulatory agencies, (e.g., EPA) to empirically verify equipment value claims, and the verification process can be cumbersome (see Exhibit 22). The end-user/consumer that invests in equipment claiming to offer life cycle cost savings demands their investment be on empirical grounds. Further, regulatory agencies seek to avoid "greenwashing"—the act of misleading consumers regarding the environmental benefits of a product or service—and maintain ethical business practices. Given the increasing onerous nature of government and increasing ease of access of the consumer to pertinent data, the systematic and controlled verification of materials and equipment will likely increase in the future.

The construction marketplace is becoming increasingly sophisticated as the demand side is creating great expectations for products and services, and the supply side is producing increasingly complex equipment and services. Moving into the future, owners will increase their demand for equipment that generates a greater return on their investment, thereby fueling even more equipment sophistication. Further, owners will require increased empirical verification to ensure the validity of equipment claims. Likewise, demand from regulatory agencies for validation will increase in an effort to protect the consumer.

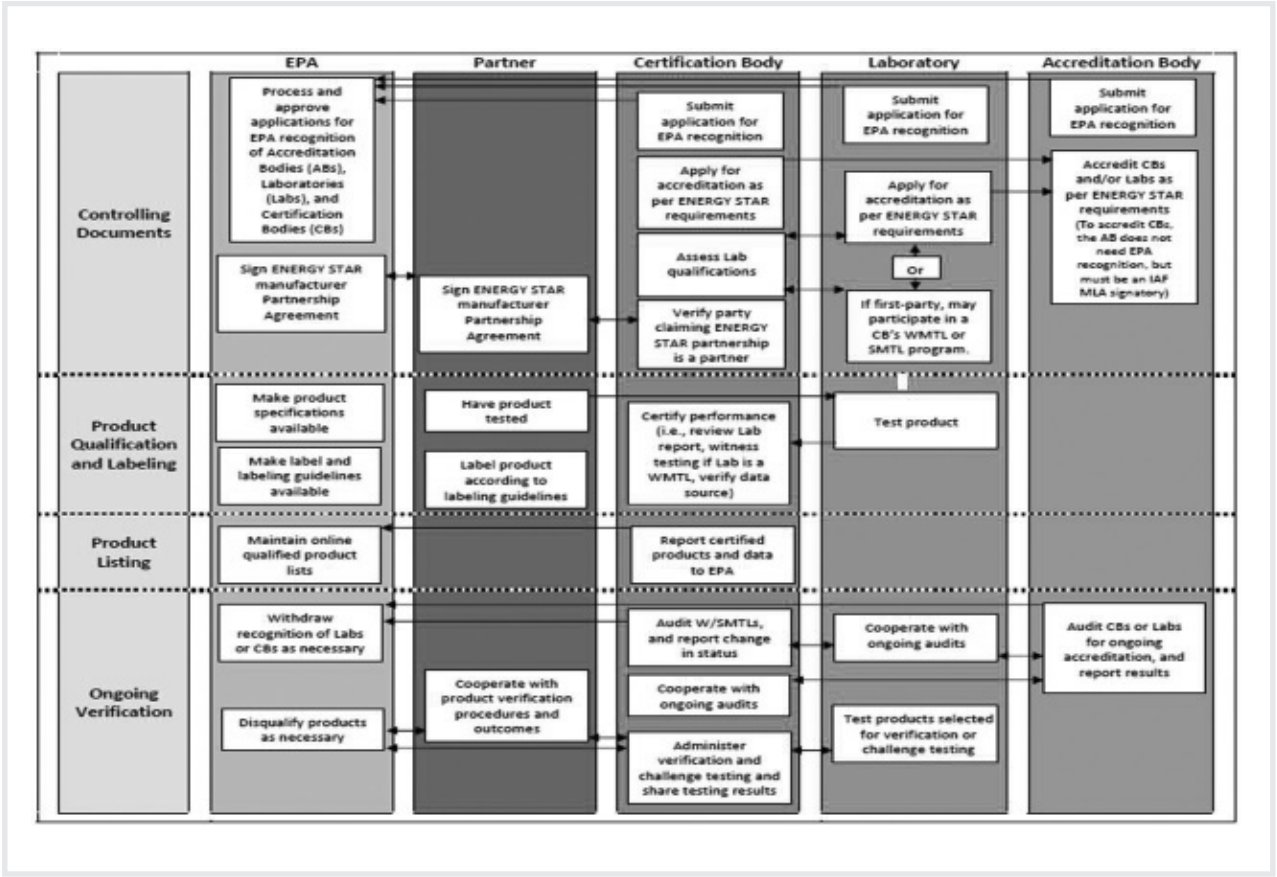


Exhibit 22: ENERGY STAR Certification Process Flow Diagram

***Source**: ENERGY STAR*

8 CONCLUSION

The conclusion to this report is in many ways how it began—an announcement that change is on the way. The entire landscape of the HVAC/sheet metal industry will be reshaped and redefined by a variety of trends over the next 10 years. Most significantly, rising and volatile energy costs will create subsequent demand for energy-efficient equipment. Advances in technology will accelerate to meet this demand with time to market for new, energy-efficient equipment decreasing. Not only will the products and services demanded by the market change, how those products and services are procured and delivered will likewise evolve. Streamlined design/construction processes and methods will be the norm in 10 years. Prefabrication and modular building will gain a significant market share, especially as the skilled labor shortage becomes increasingly acute. Coupled with technological advances, design-build and integrated project delivery will propel the merging of design/engineering and construction services. These rapid evolutions will consolidate the structure of the industry as integration up and down the supply chain (e.g., engineer, general contractor, OEM) becomes more active.

Such changes demand a critical response by HVAC/sheet metal industry stakeholders. While threats abound to the current way of conducting business in the industry, pronounced change also affords great opportunity. Those who heed and apply the findings and recommendations of this report will be competitively positioned to adapt to and succeed in the market of tomorrow. The door is open and the time ripe to forge the pathway to success and lead the industry into a brighter future.

9 APPENDIX 1: FUTURE STUDY UPDATE TASK FORCE MEMBERS

SMACNA Chicago
Tony Adolfs

New Horizons Foundation
Dennis Bradshaw

The Waldinger Corporation
Guy Gast

ACCO Engineered Systems
Milt Goodman

Melrose Metal Products, Inc.
Mitchell Hoppe

Lennox Industries
Terry Johnston

Sheet Metal Contractors Association of Philadelphia & Vicinity
William F. Reardon, CAE

R3 Investments, Inc.
Ron Rodgers

SMACNA National
Vincent R. Sandusky

Western Allied Mechanical
Angela Simon

Charles E. Jarrell Contracting Co.
Howard Stine

Streimer Sheet Metal Works, Inc.
Frederick L. Streimer

SSM Industries, Inc.
Thomas A. Szymczak

Climate Engineers
Mark Watson

Yearout Mechanical Inc.
Kevin Yearout

10 APPENDIX 2: METHODOLOGY

FMI Corporation, with the support of the New Horizons Foundation Future Study Update Task Force, gathered the industry intelligence presented in this report through the similar research methods employed in the previous study: 1) an analysis of secondary data, 2) industry surveys and stakeholder focus groups and interviews, and 3) the participation and feedback of the Task Force members. This approach ensured a broad view of the market and trends and developments likely to shape the HVAC and sheet metal industry in 10 years.

Research Design – Members of the Task Force and FMI developed an approach that would enhance the efficiency and repeatability of subsequent future studies. The decision was made to use a macro-level analytical framework (Political, Economic, Social and Technological) for organizing the research observations and identified trends. However, as this is a decidedly macro-level (and not a construction-industry-specific) model, a similar analytical framework was developed to address the unique characteristics of the construction industry. The micro-level analytical framework, like the macro-level, contains four categories—Procurement, Approach, Labor and Materials (and equipment). The emerging trends identified in each of these eight categories would then be tested using a typical Enterprise Risk Management method. This included rating each emerging trend on the basis of likelihood to occur within the 10-year horizon and potential impact on the HVAC and sheet metal industry.

Preliminary Investigation of Published Data and Information Sources – Industry researchers performed an extensive secondary search using both print and electronic media. Information was collected from academic institutions, industry trade reports, and industry and association publications to identify the emerging trends of significance that suggest the greatest potential to define the future HVAC and sheet metal industry. In addition, findings from the previous study were reviewed for relevance and incorporated into the research process.

New Horizons Foundation and Industry Leaders Survey – A survey to determine the agreement with the findings identified in the previous study was distributed to industry leaders. This was intended to identify the emerging trends of greatest importance to the industry stakeholders and guide further investigations.

Primary Research (i.e., focus groups, industry survey and stakeholder interviews) – Through a series of focus groups, the secondary research findings were refined and tested through a broad industry survey (see Appendix 2). Three-hundred and eighty (380) HVAC and sheet metal stakeholders (e.g., mechanical engineers, HVAC contractors, sheet metal fabricators) responded. The survey results were further vetted during in-depth interviews with stakeholders to obtain opinions regarding how these emerging trends would define the future of the HVAC and sheet metal industry in 10 years.

Analysis – FMI conducted its analysis of the entire body of research to identify the overarching themes suggested, and preliminary implications for the HVAC and sheet metal industry.

Task Force Response – The results of FMI's preliminary analysis were shared with the Task Force and implications for the HVAC and sheet metal industry, as well as individual stakeholders, were developed.

Report Documentation – FMI's analysis and the Task Force's feedback were incorporated into this final document.

An illustration that summarizes the research methodology is provided in Exhibit 1 below.

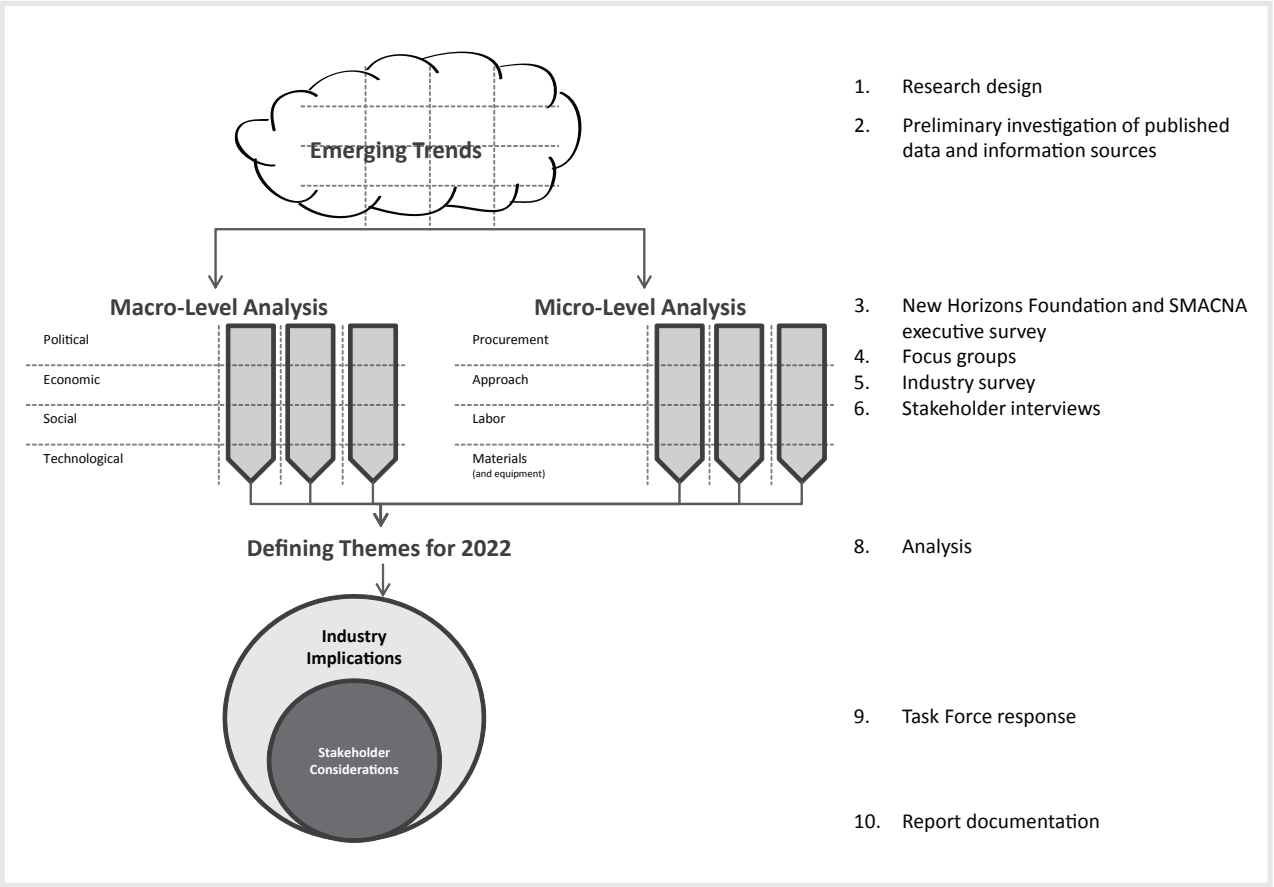


Exhibit 1: Future Study Update Research Methodology

***Source**: FMI*

11 APPENDIX 3: PUBLIC-PRIVATE PARTNERSHIP

Public-private partnership (P3) describes a government service or private business venture, which is funded and operated through a partnership of government and one or more private sector companies. P3 involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. In some types of P3, the cost of using the service is borne exclusively by the users of the service and not by the taxpayer. In other types (notably the private finance initiative), capital investment is made by the private sector on the strength of a contract with the government to provide agreed services and the cost of providing the service is borne wholly or in part by the government. Government contributions to a P3 may also be in kind (notably the transfer of existing assets). In projects that are aimed at creating public goods like in the infrastructure sector, the government may provide a capital subsidy in the form of a one-time grant, so as to make it more attractive to the private investors. In some other cases, the government may support the project by providing revenue subsidies, including tax breaks or by providing guaranteed annual revenues for a fixed period.

Typically, a private sector consortium forms a special company called a "special purpose vehicle" (SPV) to develop, build, maintain and operate the asset for the contracted period. In cases where the government has invested in the project, it is typically (but not always) allotted an equity share in the SPV. The consortium is usually made up of a building contractor, a maintenance company and bank lender(s). The SPV signs the contract with the government and with subcontractors to build the facility and then maintain it. In the infrastructure sector, complex arrangements and contracts that guarantee and secure the cash flows and make P3 projects prime candidates for project financing. A typical P3 example would be a hospital building financed and constructed by a private developer and then leased to the hospital authority. The private developer then acts as landlord, providing housekeeping and other non-medical services while the hospital itself provides medical services.

12 APPENDIX 4: NEW HORIZONS FOUNDATION AND INDUSTRY LEADERS SURVEY

The HVAC and Sheet Metal Industry Futures Study: A New Horizons Foundation Project

Introduction: In 2008 a futures study for the New Horizons Foundation was conducted by FMI Corporation. This study included an extensive look at industry trends and drivers and involved input from a variety of industry stakeholders: HVAC/sheet metal contractors, general contractors, suppliers, architecture and engineering (A/E) firms, associations, labor, academia and others related to the industry.

The New Horizons Foundation has commissioned an update of this study (for completion in late 2011) to look at changes that have occurred in the market and their impact on our future. We ask you, as a key industry leader, to consider these questions with a 10-year view and to prepare your thoughts for discussion at the upcoming meeting in Quebec City.

Please indicate your level of agreement with the following statements: (*Check one*)

☐1 *Strongly Agree* ☐5 *Strongly Diasagree*

☐1 ☐2 ☐3 ☐4 ☐5	The emerging trade of energy/environmental specialists is expected to be a highly desired discipline in the future.
☐1 ☐2 ☐3 ☐4 ☐5	Building Information Modeling will become standard operating procedure on virtually all midsize to large projects.
☐1 ☐2 ☐3 ☐4 ☐5	Contractors doing new construction and/or large renovation work must be BIM-proficient to survive.
☐1 ☐2 ☐3 ☐4 ☐5	Of all the opportunities in the non-residential building market, the retrofit market is expected to grow at the fastest pace.
☐1 ☐2 ☐3 ☐4 ☐5	Despite the current downturn in the residential market, this market will rebound and continue to be strong in future years.
☐1 ☐2 ☐3 ☐4 ☐5	A large shift is expected in the mix of single-family units versus multi-family units.
☐1 ☐2 ☐3 ☐4 ☐5	The average size of both single-family and multi-family structures is expected to decline in terms of square feet.
☐1 ☐2 ☐3 ☐4 ☐5	A much more consolidated industry is expected to exist in the future as mergers continue through both vertical and horizontal consolidation.

☐1 ☐2 ☐3 ☐4 ☐5	New competitors in the HVAC contracting business are expected to emerge over the next decade.
☐1 ☐2 ☐3 ☐4 ☐5	In the non-residential market, larger HVAC firms are expected to become full mechanicals (even MEPs).
☐1 ☐2 ☐3 ☐4 ☐5	Globalization is inevitable in the HVAC industry.
☐1 ☐2 ☐3 ☐4 ☐5	Fewer HVAC contractors will do their own fabrication.
☐1 ☐2 ☐3 ☐4 ☐5	The HVAC industry has a severe image problem that will be extremely difficult to overcome.
☐1 ☐2 ☐3 ☐4 ☐5	A labor shortage in the HVAC industry will exist and will continue to grow.
☐1 ☐2 ☐3 ☐4 ☐5	A more flexible, just-in-time training model will exist to enhance efficiency, and a more "pay-for-performance" culture will evolve.
☐1 ☐2 ☐3 ☐4 ☐5	The current labor intensity of HVAC work will be decreased.
☐1 ☐2 ☐3 ☐4 ☐5	The HVAC industry will become a significant player in the solar installation business.
☐1 ☐2 ☐3 ☐4 ☐5	Labor unions in the building industry are expected to decline without reorganization, consolidation and repurposing.
☐1 ☐2 ☐3 ☐4 ☐5	The union membership of the successful trade union in 10 years will represent the demographics of the workforce.
☐1 ☐2 ☐3 ☐4 ☐5	Union strength and geographic market positioning will remain severely misaligned with future construction activity.
☐1 ☐2 ☐3 ☐4 ☐5	Breakthrough technology changes will occur in the industry.
☐1 ☐2 ☐3 ☐4 ☐5	Various forms of factory-built construction (ranging from manufacturing housing to modularization and panelization) will significantly increase.
☐1 ☐2 ☐3 ☐4 ☐5	HVAC contractors and manufacturers will offer a complete analysis of the carbon footprint and provide documentation and advice to meet increasing green requirements of owners.
☐1 ☐2 ☐3 ☐4 ☐5	The relatively homogeneous market of today with many fabrication-installation firms is expected to be replaced by a highly niche-oriented market.
☐1 ☐2 ☐3 ☐4 ☐5	The expected leaders within the HVAC contracting community are expected to be leaders in LEED/energy management/green building/sustainability practices.

Critical Issues for Consideration

A. What are the three biggest issues and challenges facing the HVAC/sheet metal industry in the next 10 years?

1. _____
_____
_____

2. _____
_____
_____

3. _____
_____
_____

B. What will be the most significant difference in the next 10 years in these areas:

HVAC Equipment: _____
_____

Labor: _____
_____

Technology:
_____

_____

HVAC Work Type: _____
_____

Industry Structure: _____
_____

Optional

Name: _____ Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

13 APPENDIX 5: INDUSTRY SURVEY

Demographics

1. Which of the following best describes your organization?

   ☐ Architecture and/or engineering firm

   ☐ Construction manager or general contractor

   ☐ HVAC and/or sheet metal contractor

   ☐ Industry/Trade association

   ☐ Manufacturer

   ☐ Owner

   ☐ Other (please describe)

   _____

2. Is your company union, non-union or both?

   ☐ Union

   ☐ Non-union

   ☐ Both

3. What is your organization's primary construction sector focus?

   ☐ Residential

   ☐ Commercial

   ☐ Industrial

   ☐ Institutional

Trends

Each of the following potential trends were identified through a broad literature scan and a series of focus groups with and survey of industry stakeholders. They do not represent the entirety of trends that may considerably alter the procurement and delivery of HVAC and sheet metal construction-related services.

The first set of potential trends are general and not necessarily construction or HVAC and sheet metal specific. However, they could have significant influence on this industry. We have organized these trends in four groups: Political, Economic, Social and Technology. For each group, you are asked to rate the trends two ways. First, you will be asked how likely you believe each trend will occur within the next 10 years. Second, you will be asked how impactful you believe they will be on the HVAC and sheet metal industry.

Political

4. Ideological polarization will intensify resulting in greater legislative gridlock and fewer new rules and regulations					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
5. Government oversight will intensify, leading to more onerous intrusion in the conduct of business					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
6. Government indebtedness will result in significant tax increases, deep spending cuts or some combination of the two					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
7. Spending cuts will disproportionately target capital construction projects					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Economic

8. Economic malaise will permeate for several more years, followed by a slow-paced recovery					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
9. Inflation will rise sharply, particularly among the price of commodities (and therefore building products)					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
10. Access to capital will be limited					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
11. Segregation of the "haves" and "have nots" will widen, resulting in fewer buyers capable of investing in capital construction projects					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Social

12. Urban infill will represent the majority of future construction activity as job and lifestyle choices favor cities					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
13. Energy-efficient buildings and building systems will be the norm					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
14. Business practices will have to change to cater to an aging and more diverse workforce					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
15. Stubbornly high unemployment will persist					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Technology

16. Traditional design and construction roles and responsibilities will be challenged and distinctions blurred (e.g., mechanical contractor performing more design work)					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
17. Introduction of more complex/sophisticated equipment as demands for energy efficiency and related performance enhancements/expectations increase					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
18. Younger generations will have greater proclivity toward the use of technology, increasing the rate of new technology adoptions					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
19. Increasingly rigid building codes will require special licensing that tend to favor larger firms					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

The second set of potential trends are construction and/or HVAC and sheet metal industry-specific. Just as you rated the general trends according to their likelihood of occurrence and potential impact, do the same for these specific industry trends. They too have been organized in four groups: Procurement, Applications, Labor and Materials.

Procurement

20. Procurement of construction services will become more centralized					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
21. A solutions-based approach (e.g., consultancy, value engineering) to construction services will become the preferred model					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
22. There will be greater integration of the delivery of the mechanical, electrical and plumbing systems					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
23. MEP contractors will become more of an installer as the GC/CM purchases more of the equipment					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Approach

24. Demand for construction services will be strongest in renovation and replacement applications					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
25. Modularization/factory-built will become more commonplace					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
26. Technological improvements will merge MEP systems					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
27. MEP contractors are likely to lead fewer energy related projects over the next 10 years as new technology allows CMs/GCs and other trades to compete					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Labor

28. The attractiveness of the industry to new potential entrants will be reduced					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
29. Pensions, health care and related unfunded liabilities will be more acute issues for the unions					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
30. Improved technologies will reduce the installers to plug and play (less skill requirements)					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
31. Mergers and acquisitions/consolidation among union firms will be challenged					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

Materials (and Equipment)

32. Material cost increases are very likely and are expected to result in new waves of increasingly novel, or alternative, types of materials being introduced into the construction process and HVAC systems					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
33. Increased regulations (e.g., OSHA, MSHA, EPA) will contribute to rising material costs					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
34. There will be continued emphasis on utilizing sustainable/ recycled materials designed to enhance productivity and support the green movement					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
35. Expected shortages in traditional material supplies will lead to higher usage of non-traditional materials that are newly developed and may not even be known about today					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

This third and final section follows the same pattern as the prior two, but it specifically asks about the future structure of the HVAC and sheet metal industry.

Industry Structure

36. HVAC and sheet metal construction will be viewed as a commodity with little opportunity for differentiation and purchased on price					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
37. Consolidation within the HVAC and sheet metal industry will accelerate leading to fewer but much larger contractors					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
38. There will be a definitive separation of the design, fabrication and installation of HVAC and sheet metal products and services					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact
39. The HVAC and sheet metal industry will be increasingly challenged to find qualified labor					
Likelihood of occurrence	☐ Very likely	☐ Somewhat likely	☐ Possibly	☐ Somewhat unlikely	☐ Very unlikely
Potential impact	☐ Very impactful	☐ Impactful	☐ Moderate impact	☐ Little impact	☐ No impact

40. Do you have any final thoughts or comments?

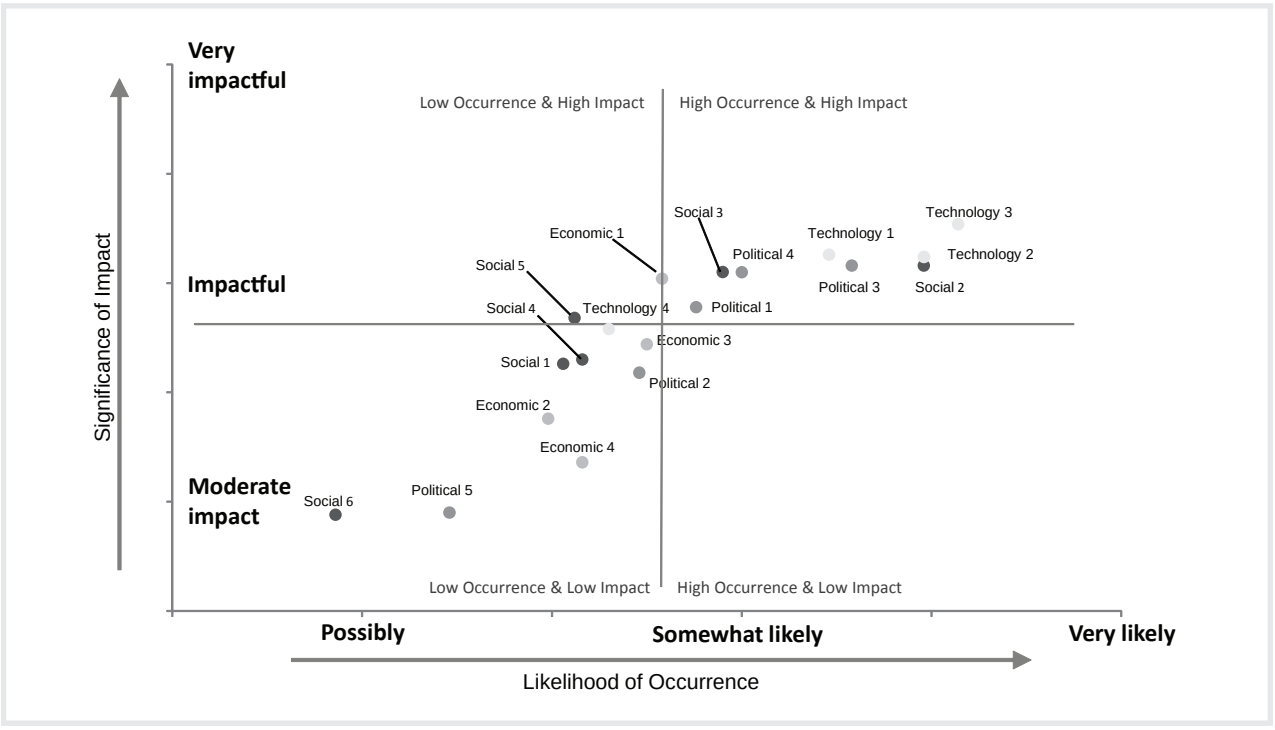
41. Would you be willing to discuss the results of the survey with a member of the FMI research team by telephone at a later date?

☐ Yes ☐ No

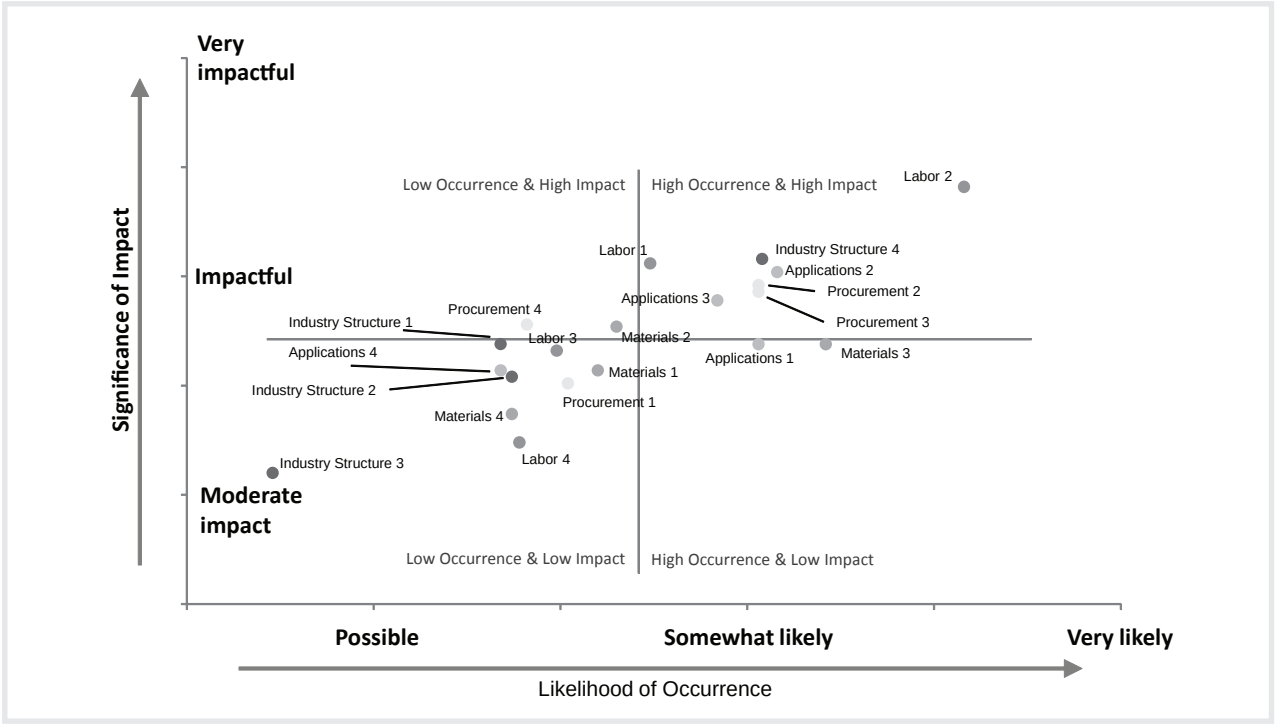
14 APPENDIX 6: INDUSTRY SURVEY RESULTS

The following scatter plots were developed from the survey responses of more than 400 industry stakeholders. Respondents were asked to rate categorical trends (political, economic, social, technological, procurement, approach, labor and materials) based on the respondent's believed significance of impact and likeliness to occur. Each response was assigned a numerical value (i.e., very likely =5, unlikely =1, very impactful = 5 and no impact = 1) and plotted on a graph. The graphic visually demonstrates the industry consensus regarding the weight of impact and likelihood of occurrence of each trend and identifies those trends that are most likely to significantly shape the industry on the 10-year horizon.

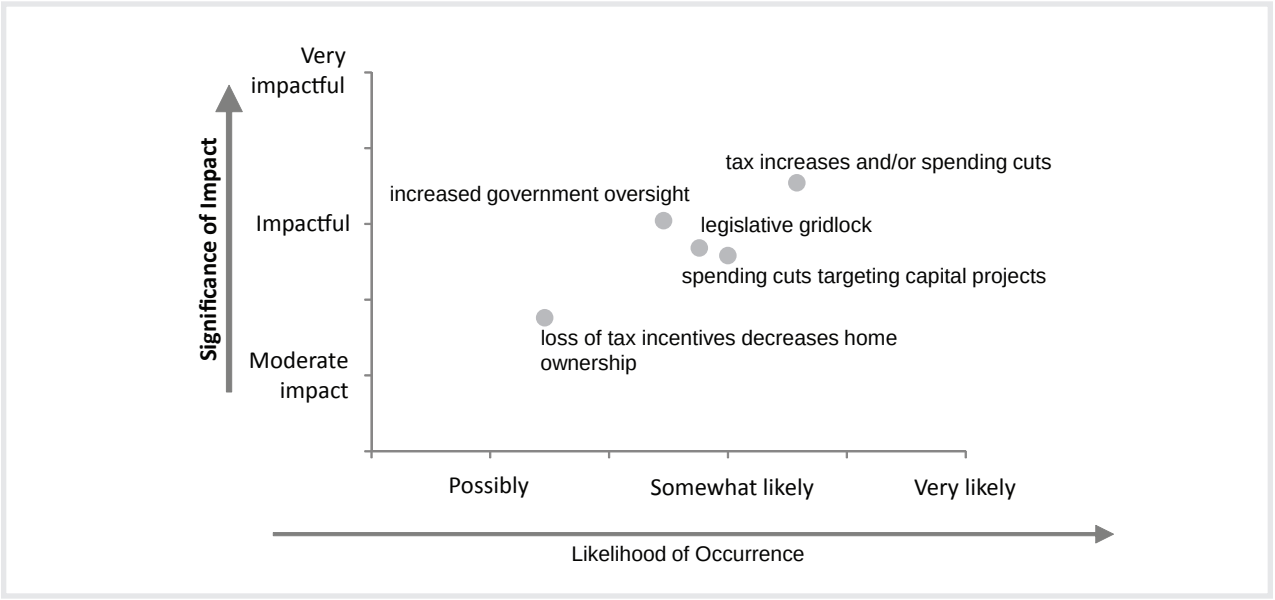
Macro-Level



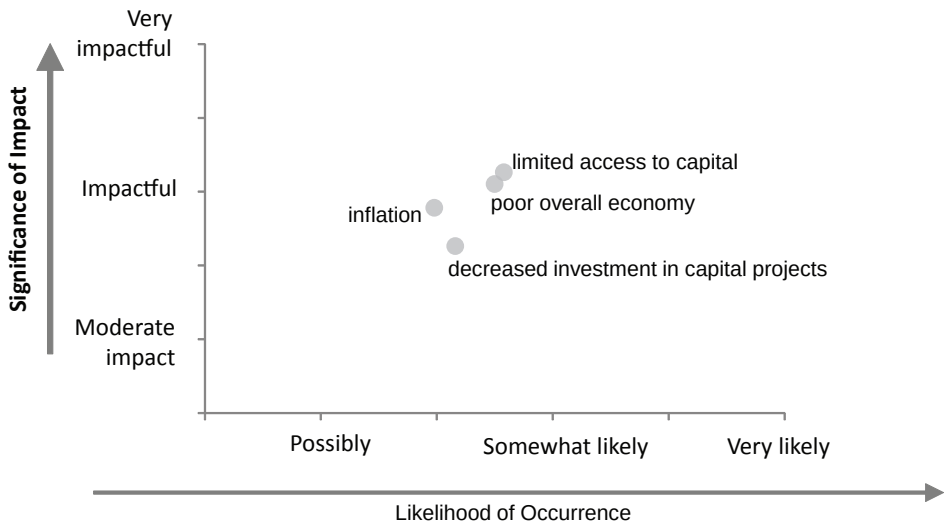
Micro-Level



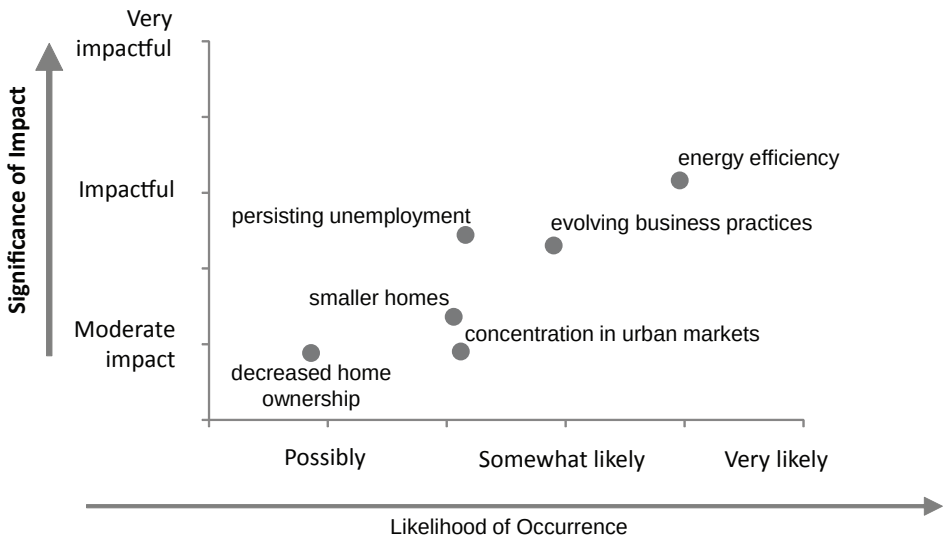
Political



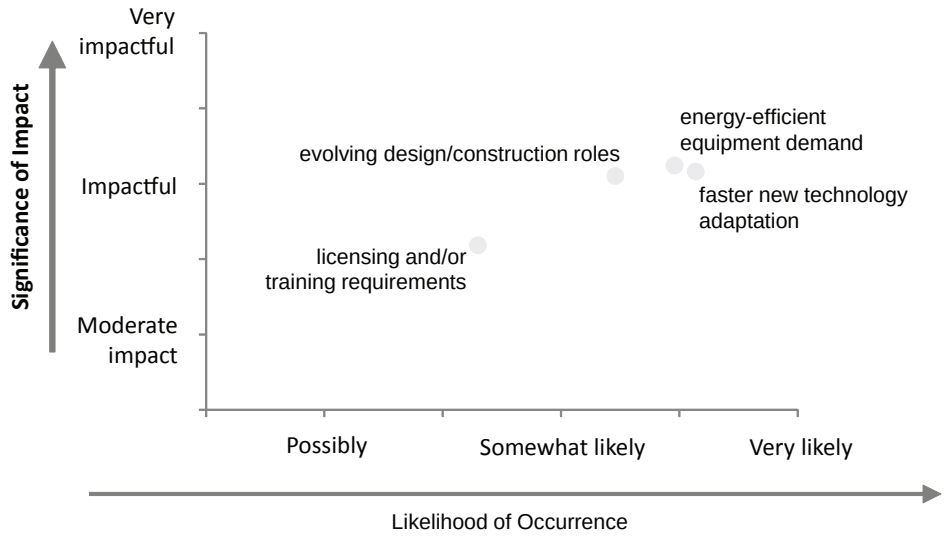
Economic



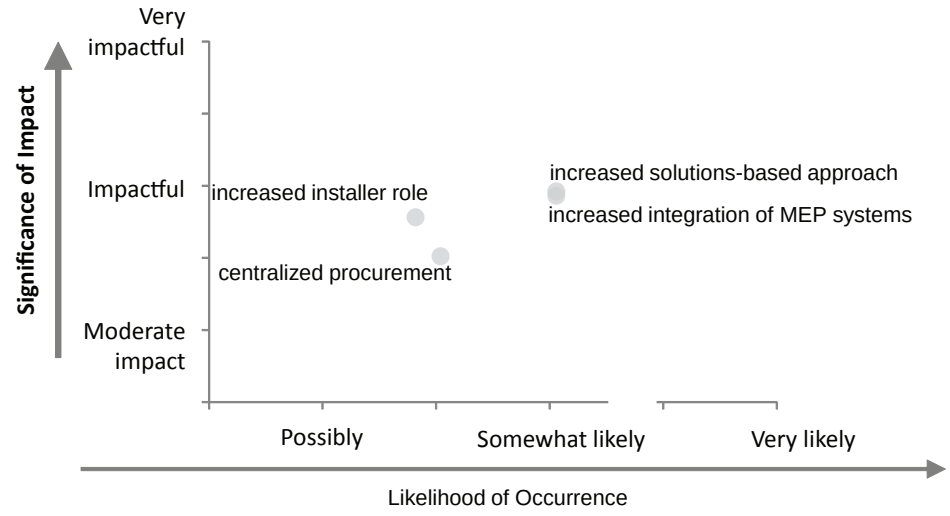
Social



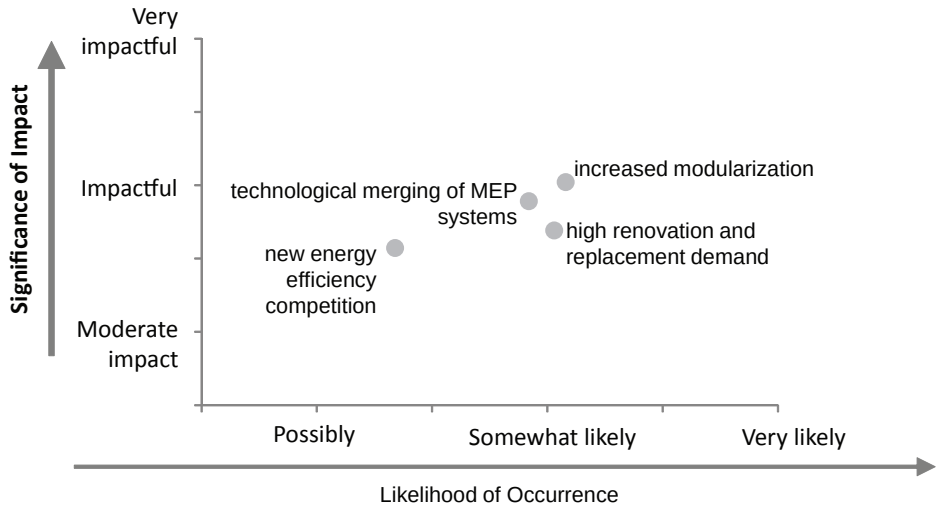
Technological



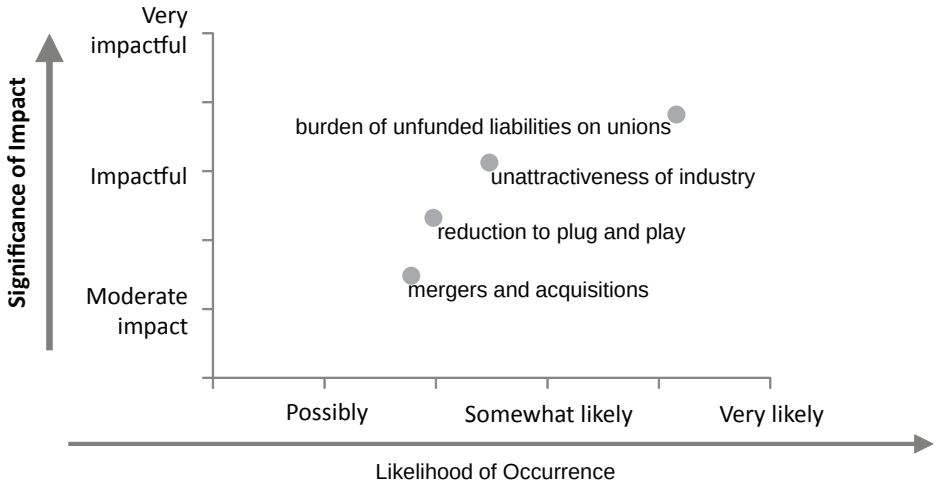
Procurement



Approach



Labor



Materials (and Equipment)