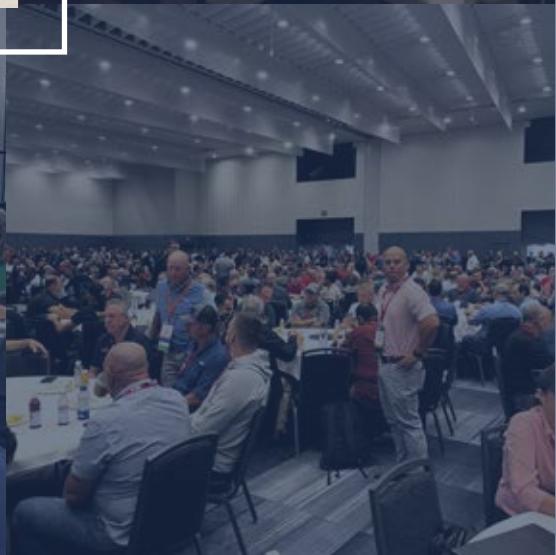


# SBCA<sup>TM</sup>



## 2023 – 2027 **Strategic Plan**

Created January 2023





## Strategic Plan

# Table of Contents

- 3 A Letter from the Executive Director and President, Board of Directors**
- 4 SBCA 2022-2023 Strategic Planning Group**
- 4 Mission and Vision**
- 6 Strategic Pillar 1: Grow and Engage Membership**
- 7 Strategic Pillar 2: Innovate and Adapt**
- 8 Strategic Pillar 3: Demonstrate Expertise**
- 9 Activating SBCA's 2023- 2027 Strategic Plan**
- 10 SBCA 2023 Board of Directors**
- 11 Communication Plan**
- 11 Execution Plan**
- 12 Appendix**
- 13 Summary of Survey Results**
- 16 SBCA 2020 Strategic Plan Overview**
- 17 Scanning the Macroenvironment**



# A Letter from the **Executive Director and President, Board of Directors**

This five-year strategic plan serves as a roadmap for SBCA to meet its mission of helping its members and affiliated partners to run successful, growing, and profitable companies. It is with that purpose in mind that the SBCA Board of Directors in late 2022 and early 2023 crafted the strategic pillars focused on three critical areas: membership growth and engagement, innovation and adaptability, and demonstrating expertise.

For 40 years, SBCA has been delivering outstanding educational and networking opportunities for its over 800 members. With its dedicated Board of Directors providing oversight, foresight, and insight, combined with a highly skilled, talented, and committed staff, SBCA is poised for growth, innovation, and alliances with key industry partners.

SBCA takes seriously its role to advocate for the interests of its members and to help them and other industry partners in their quest for building high quality structures. Being the central repository for up-to-date, efficient, and safe building practices is how SBCA intends to serve its key constituents, and to lead the way in the structural building components industry.

We are proud to share this strategic plan with you and look forward to going on the journey to achieve our vision of a building industry that uses high quality building components provided by SBCA member companies.

A handwritten signature in blue ink that reads "Jess Lohse".

**Jess Lohse**

SBCA Executive Director

A handwritten signature in blue ink that reads "Gene Frogale".

**Gene Frogale**

President, Board of Directors

SBCA 2022-2023

# Strategic Planning Group

## *Members:*

Gene Frogale  
Jeff Taake  
Larry Dix II  
Mike Ruede  
Roger Helgeson  
Jeff Smith  
Greg Griggs  
BJ Louws  
Jason Hikel  
Justin Richardson  
Howard Gauger  
Scott Ward  
Rick Parrino  
Joe Hikel  
Chris Breedlove  
Cheryl Lewis  
Shawn Overholtzer

## *Staff:*

Jess Lohse  
Molly Butz  
Ashley Nuess  
Ali Saladin  
Sean Shields

## *Strategic Plan Facilitators:*

Paula Widerlite  
Michael Galbus

# Mission and Vision

## Mission Statement

*(Why We Exist)*

SBCA members will gain the knowledge and power to run successful, growing, profitable companies offering a compelling competitive advantage in the marketplace for their customers and professional growth for employees.

## Vision Statement

*(What We Hope to Achieve)*

The building industry will use high quality building components provided by SBCA member companies.

# Mission and Vision

## Purpose

We provide the resources and services our membership needs to continue expanding the market share of all structural building components by promoting the common interests of those engaged in manufacturing trusses, wall panels, and related structural components to ensure growth, continuity, and increased professionalism, which will strengthen the structural building component manufacturing industry's influence.

## Action

SBCA formulates policy that protects and advances the interests of its members by initiating and carrying out projects that address membership concerns and promote industry market place interests.

SBCA acts as the voice of the structural building components industry to legislative, regulatory, and standards-generating agencies.

SBCA provides membership services, including addressing technical questions, serving members through the creation of various products and publications, and providing support to each SBCA committee, council, and chapter.

SBCA supports each of its chapters to enable our industry to put a human face on the structural building components industry.

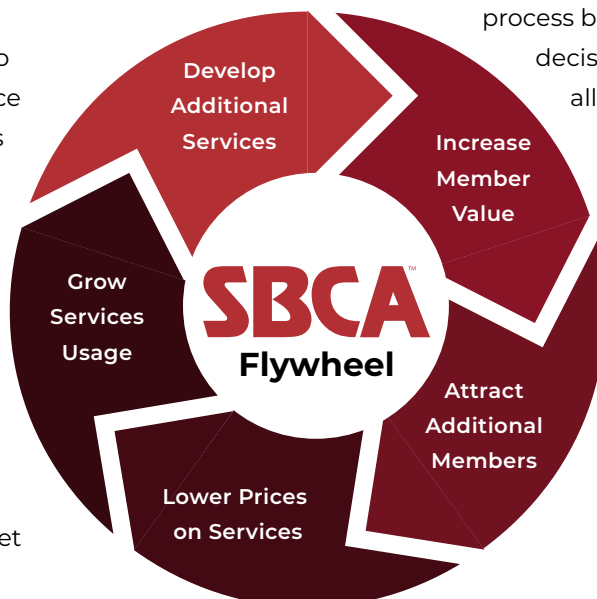
SBCA supports research and development of structural building components – trusses, wall panels, and related structural components – to root the industry in sound engineering and improve the quality, efficiency, and cost-effectiveness of these products, for the purpose of achieving greater market acceptance and design specification.

## Drafting a Plan

This plan provides a roadmap for SBCA to boost member value while engaging constituents surrounding component manufacturers (CMs) in the supply chain. We will strengthen our position as the authority on structural building components, and expand our reach and focus on offsite construction throughout North America. The strategic planning process involved stakeholders from across the United States, with a subset meeting several times to synthesize member surveys and non-member focus group information prior to an in-person workshop consisting of the full group that produced a draft strategic plan.

The group expanded upon SBCA's previously created (2019) mission and vision led by Widerlite Consulting and Coaching to overlay Jim Collins' Flywheel model found in his book *Good to Great*. This allowed the strategic planning process to explore greater depths to better define three strategic pillars, each with clearly defined goals and specific strategic initiatives.

The Flywheel conveys that change is not a single action but an iterative process building on many decisions and actions, all directed towards a common vision. SBCA's Flywheel focuses on increasing member value, growing membership, and developing valuable services.





## Strategic Pillar 1:

# Grow and Engage Membership

*As a member-centric organization, SBCA will retain and recruit members by meeting and advocating for the needs of building component manufacturers.*

## 1.1

**SBCA will attract new and further engage existing members with value added services.**

**STRATEGIC GOAL:** By 2027, SBCA will achieve membership from at least 25% of the market opportunity of component manufacturers and maintain a 97% retention rate.

### 1.1.1.

Define, promote, and market the SBCA membership value.

### 1.1.2.

Emphasize and enhance additional networking opportunities for members.

### 1.1.3.

Increase the active engagement of members throughout all levels of SBCA.



## Strategic Pillar 2:

# Innovate and Adapt

*SBCA will be a catalyst and incubator for innovation in the structural building component manufacturing space and will implement strategies to address environmental factors in the offsite construction industry.*

## 2.1

### Innovate and adapt SBCA to the changing environment.

**STRATEGIC GOAL:** By 2027, SBCA will attract at least 10 new innovators and 10 innovations that improve systems, processes, and/or services that are adopted and make a business impact for our members.

### 2.1.1.

Attract, encourage, and recognize innovators in the structural building component manufacturing and offsite construction industry.

### 2.1.2.

Create and implement strategies to address the environmental factors (e.g., ongoing consolidation in the industry, workforce shortage, economy, etc.).







## Strategic Pillar 3:

# Demonstrate Expertise

*In order to remain relevant and to add value for its constituents, SBCA will position itself as an expert in structural building component manufacturing and offsite construction.*

### 3.1

**Establish and recognize SBCA as the structural building component manufacturing and offsite construction resource knowledge center to increase market share for building components.**

**STRATEGIC GOAL:** By 2027, SBCA will launch a preferred knowledge center for its members and constituents that keeps them engaged.

#### 3.1.1.

Create, implement, and resource the structure to provide industry specific support and service.

#### 3.1.2.

Promote an easily accessible knowledge center.

#### 3.1.3.

Modernize and deploy educational and training curriculum for constituents.

#### 3.1.4.

Advocate on behalf of the interests of SBCA members with its constituency groups.



# Activating SBCA's 2023-2027 Strategic Plan

## Understand the Component Manufacturing Landscape

- ▶ Work with industry partners to definitively understand all CM locations throughout North America.
- ▶ Continue to identify the needs of member and non-member component manufacturers and framers.
- ▶ Develop the necessary tools and processes to properly engage non-members.

## Communicate the Value

- ▶ Develop and support the necessary messages and identify the most effective mediums to increase awareness, educate, and engage members and targeted constituencies on the value of SBCA membership.
- ▶ Develop and declare SBCA's short-term and long-term goals and identify metrics to advance SBCA.

## Focus on the Future

- ▶ Identify opportunities to advance offsite framing techniques and engage innovation to the betterment of SBCA members.
- ▶ Effectively communicate the value and market potential for innovators looking to engage the structural building components industry.
- ▶ Ensure future framing techniques include structural framing components and sound installation techniques.

## Exhibit Industry Knowledge

- ▶ Act as the leading resources for members, non-members, and other constituencies on topics relating to structural building components.
- ▶ Utilize SBCA's domain expertise to engage others in the construction supply chain.
- ▶ Advocate on behalf of SBCA's interests to ensure a beneficial long-term operating environment for SBCA members.

## Review and Recalibrate

- ▶ Commit to consistent assessment of progress, goals, needs, and execution of SBCA's 2023-2027 Strategic Plan.
- ▶ Perform a 360° review of SBCA's Strategic Plan near the end of 2025 to ensure it remains relevant and useful to the organization, and if not, make proper adjustments.

# SBCA 2023 Board of Directors

## President

### **Gene Frogale**

*President*  
Annandale Millwork & Allied Systems

## President-Elect/Treasurer

### **Jeff Taake**

*VP Manufacturing & Comm.*  
*Sales, Reg. Manager*  
Mead Lumber Co.

## Secretary

### **Larry Dix II**

*Owner*  
Apex Truss

## Past President

### **Mike Ruede, Sr.**

*EVP/COO*  
A-1 Industries

## Executive Committee Representatives

### **Roger Helgeson**

*President*  
The Truss Company & Building Supply

### **BJ Louws**

*President*  
Louws Truss, Inc.

### **Jeff Smith**

*President/CEO*  
Trussway

## Associate Representatives

### **Mike Callahan**

*Director - East Region & Latin America*  
Kyocera-SENCO Industrial Tools

### **Joe Halteman**

*Vice President*  
Wood Tech Systems - Fishers

### **Kevin Kraft**

*VP & General Manager*  
Alpine, an ITW Company

## NFC Representative

### **Chris Tatge**

*Co-Owner*  
Dynamic Construction

## At-Large Representatives

### **Greg Griggs**

*SVP Manufacturing*  
Builders FirstSource

### **Jason Hikel**

*IT Director*  
Shelter Systems

### **Rachel Hoops**

*B2B Sales Manager*  
LMC - Lumbermens  
Merchandising Corp.

### **Ken Kucera**

*VP Installed Sales & Manufacturing*  
84 Lumber

### **Tom Kurowski**

*National Director of Manufacturing*  
US LBM

### **Cheryl Lewis**

*CEO*  
NVO Construction

### **Shawn Overholtzer**

*Market Component Manager*  
California Truss Frame/BFS

### **Rick Parrino**

*General Manager*  
Plum Building Systems LLC

## Chapter Representatives

### **Greg Dahlstrom**

*Sr Mgr. of Mfg. Tech*  
US LBM

### **Howard Gauger**

*Engineering Department Manager*  
Carpenter Contractors of America

### **Josh Hendrickson**

*Director of Sales*  
Wilson Lumber

### **Joe Hikel**

*President/CEO*  
Shelter Systems

### **Paul Johnson**

*Director of Technical Services*  
UFP San Antonio

### **Chris Lambert**

*General Manager*  
Builders FirstSource

### **David Mitchell**

*General Manager*  
Engineered Building Design, L.C.

### **Justin Richardson**

*President*  
Richco Structures

### **Steve Strom**

*VP Oregon Operations*  
The Truss Company & Building Supply

### **Scott Ward**

*Principal*  
Southern Components, Inc.

### **Javan Yoder**

*Executive Vice President*  
Stark Truss Company, Inc.





# Communication Plan

This strategic plan has the full endorsement of its Board of Directors, leadership, and staff. Therefore, it is imperative that the strategic plan be made available and understood by all stakeholder groups and individuals engaged in the structural building components industry. The communication plan will include a multi-media strategy that will start with public posting on SBCA's website. That URL will be shared with the membership and other stakeholders via direct email, *SBCA Magazine*, *SBCA Industry News*, and social media. In addition, the development and content of this strategic plan will be highlighted in subsequent videos and podcasts, and through other relevant media channels.

---

## Execution Plan

The old adage of a strategic plan drafted with much fanfare that “sits on a shelf collecting dust” cannot be the destiny of this five-year strategic plan with a ten-year vision. A formal strategic management system will be designed to put in place accountability for the strategic plan's execution.

The Board of Directors has fulfilled its fiduciary responsibility of foresight and insight by leading and participating in the development of the strategic plan. The management team of SBCA will take the lead in detailing time-bound action steps to achieve each strategic initiative. It will estimate resources, both capital and operating, necessary for implementation. It will track its progress at quarterly monitoring meetings and report to the Board of Directors so that it can fulfil its duty of oversight.

### *Board Responsibilities:*

Insight, Oversight, Foresight

### *Staff Responsibilities:*

Estimate Resources,  
Take Action, Track Progress,  
Ask for Help



# Appendix

## Strategic Initiatives Prioritized:

1. Attract, encourage, and recognize innovators in the structural building component manufacturing and offsite construction industry **2.1.1.**
2. Modernize and deploy educational and training curriculum for constituents **3.1.3.**
3. Define, promote, and market the SBCA membership value **1.1.1.**
4. Create, implement, and resource the structure to provide industry specific support and service **3.1.1.**
5. Increase the active engagement of members throughout all levels of SBCA **1.1.3.**
6. Promote an easily accessible knowledge center **3.1.2.**
7. Create and implement strategies to address the environmental factors (e.g., ongoing consolidation in the industry, workforce shortage, economy, etc.) **2.1.2.**
8. Emphasize and enhance networking opportunities for members **1.1.2.**
9. Advocate on behalf of the interests of SBCA members with its constituency groups **3.1.4.**





# Summary of Survey Results

In advance of its quarterly meeting in January 2023 in Phoenix, AZ, the Structural Building Components Association (SBCA) engaged Widerlite Coaching and Consulting (WC&C) to design and facilitate the SBCA strategic planning process. This is the firm's first engagement with SBCA.

To prepare for the creation of the strategic plan, WC&C administered an electronic survey to the Board of Directors, Association Presidents, and Staff members. The survey input serves to inform and focus the development of a future strategy and tactical plans.

## Survey Questions

The strategic planning survey questions were:

1. What is the **VALUE PROPOSITION** for SBCA?
2. How is SBCA perceived among its constituents? How does it want to be perceived?
3. Over the next five years, what do you believe are the top three to five **STRATEGIC OPPORTUNITIES** facing SBCA?
4. Over the next five years, what do you believe are the top **STRATEGIC CHALLENGES**? What should SBCA do to mitigate these challenges?
5. What **LIMITATIONS, BARRIERS, and OBSTACLES** will SBCA face that will get in the way of achieving this plan?
6. When the strategic plan is completed, what would SBCA be most proud to have accomplished?
7. Finish the following sentence: "I'll be satisfied with our strategic planning retreat if..."
8. What is important to know, that was not asked?



# Summary of Survey Results (cont.)

## Survey Respondents

The survey was sent to a total of 22 individuals. The following team members completed the pre-strategic planning survey which yielded a 77 percent response rate:

Chris Breedlove	Jason Hikel	Michael Ruede
Larry Dix II	Cheryl Lewis	Sean Shields
Gene Frogale	Jess Lohse	Jeff Smith
Howard Gauger	BJ Louws	Jeff Taake
Gregg Griggs	Ashley Nuess	Scott Ward
Roger Helgeson	Justin Richardson	

In the analysis and synthesis across all survey responses, several major messages emerged as recurring themes from the feedback. The major messages and common themes which emerged across all responses to all questions were:

### **Grow the Membership by Providing Value-Added Services and Targeting New Markets**

- ▶ Promote, Market, and Increase the SBCA Membership Value
- ▶ Provide Networking Opportunities for Members
- ▶ Grow and Expand Membership in New Markets and with New Components

### **Innovate and Adapt SBCA to the Changing Environment**

- ▶ Adapt the Organization for Ongoing Consolidation in the Industry
- ▶ Develop Long-Term Strategies to Address Shortages and Increased Costs of Labor
- ▶ Attract and Encourage Innovators in Our Industry and Adjacent Spaces

### **Establish SBCA as the Subject Matter Expert in Component and Building Design**

- ▶ Create and Implement the Premier Component and Building Design Resource Hub
- ▶ Create and Implement Educational and Training Programs
- ▶ Develop and Market SBCA's Expertise in the Industry

### **Prioritize and Effectively Resource a Clear and Aligned Strategic Plan**

- ▶ Prioritize and Implement the Critical Few Actionable Goals
- ▶ Address the SBCA Resource Constraints and Concerns





## Summary of Survey Results (cont.)

In addition to the survey, a custom macro-environmental scan was conducted to determine the forces and conditions that may impact the association and its members. The key take-aways included:

- ▶ From a long-term perspective, more housing permits are being issued each year. However, housing starts have been decreasing during the past year.
- ▶ Houses are getting smaller.
- ▶ Raw material pricing is coming back to normal after the pandemic.
- ▶ Labor is constrained.
- ▶ Automation improves efficiency but hasn't been extensively used in construction.
- ▶ The building code is driving towards more efficient homes.

The results of the team member survey served as a launch point for the Strategic Planning Task Force's decision-making process during the planning sessions. The Strategic Planning Task Force reviewed this report along with the environmental scan. The Strategic Planning Task Force then engaged in a collaborative and consensus-based discussion and decision-making process in building the strategic plan.

# SBCA 2020 Strategic Plan Overview

## SBCA VISION

The building industry will use high quality building components provided by SBCA member companies.

## SBCA MISSION

SBCA members will have the knowledge and power to successfully run growing, profitable companies offering a compelling competitive advantage in the marketplace for customers and employees.

Organizational Goals and Strategies to achieve the mission and vision.

### INDUSTRY INFLUENCE

Goal: Member companies will have more influence with suppliers and other vendors.

### COMPANY LEADERS

Goal: Company leaders will understand and apply business management and leadership techniques designed to improve company performance.

### COMPANY STAFF & STUDENTS

Goal: Managers will understand and apply common leadership and management practices designed to improve employee satisfaction and retention.

Goal: Students and other potential member company staff will have positive awareness of careers in the structural building components industry.

### MARKET DEVELOPMENT

Goal: Customers, framers, A/E, and other key stakeholders are knowledgeable about component building production and installation practices and seek out SBCA member companies for their expertise and the quality of their work.

#### Strategies:

**SBCA will** create entities designed to aggregate the buying power of SBCA member companies to aid buying decisions and reduce risk regarding lumber, technology, and equipment purchases.

**SBCA will** educate and provide tools to members on effective practices surrounding the purchase and sustained operations of critical equipment and technology.

SBCA will update and finalize a Unified Data Standard (UDS) and advocate for UDS compliant machinery as an industry best practice.

**SBCA will** educate leaders on the need for and use of a Universal Data Standard.

**SBCA will** investigate means to identify future innovations in component building and orient member leaders to the implications and potential opportunities of these innovations.

#### Strategies:

**SBCA will** create a CM Leadership Summit to support face-to-face discussion of best practices and peer community development.

**SBCA will** encourage face-to-face activities connecting relevant industry leadership designed to create engaging, CM-to-CM communities.

**SBCA will** provide templates, tools, and other resources designed to improve member company strategic leadership and decision-making surrounding lumber, technology, and equipment.

**SBCA will** aggregate relevant leadership resources, technical and risk management education and training aids, and other applicable information to position itself as a central repository of industry best practices.

#### Strategies:

**SBCA will** develop an educational curriculum for managers on leadership and management practices including PI, employment practices, leadership techniques, etc.

**SBCA will** implement a multi-mode education delivery strategy to allow for face-to-face, online, and digital education and training.

**SBCA will** support industry and, when possible, member company efforts to educate and create positive perceptions among students and other individuals interested in the structural building components industry.

#### Strategies:

**SBCA will** support local, face-to-face events and activities designed to facilitate engaging interactions that connect identified stakeholders and other key buyer influencers to discuss relevant topics.

**SBCA will** investigate means to educate stakeholders such as A/E, framers, etc., on building component production and installation practices.

# **SBCA Strategic Plan: Scanning the Macroenvironment**

November 4, 2022

v1.1

Research Conducted by M. Schett

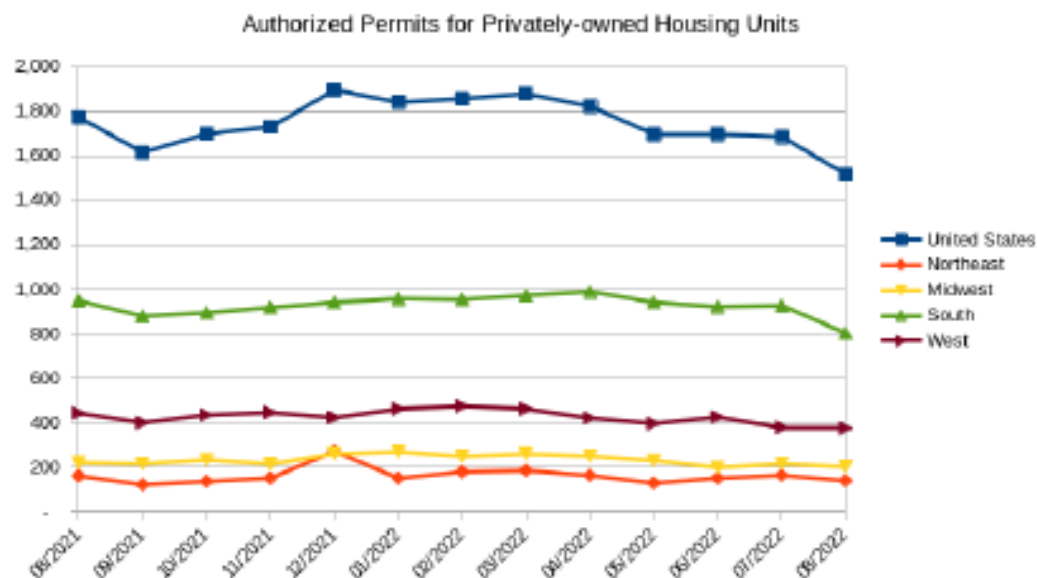
Edited by M. Galbus



## DEMAND SIDE CONSIDERATIONS: TRENDS IN CONSTRUCTION PERMIT AUTHORIZATION

The numbers in this section are based on the seasonally adjusted numbers found via Census Bureau, New Residential Construction, 2022. [1]

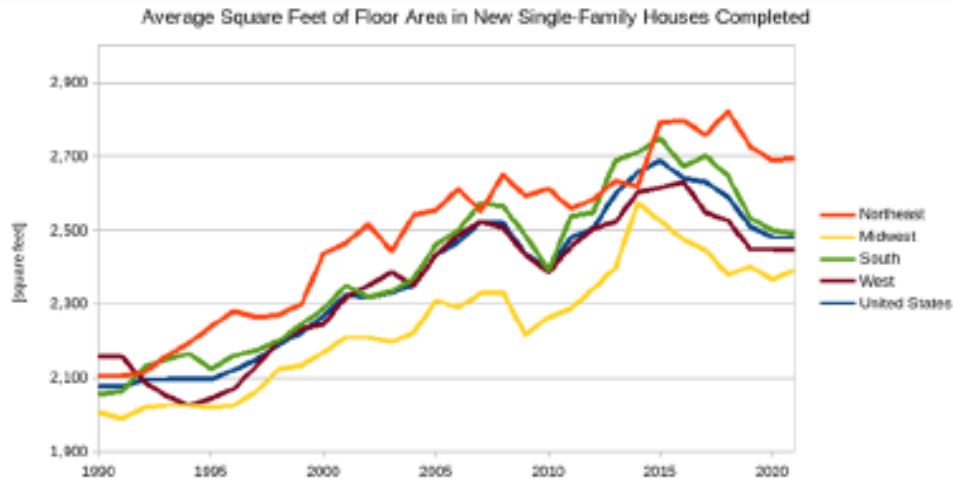
- From a longer-term perspective, there is a clear trend to more housing units being authorized each year. Since 2010, the yearly growth rate has been between 2% and 33%. During the last five years, the growth rate was between 3.6% and 18%. Overall, the number of permits has almost tripled since the lowest point after the financial crisis.
- The region with the strongest growth in this time window was the West (increase of 370%), followed by the Midwest (increase of 197%), the Northeast (increase of 153%) and, the South (increase of 111%).
- All regions show strong growth over the last few years, but particularly between 2020 and 2021 when the pandemic started. Nationwide, the number of permits grew by 18% (22% in the Northeast, 13% in the Midwest, 18% in the South, and 19% in the West).



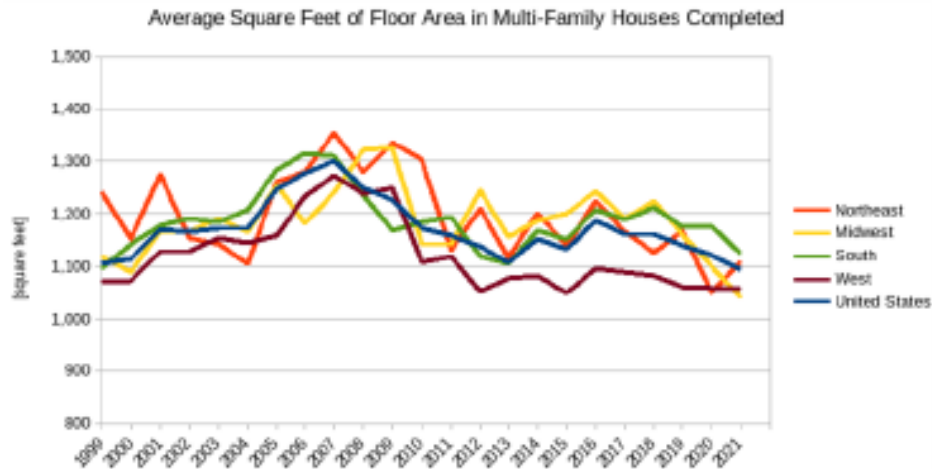
- The number of authorized permits per month has continuously decreased since the Spring of 2022 and in total 14% between August 2021 (1.77 million) and August 2022 (1.52 million).
- Overall, the decrease affected the regions of the Northeast by -14%, the South by -15%, and the West by -15%. The Midwest only noticed a reduction of -9%.
- On average across the US and within each region, a similar number of housing permits were authorized during the year as in August 2021:
  - 1.75 million housing permits for the US in total and were distributed across the regions as:
    - 162 thousand in the Northeast,
    - 232 thousand in the Midwest,
    - 927 thousand in the South
    - 426 thousand in the West

## DEMAND SIDE CONSIDERATIONS: TRENDS IN HOUSING SIZES

All observations in this section are based on information from United States Census Bureau, Characteristics of New Housing, 2022. [2]



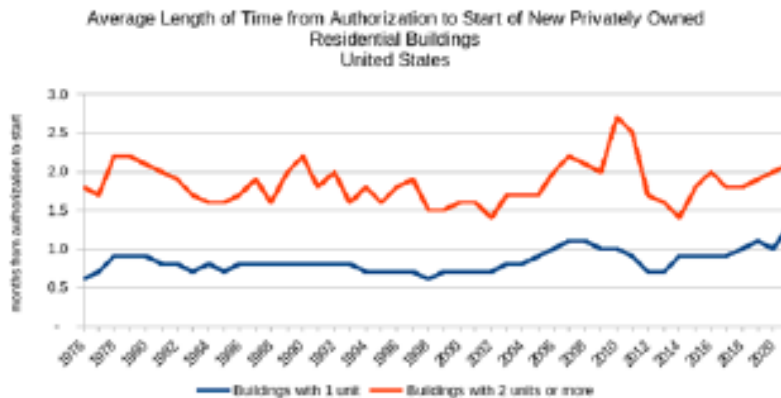
- During the last five to seven years, new single-family dwellings became smaller compared to the peak at around 2015. This was particularly the case in the Midwest, the South, and the West. There was a minor decline in the size of single-family dwellings in the Northeast.
- This recent decrease is counter to the longer term trend seen over the last several decades. That is, the size of new single-family dwellings has continuously increased other than a 2008 temporary dip.



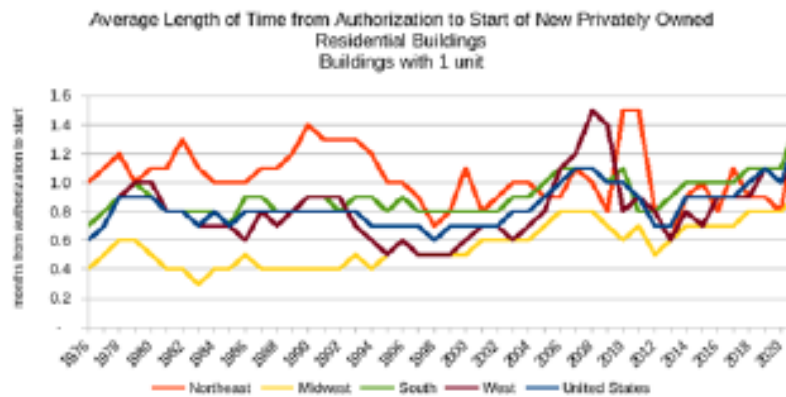
- Multi-family houses show a different picture. The average size of these homes has declined since the peak in 2008.
- After the housing crisis in 2008, the trend shows that the average size of dwellings is becoming smaller. Looking at the numbers in more detail shows that in the mid-2010s, there was a slight increase. However, during the last five to seven years the numbers are declining again, most noticeably in the Midwest.

## DEMAND SIDE CONSIDERATIONS: PRE-CONSTRUCTION TIME

All observations in this section are based on information from the United States Census Bureau, New Residential Construction - Length of Time, 2022. [3]



- The time from approval of the permit to the start of construction of single-family housing has been fluctuating between  $\frac{1}{2}$  to 1 month until the financial crisis in 2008. During 2021, the time increased to 1.3 months which is the longer than any time during the last 50 years.
- With multi-family dwellings, construction has started 1.5 to 2 months after authorization, with an exception in 2010 and 2022 when the average time was around 2.5 months. During the last five to seven years, the time between permit approval and start of construction has continuously increased by a small level to over two months for multi-unit buildings in 2021.

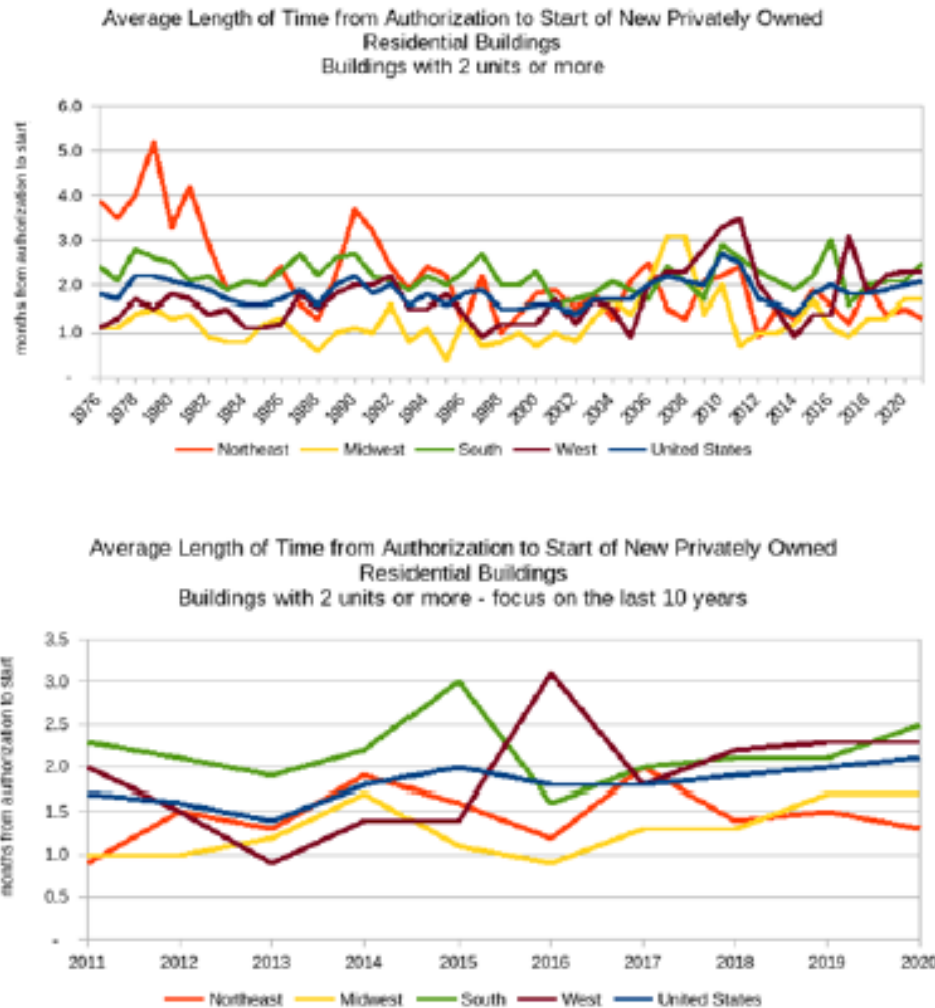


- There is a noticeable difference in the time between authorization to start construction between the four regions of the US (Northeast, South, Midwest, and West).
- While the South and West have been close to the country's average during the last few decades, the time between permit and beginning of construction was longer in the Northeast at 1 to 1.4 months and shorter in the Midwest with 0.3-0.6 months up until the early 2000s.
- During the last seven to ten years, the time between authorization and construction start has slowly but steadily increased in all regions. In 2021, the nation-wide average reached a peak which is mainly caused by the noticeable increase to 1.4 months in the Northeast and the South. In the Midwest, it has remained below one month and, in the West, just above one month.



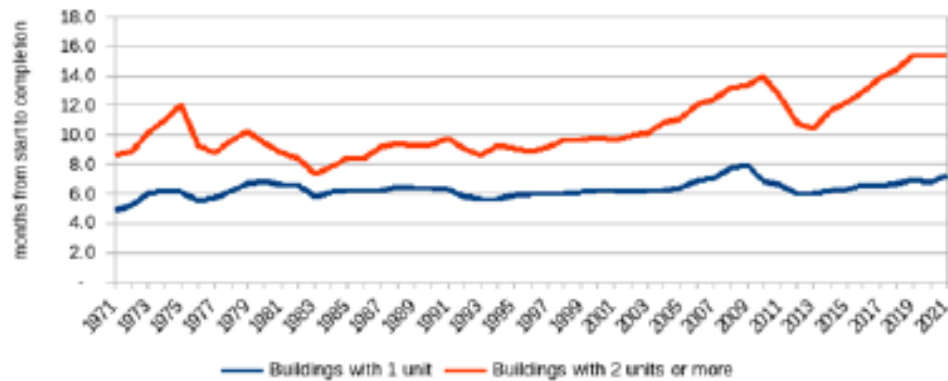
## DEMAND SIDE CONSIDERATIONS: TRENDS IN CONSTRUCTION TIME

The two graphs below show the same data. The first one shows the last 45 years, while the second one focuses on the last ten years.



- For multi-unit buildings, the trend looks different than the single-family dwellings. The variation in times between the authorization and the beginning of construction is much higher between the regions and does not clearly show a trend for the individual regions over the last 45 years. In some years, the construction start takes the longest in the Midwest. While in just a few years, the Midwest has the shortest times to start construction.
- A closer look at the last ten years reveals that in 2015 and 2016, the South and the West experienced a temporary peak in times to start construction. However, since 2017 the time to start construction has only changed to a minor extent. In most regions it has slightly increased, but in the Northeast, it has decreased in 2021, which is in strong contrast to single family units.

Average Length of Time from Start to Completion of New Privately Owned Residential Buildings  
United States



- Between the mid-1990s and up to the financial crisis in 2008, the time from start to completion of new privately owned residential buildings has increased continuously until it dropped back to early-2000s numbers.
- During the last eight to ten years, the time between start and end of construction has grown for all types of houses, but particularly for multi-family houses from 10.4 months in 2012 to over 15 months in 2019. This time exceeded the previous peak in 2010.
- In 2021, the average time between start of construction and the building construction being completed was approximately seven months for single-unit houses and 15-16 months for multi-unit houses.
- At seven months, single-family houses also require more time to be completed after construction started than in the early 2000s when it took around 6 months. Unlike multi-unit houses, the current construction times are still faster than the years shortly after the financial crisis.

## DEMAND SIDE CONSIDERATIONS: HOUSING PRICES COULD HAVE PEAKED

- All observations in this section are based on information by Paul Bergeron in *As Housing Demand Softens, Could Building Prices Finally Peak*, 2022. [12]
- Lower material prices will not necessarily mean lower construction prices for the buyer due to other factors influencing the overall price.
- While construction materials costs have climbed by 20% due to high demand and insufficient supply, in the of Spring 2022 prices have fallen by almost 50% compared to the same period in 2021.
- Prices for drywall, steel, concrete, and trusses continue to rise.
- The CEO of The Procopio Companies warns that the current peak of the prices is only temporarily.
- Steel prices have peaked at the end of 2021.
- Global supply chain issues are likely to remain in place due to Covid-19, the war in Ukraine, energy dependency, lock-downs in China, and the lack of long-term investment domestically and internationally



## SUPPLY-SIDE CONSIDERATIONS: LUMBER

All observations in this section are based on information from Nasdaq, Lumber. [4]

Figure 1: Lumber Price Development During the Last Five Years (status: 09/22/2022)



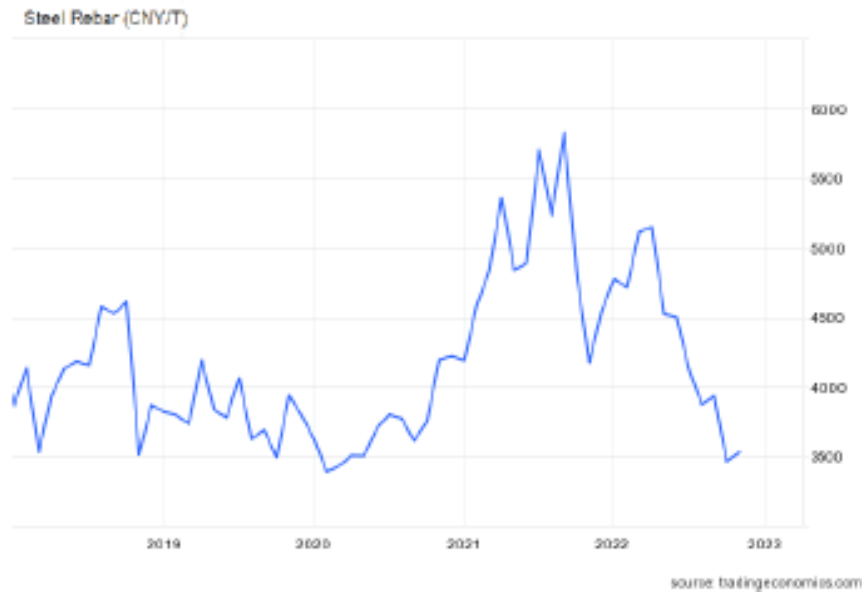
- In the years before the pandemic started, the price of lumber was between \$300 and \$600. During 2021, it reached a peak of over \$1,500. After a short decline in the fall of 2021, the price has risen again during 2022 and has recently declined to around \$500.
- Softwood lumber prices have been even more volatile since the beginning of the pandemic.
- The following reasons explain the development in lumber prices:

Tariffs	In 2021, the US introduced tariffs on cheaper Canadian lumber. In August 2022, the tariff has been lowered from 17.99% to 8.59%. [5]
Covid-19 Shutdowns	Due to predictions of a slowing housing market following shut-downs, lumber producers stopped production at first, and continued with reduced production following estimates that the housing market would cool down. [6]
Labor	Labor is short both in the production but also transportation. [6]
Supply Chain	Increase in bottlenecks in the shipping industry within ports, trucking, and rail transportation. Also, the increases were partly caused by trade barriers. [6]
Sustainable Production	Measures to establish increased sustainable forest practices. [6]
Climate	Increase of extreme weather such as freezing temperatures in the south and wildfires in the west drove variability in lumber prices. [6]
Demand	Increased demand for lumber for new building constructions, home improvement projects, and wood finishes increased demand. [6]

## SUPPLY-SIDE CONSIDERATIONS: STEEL

All observations in this section are based on Trading Economics, Steel Rebar pricing. [7]

Figure 2: Steel Price Development During the Last Five Years (status 09/29/2022)



- Steel price in the US have been under pressure during 2022 due to decreasing demand and high supply.
- The following reasons explain the development in steel prices:

Actual Demand	Decreasing demand for steel by buyers, to a large extent due to concerns about an upcoming recession leading to lower prices in the future. [8]
Expected Demand	Producers of steel, however, expect demand to remain stable or even increase due to current backlogs, and therefore they plan to increase production. [8]

## SUSTAINABILITY CONSIDERATIONS FOR CONSTRUCTION MATERIAL

- In Europe, a trend shows that buildings are more frequently built with wood instead of steel or concrete. According to an analysis, constructing 80% of the buildings with wood can lead to an absorption of 55 million tons of CO<sub>2</sub>. [9]
- Environmental benefits of building with wood products are the fact that it is the only renewable construction material. Wood can: absorb carbon; produce less waste; and it has a better energy efficiency. Producing a ton of wood generates 33kg of net emissions whereas steel generates 694 kg of net emissions. Wood products have benefits as a material in a house by providing better insulation than concrete or steel, as the Inter-American Development Bank summarizes. [10]
- However, other analyses show that timber is also a waste product at the end of the use while steel can be recycled. Timber, however, releases the embodied carbon if decomposed or incinerated. [11]



## LABOR CONSIDERATIONS: CAREER CHOICES BY HIGH-SCHOOL GRADUATES

- The number of teenagers considering a four-year college degree has dropped significantly since the beginning of the pandemic. In February and May 2020, 65% and 71%, respectively, considered doing a four-year degree. In January 2021 and September 2021 that number has decreased to 53% and 48%, respectively. 58% believe that a skill-based education such as trade skills “make sense”. [13]
- In October 2020, approximately 273,000 high school graduates continued their education in a trade school which is 1% of all high school graduates in the US. [14]
- The National Student Clearinghouse Research Center [15] states that enrollment in undergraduate and graduate programs has fallen by 4.7% between Spring 2021 and Spring 2022. The year before it fell by 4.9%. The study also shows that enrollment in construction trades grew by 19.3% in the Spring 2022. There was a decline by 8.1% in the Spring 2021 after a growth of 7.4% in the Spring 2020.
- Reasons for this trend include fewer people are enrolling in for four-year colleges; more are enrolling in trade schools; and, the number of job opportunities and higher pay in the trades. [16]
- One problem for carpentry specifically is, as identified by Hustle, kids are less exposed to carpentry. Schools have dropped wood shop classes. Between 2007 and 2014, the number of high school kids enrolling in construction class has declined; However, it rebounded again by 2019. [17]
- There is a positive shift in attitudes towards trade schools. This shift is making the trade school jobs such as carpentry more appealing. It also is showing career growth potential in their industry. [18]

## LABOR CONSIDERATIONS: TRADE WORKERS AND CARPENTRY

- After construction bounced back following the financial crisis of 2008, many carpenters have left the industry and increased the shortage that already existed before the crisis. In 2018, 90% of the single-family builders reported a shortage of rough carpenter subcontractors, and a survey from November 2021 revealed that it has increased to 93% (for framing and finished carpenters 94% and 90%, respectively, report a shortage). [17]
- An analysis by the US Bureau of Labor Statistics shows that with \$48.2k, carpenters have the lowest median pay when comparing the top 19 most common trades, while most other trades (such as tapers, brick masons, electricians, etc.) earn at least \$59k annually. [17]
- Historically, low wages for carpenters have been common for a long time but the gap has increased when comparing to electricians or plumbers. Reasons for the lower wages are that the type of work usually takes multiple weeks or months to finish instead of one day, and lower entry barriers as no licensing is required in most states. [17]

## LABOR CONSIDERATIONS: COMPUTER-AIDED DESIGNERS

- Computer-Aided Design provides several benefits to designing a building compared to the traditional way of physical drawings. These benefits include better representation and visualization, faster project delivery, improved accuracy, easier amendments, and a better way of keeping track amendments. [19]
- It is expected that demand for CAD designers will grow throughout the next decade. The Office of Occupational Statistics and Employment Projections (BLS) who considers CAD designers part of “architectural and civil drafters”, estimated a growth of 8% between 2016 and 2026 for this group. [20]

## AUTOMATION TRENDS: GENERAL AUTOMATION TRENDS

- In many industries automation is seen as competing with human workers and thereby reducing jobs, in construction this is less likely to happen. [23]
- Automation can significantly increase productivity. In agriculture, automation helped make the industry 16x as productive since the mid-50s, in manufacturing 8x as productive, while in the construction industry productivity has not changed significantly. [23]
- Opportunities for automation in construction: Automating physical tasks on the construction site, automating production of modules for modular construction (including 3D printing), and digitization of design, planning, and management procedures. [23]
- The increasing availability of Internet of Things (IoT) devices and machines means that more devices are connected, communicating with each other, and collecting data. Manufacturers can use this data to improve their processes and efficiency. [24]
- Artificial Intelligence (AI) and Machine Learning create opportunities for intelligent production automation, warehousing, and distribution. In combination with IoT and other technologies that collect and measure data, collected data can be used to identify trends, and implement predictive maintenance to reduce or avoid downtime caused by failures. The knowledge gained from the data can also be used to improve inventory management, supply chain visibility, asset tracking, forecast accuracy, or to reduce costs for warehouses and transportation. [24], [25]
- A common system of automation are robots. Robots can perform tasks that either replace workers, support them in doing tasks more efficiently, or assist them in other ways (e.g., pick and place robots). Manufacturing trends show that collaborative robots in factories and warehouses support increasing productivity without replacing workers. [24], [25]

## AUTOMATION TRENDS: 3D PRINTING TRENDS

- During the last several years, 3D printing became significantly more popular and fulfills different purposes. The figure below shows an increasing use of 3D printing for research and development, jigs, fixtures and tooling, bridge production, production parts, and repair and maintenance. [26]

Figure 3: Survey among companies about fields in which they use 3D printing

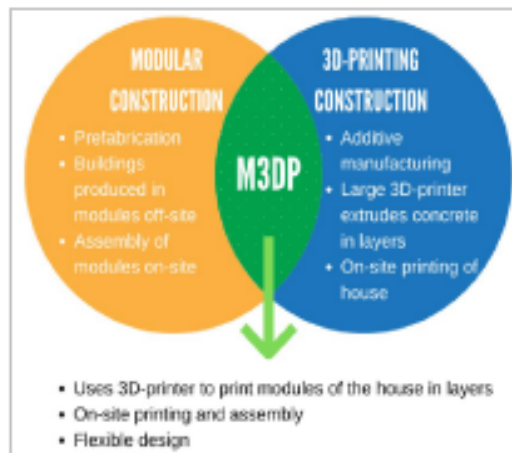
Research and development is now the most common 3D printing use case.						
In what ways is your company currently using 3D printing?						
	 Research and Development	 Prototyping	 Jigs, Fixtures and Tooling	 Bridge Production	 Production Parts	 Repair and Maintenance
2017	-	69%	30%	23%	27%	14%
2019	53%	66%	37%	39%	52%	38%
2021	73%	72%	57%	56%	62%	46%

- 3D printed houses are a new and strongly growing market. Benefits of 3D printed houses are more efficient use of material (reduction of wasted material) and less impacted by lack of labor. [27]
- Scientific research in the environmental footprint and economics of a full-scale 3D printed house in the United Arab Emirates showed that houses built using additive manufacturing and 3D printed materials are more environmentally favorable (609 kg CO<sub>2</sub> vs 1154 kg, 11.9 kg of non-carcinogenic toxicity vs 675 kg, and 194 m<sup>3</sup> vs 233 m<sup>3</sup>.) The eco-efficiency analysis showed that 3D printing was the optimum choice, and the sensitivity analysis showed that decreasing cement ratios in 3D printing can significantly decrease the environmental impact. [28]
- Manufacturers benefit from 3D printing as it is easier for them to produce individual custom components with lower material demand. [25]

## AUTOMATION TRENDS: MODULAR 3D PRINTING CONSTRUCTION TECHNOLOGY

- Modular 3D printing construction technology (M3DP) combines modular construction with 3D printing. It has the potential to create adjustable, affordable, and climate-resilient housing for people with low-income. It requires social acceptance of the projects, local expert availability, and thermal insulation needs to be included as part of the design. [29]

Figure 4: Overlap between modular construction and 3D-printing construction



- The research [29] identified the following trends within modular 3D printing construction technology:

<b>Adjustability</b>	<b>Prefabrication</b>	Smaller prefabricated structures, furniture, and piping will be constructed by smaller printers instead of depending on on-site building only.
	<b>Higher buildings</b>	3D printers will be able to be stacked on top of each other to create higher buildings (currently only one or two floors)
	<b>Disassembly</b>	Dry joints between house components, unlike wet ones, allow moving and disassembling of the building.
<b>Climate-resilience</b>	<b>Insulation</b>	Bio-based materials such as hemp and mycelium in the material mix will improve insulation compared to the current solutions.
	<b>Extreme climate</b>	Currently concrete is used because of its qualities for withstanding extreme climate, but future mixes without concrete but other, stronger materials will be more resistant to natural hazards.
<b>Affordability</b>	<b>Independence</b>	Material mixes with local materials creates independence of foreign companies
	<b>Awareness</b>	Increasing popularity of 3D printing of buildings will lead to more investment and knowledge of the technology.



## BUILDING CODE TRENDS

- Building codes need to be updated and aligned with technological advances to ensure potential energy savings and reduction of costs are implemented. The building codes applicable in 2020 create an energy savings of 30% compared to the codes from 2000 due to requirements for insulation and wall thickness. It is also cheaper to install modern heat pumps and other equipment in new construction than retrofitting existing buildings. [30]
- In 2020, California was the first state to enact standards to encourage rooftop solar panel installations on new buildings. In other states, proposals are drafted as well to change the state's building code, such as Minnesota, Michigan, or Wisconsin, while in other states are considering bans on gas in new buildings. [31]
- During the last seven years, the states on the west coast and in the northeast (with the exception of New Hampshire, Connecticut, Rhode Island, and New Jersey) as well as Nebraska and Texas have updated their state energy code for residential buildings. [32]
- The California 2022 Building Energy Efficiency Standard includes requirements for electric heat pumps, electric-ready requirements for new homes, solar photo voltaic and battery storage standards, and ventilation standards. It is applicable to new buildings, additions, and changes. [33]
- In addition to states' building codes, in June 2022 the Biden-Harris Administration announced an initiative to adopt newer building codes and standards to improve resilience of buildings towards extreme weather exposure. As part of the initiative, it is planned to review federal funding and financing of building construction, spend funding on implementation of updated building energy codes and creating jobs, motivating, and supporting communities to adopt current building codes and standards, and leading by example through implementation of resilience better than required by the code in federal buildings. [35]
- Virginia is in the process of updating its building code and proposals. Under consideration are the alignment of energy conservation codes, requirements for Air Changes per Hour (ACH), requirements for duct testing compliance, and the alignment of residential energy code for electric vehicles, and others. [36]

## REFERENCES

- 1: United States Census Bureau, New Residential Construction, 2022, <https://www.census.gov/construction/nrc/index.html>
- 2: United States Census Bureau, Characteristics of New Housing, 2022, <https://www.census.gov/construction/chars/>
- 3: United States Census Bureau, New Residential Construction - Length of Time, 2022, <https://www.census.gov/construction/nrc/lengthoftime.html>
- 4: Nasdaq, Lumber, , <https://www.nasdaq.com/market-activity/commodities/lbs>
- 5: NAHB, Canadian Lumber Tariffs Cut by More than Half, 2022, <https://www.nahb.org/blog/2022/08/lumber-tariff>
- 6: Carey Chesney, Why Is Lumber So Expensive In 2022?, 2022, <https://www.rockethomes.com/blog/housing-market/lumber-prices>
- 7: Trading Economics, Steel Rebar, <https://tradingeconomics.com/commodity/steel>
- 8: Rye Druzin, US steel capacity set to rise as prices drop, 2022, <https://www.arsusmedia.com/en/news/2357689-us-steel-capacity-set-to-rise-as-prices-drop>
- 9: Bethan Davies, Researchers Point Out Wooden Buildings as an Effective Sustainable Alternative, 2022, <https://www.azobuild.com/news.aspx?newsID=23258>
- 10: Veronica Adler, Daniel Pecina Lopez, Wood as a housing construction material: what are its benefits?, , <https://www.azobuild.com/news.aspx?newsID=23258>
- 11: Damian Clarke, Lumber versus steel - which is the most sustainable?, 2022, <https://thegreenlist.com.au/listing/timber-versus-steel-which-is-the-most-sustainable/>
- 12: Paul Bergeron, As Housing Demand Softens, Could Building Prices Finally Peak, 2022, <https://www.globest.com/2022/06/28/as-housing-demand-softens-could-building-prices-finally-peak/>
- 13: ECM Group, Question the quo: Gen Z Teens Seek to Blaze Their Own Education Path, 2021
- 14: United States Census Bureau, School Enrollment in the United States: October 2020 - Detailed Tables, 2021, <https://www.census.gov/data/tables/2020/demo/school-enrollment/2020-cps.html>
- 15: National Student Clearinghouse Research Center, Current Term Enrollment Estimates - Spring 2022, 2022, [https://nscresearchcenter.org/wp-content/uploads/CTEE\\_Report\\_Spring\\_2022.pdf](https://nscresearchcenter.org/wp-content/uploads/CTEE_Report_Spring_2022.pdf)
- 16: Andrew Lamparski, Trade school enrollment on the rise as enrollment at community and 4-year colleges drops, 2022, <https://www.kxxv.com/hometown/mcclennan-county/trade-school-enrollment-on-the-rise-as-enrollment-at-community-and-4-year-colleges-drops>
- 17: Mark Dent, Why America has so few carpenters, 2022, <https://thehustle.co/why-america-has-so-few-carpenters/>
- 18: BigRentz, Top 10 Construction Industry Trends to Watch For In 2022, 2021, <https://www.bigrentz.com/blog/construction-trends>
- 19: Hamish Champ, Computer-Aided Design in Construction: Endless Possibilities?, 2022, <https://blog.bluebeam.com/uk/computer-aided-design-in-construction/>
- 20: Elka Torpey, CAD designer, 2019, <https://www.bls.gov/careeroutlook/2019/youre-a-what/cad-designer.htm>
- 21: U.S. Bureau of Labor Statistics, Occupational Employment and Wages, May 2019, 2019, <https://www.bls.gov/oes/2019/may/oes173011.htm>
- 22: U.S. Bureau of Labor Statistics, Occupational Employment and Wages, May 2021, , <https://www.bls.gov/oes/2019/may/oes173011.htm>
- 23: McKinsey & Company, The impact and opportunities of automation in construction, 2019, <https://www.mckinsey.com/capabilities/operations/our-insights/the-impact-and-opportunities-of-automation-in-construction>

- 24: Jason Walker, 14 Trends Shaping the Future of Manufacturing in 2022, 2022, <https://locusrobotics.com/14-manufacturing-trends-2022/>
- 25: Automate Team, 12 Automation Trends Redefining Manufacturing Today, 2022, [/12%20Automation%20Trends%20Redefining%20Manufacturing%20Today](https://www.automate.com/12-automation-trends-redefining-manufacturing-today)
- 26: Jabil, 3D Printing Trends: Six Major Developments, , <https://www.jabil.com/blog/3d-printing-trends-show-positive-outlook.html>
- 27: Vanessa Bates Ramirez, 3D Printed Homes Will Be the Teslas of Housing, Says ICON CEO, 2022, <https://singularityhub.com/2022/04/05/3d-printed-homes-will-be-the-teslas-of-housing-says-icon-ceo/>
- 28: Hadeer Abdalla, Kazi Parvez Fattah, Mohamed Abdallah, Adil K. Tamimi, Environmental Footprint and Economics of a Full-Scale 3D-Printed House, 2021
- 29: Justine van den Bergh, Christle Nieuw, Wietse Slob, Myrka Escalante Suarez, Pia Lou Velema, Modular 3D printing construction: towards affordable, adjustable and climate-resilient housing, 2022
- 30: Amanda Myers, Building Codes: A Powerful Yet Underused Climate Policy That Could Save Billions, 2020, <https://www.forbes.com/sites/energyinnovation/2020/12/02/a-powerful-yet-underused-climate-tool-building-codes/?sh=2b2a4f2fd978>
- 31: Emma Foehringer Merchant, The Fight to Change US Building Codes, 2021, <https://insideclimatenews.org/news/02082021/building-codes-california-climate-change/>
- 32: Office of Energy Efficiency & Renewable Energy, Status of State Energy Code Adoption - Residential, , <https://www.energycodes.gov/status/residential>
- 33: California Energy Commission, 2022 Building Energy Efficiency Standards, , <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency>
- 34: California Energy Commission, Modifications to Field Verification and Diagnostic Testing Program Requirements, , <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency-0>
- 35: The White House, FACT SHEET: Biden-Harris Administration Launches Initiative to Modernize Building Codes, Improve Climate Resilience, and Reduce Energy Costs, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/01/fact-sheet-biden-harris-administration-launches-initiative-to-modernize-building-codes-improve-climate-resilience-and-reduce-energy-costs/>
- 36: Virginia Energy Efficiency Council, 2022 Building Code Updates, , <https://vaeec.org/2022-building-code-updates/>