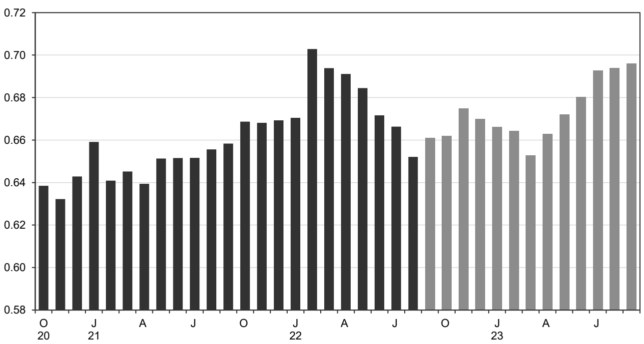
September 2022

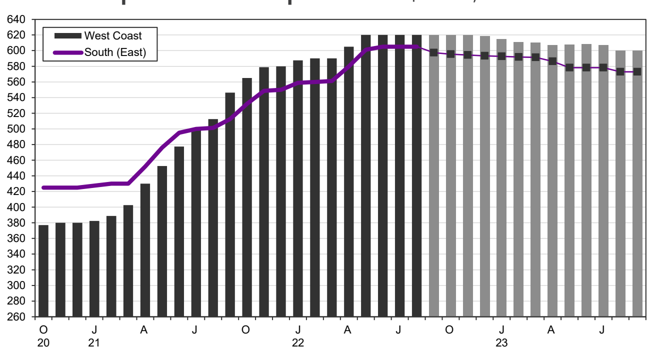
Particleboard and MDF Commentary **Dashboard**

Key concepts

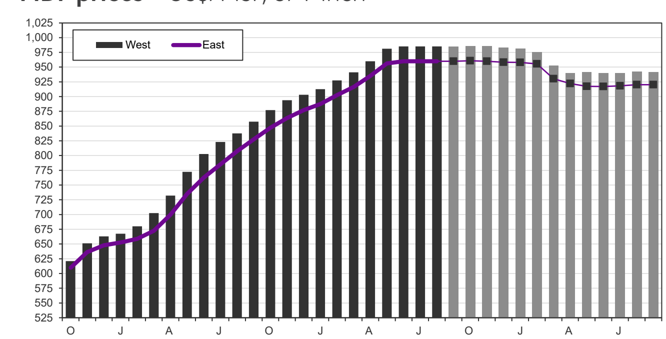
Furniture and related production – SAAR, 2007=1.00



Industrial particleboard prices – US$/MSF, 3/4-inch



MDF prices – US$/MSF, 3/4-inch



End-use indicators

US housing starts

2022: 1.550 million (-3.7%)

2023: 1.365 million (-12.0%)

Repair and remodeling

2022: $138.1 billion (-3.8%)

2023: $138.1 billion (0.0%)

Mobile home production

2022: 113,736 (+7.5%)

2023: 106,939 (-6.0%)

Manufacturing index

2022: 0.947 (+3.6%)

2023: 0.959 (+1.3%)

Nonresidential construction

2022: $178.0 billion (+1.9%)

2023: $171.5 billion (-3.6%)

Changes

- Historical revisions to the furniture production index have reduced particleboard and MDF demand this year, and we now foresee it growing 3.1% in 2022 rather than 5.7%. We have revised our outlook for 2023 also.
- The single-family housing market looks much worse than in our last issue, while the outlook on the multifamily side is considerably stronger.
- The effects of changes to the housing and furniture cycles on MDF demand offset each other, and the particleboard demand forecast has shifted down in 2023 due mostly to changes to the furniture forecast.

North American particleboard and MDF forecast summary

Particleboard prices in the East slipped slightly in the first half of the month, and we have slightly lowered our particleboard price forecast. The fire at the Timber Products mill in Martell, California, caused particleboard operating rates to increase at the end of 2022, but with reductions to both the furniture and housing forecasts, operating rates will be lower in 2023. Particleboard and MDF demand will end 2022 up from last year before declining in 2023 to below 2021 levels.

North American particleboard and MDF forecast summary

	Particleboard consumption	MDF consumption	Particleboard D/C ratio	MDF D/C ratio	Particleboard US South prices	MDF US South prices
2022:	3.41 BSF (+3.4%)	3.19 BSF (+2.1%)	83%	81%	$588/MSF (+20.5%)	$943/MSF (+23.2%)
2023:	3.28 BSF (-4.0%)	3.11 BSF (-2.6%)	71%	75%	$580/MSF (-1.3%)	$927/MSF (-1.7%)

Fastmarkets RISI

September 2022

Particleboard and MDF Commentary

A MONTHLY ECONOMIC ANALYSIS OF THE NORTH AMERICAN PARTICLEBOARD AND MDF MARKETS

Introduction

Housing starts surprised on the upside in August, with the big driver being multifamily construction, though we still are forecasting a challenging fourth quarter as affordability issues remain acute. According to the US Census, housing starts rose 12.2% from July and were essentially flat from a year ago to 1.575 million units. The single-family market rose 3.4% from July to 0.935 million units, an unexpectedly strong showing given that mortgage rates have climbed to over 5.5%. Meanwhile, multifamily construction maintained momentum, with rental rates remaining strong, expanding 28% to 0.640 million units, its highest level going back to at least 1986. Total units under construction also reached a record high, surpassing the last cyclical peak in 2005. Total housing permits are weakening and declined by 10.0%, to 1.517 million units, the lowest levels since August 2020.

The expectation for a decline in housing in 2022 remains in place as buyers balk at higher rates and prices and more builders experience cancellations. The inventory of unsold new homes remains very high, rivaling levels following the Great Recession. On the supply side, builder material costs outside of wood products are trending upward, and builders are starting to see buyer interest deteriorate somewhat as mortgage rates spike. Cancellation rates for some builders are increasing as more potential buyers are priced out of the market, while buyer lists are shrinking. Builders generally have enough backlog to last the year, because completion times continue to lengthen. As a harbinger of things to come, the National Association of Home Builders' (NAHB) Housing Market Index (HMI) fell to 46, a rapid rate of decline from the 83 posted at the start of the year. Housing starts are forecast to fall about 4.0% in 2022, but we have dramatically revised down our outlook for 2023. Inflation is broadening, suggesting that the Federal Reserve will have a tougher fight bringing it to heel. With rates likely to stay higher longer, we are calling for housing starts to now decline 11% in 2023, with most of the deterioration occurring on the vulnerable single-family side.

Lumber markets have stabilized and are seeing the lowest level of volatility in years. Little in the way of speculative buying is occurring, with most market participants appreciating the more measured tone to the market. The forecast detailed in this month's *Particleboard and MDF Commentary* continues to call for prices to trade in a far narrower range than what the market has experienced since 2020. While downstream inventories are still lean, prompt inventory at the mill level has helped keep a lid on prices. Market participants are also very wary of what the fourth quarter of 2022 could bring for both housing and wood demand. The bearish sentiment

Economic insights

- **Demand will grow slightly in 2022, contract in 2023**
- **US South prices ticking downward**
- **Imports have remained elevated**

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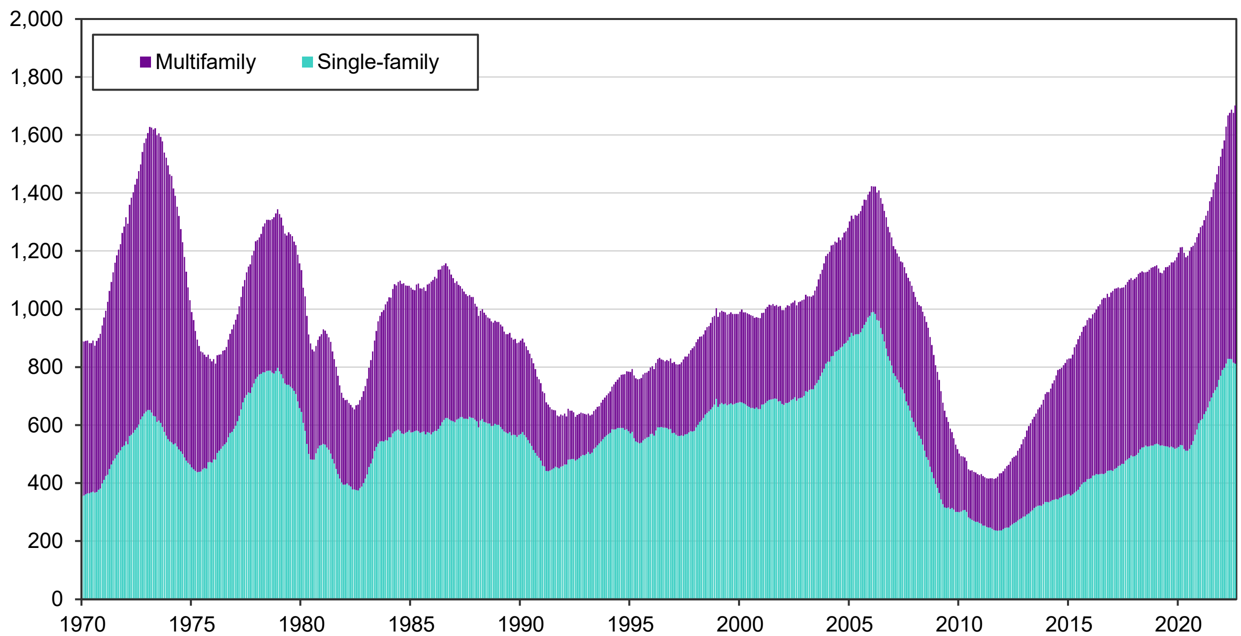
Figure A

Privately-owned housing units under construction in the United States

Thousand units



Source: US Census, Fastmarkets RISI.

appears to be growing more entrenched. While the data is not suggesting a complete collapse in either housing construction or demand for panels and lumber, the last two years have led to an extra sense of caution when it comes to buying patterns. Many buyers of wood are anxious to avoid being caught on the wrong side of the market again. Meanwhile, fiber constraints in British Columbia are still challenging the market there. Canadian producers are facing compressed margins at current price levels and historically elevated log costs in British Columbia. Stumpage rates should continue to fall in the coming quarters, but more mill temporary curtailments and permanent closures in BC are likely due to the weak market conditions and the distance prices still have to fall.

End-use markets

US housing

After falling across the board by around 11% in July, housing starts surprised many by increasing 12.2% in August to a seasonally adjusted annual rate (SAAR) of 1.575 million. However, this increase was nearly all on the multifamily side, and even that was nearly all in the US South. Single-family starts increased 3.4% to 935,000 (SAAR) in August, 14.6% below August 2021 single-family starts. Multifamily starts, on the other hand, increased 28% from July to 640,000, 33% higher than the August 2021 rate. Multifamily starts in the South increased 85% month over month and made up over half of all multifamily starts in the country; multifamily starts in the rest of the US declined 7.5%. Increasing interest rates in a high-price environment are taking a toll on new home affordability, which is putting a damper on new home construction. There were just over 1.7 million (seasonally adjusted) total housing units under construction in August, an all-time high, another headwind for new home construction. Rents have been increasing, and these headwinds for the single-family side have coupled with tailwinds for the multifamily side to shift the share of new starts in the multifamily direction. Single-family starts were as high as 79% of all new starts in December

2020 and have since fallen to 59% in August. This shift was gradual throughout 2021 and early 2020 but has accelerated since the beginning of summer when mortgage rates rose above 5% for the first time in more than a decade. New single-family permits have been declining by an average of 4.7% month over month since February, and multifamily permits had been increasing by an average of 3.2% until August figures were released, dropping the average into negative territory for that period. We expect multifamily to remain strong relative to single-family, but we do not foresee multifamily starts surpassing the August rate during this forecast period, nor the share of total starts. We anticipate housing starts will total 1.55 million in 2022, of which we project 998,000 will be single-family. This would be the lowest single-family share since 2015. While single-family starts have averaged 1.08 million (SAAR) so far this year, we expect the remainder of the year to be weak. We are calling for the pace of multifamily construction to continue at about the pace it has been thus far this year, ending 2022 at 552,000 units, an increase in 16.5% over 2021, which itself showed an increase of 20.7% over 2020. In 2023, we expect declines across the board as annual starts will be compared to 2022, when starts were extremely strong in the first quarter and remained moderately strong in the second. We are calling for 1.36 million housing starts in 2023, a decline of 12%, with single-family and multifamily declining 14.7% and 7.0%, respectively.

- After falling 11% to 1.4 million (SAAR) in July, housing starts increased 12.2% in August to 1.575 million (SAAR), equal to the revised June rate. The August starts figure was essentially equal to the August 2021 rate. The trend in recent months of weakness on the single-family side coupled with strength in the multifamily side continued. Single-family starts increased just 3.4% in August to 935,000 (SAAR) after a 10.8% drop in July, while multifamily starts increased 28% in August to 640,000 units (SAAR) following an 11% decline in July. The single-family starts figure in August was 14.6% below the year-ago figure, while the multifamily starts figure was up 33% year over year.

- Permits declined 10% month over month in August to 1.517 million (SAAR), representing a 14.4% year-over-year decline. Single-family permits declined for the sixth consecutive month to 899,000 (SAAR). Multifamily permits declined 17.9% month over month to 618,000 (SAAR). This was the lowest since November 2021 and a year-over-year decline of 13.1%, but still elevated historically. In 2020, the average monthly rate for multifamily permits was 491,000; in 2021, it was 615,500.

- Beginning in mid-2020 and until very recently, the gap between housing starts and completions has been increasing. In the first four months of 2022, the average difference between monthly starts and completions was

Table 1

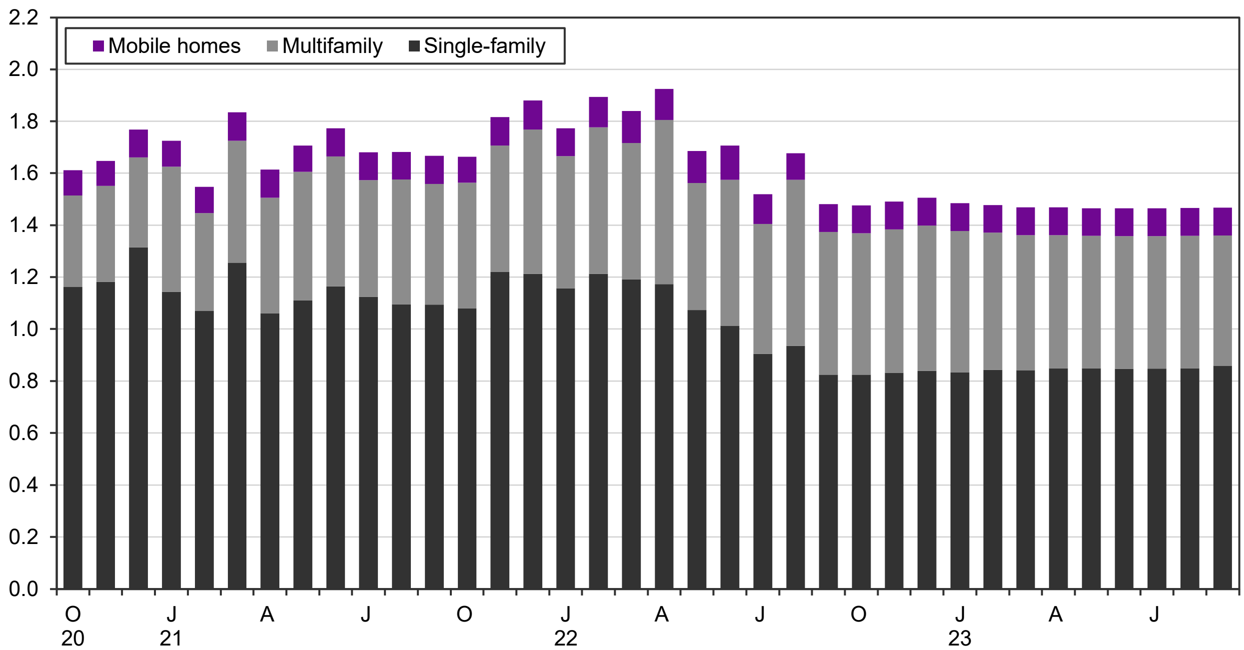
Monthly wood products demand indicators

	History			Estimates and forecast		
	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22
Housing starts (millions, SAAR)	1.58	1.40	1.58	1.37	1.37	1.38
Single-family starts (millions, SAAR)	1.01	0.90	0.94	0.82	0.82	0.83
Mobile home production (thousands, SAAR)	130.86	114.66	101.19	106.85	106.85	106.77
Residential improvements (billion 2005 $)	12.61	12.93	12.91	12.64	11.79	11.26
Manufacturing index (2007=1)	0.94	0.95	0.95	0.95	0.95	0.95
% change, annual rate	-6.3%	7.8%	1.0%	2.6%	0.3%	0.8%
Furniture and related production (2007=1)	0.67	0.67	0.65	0.66	0.66	0.68
% change, annual rate	-20.3%	-9.1%	-22.8%	17.7%	1.8%	26.3%

Figure 1

US housing production

Million units (SAAR)



408,000. In May and June, it was 122,000 and 184,000, respectively. It was then negative in July for the first time since May 2020. But starts outpaced completions by another 233,000 in August. Units under construction have been steadily increasing since late 2020 and sit at 1.702 million (SAAR) as of August, 20.5% higher than August 2021.

- The unemployment rate increased from 3.5% in July to 3.7% in August. The Labor Force Participation Rate ticked back up to its March level and post-virus high of 62.4% in August, exactly 1 percentage point below where it was in February 2020. Total nonfarm employment increased 315,000 in August after gaining 526,000 in July. Average hourly earnings were up $0.10/hour to $32.36/hour, up 5.2% from a year prior.

- The National Association of Realtors (NAR) reported that existing home sales fell 5.7% in July and 0.4% in August to 4.8 million (SAAR), 19.9% below August 2021 and the seventh consecutive month of decline. The median sales price fell 3.5% followed by 2.4% to $389,500, a year-over-year increase of 7.7%. For comparison, June's median sales price was 12.8% higher than the previous June.

- According to the US Census Bureau, there were month-to-month declines in new single-family home sales of 7.1% in June followed by 12.6% in July. The July sales figure of 511,000 (SAAR) was 29.6% below July 2021. There were 464,000 new houses for sales at the end of July, enough for 10.9 months of sales at the current sales pace. The inventory of new single-family homes for sales has increased 28.2% from a year ago, and when viewed in terms of months of sales, inventory is up 81.7% from a year ago, when there was enough inventory for 6 months of sales. A year prior to that, in July 2020, there was sufficient inventory for just 3.6 months of sales. The median sales price dipped 5.9% in June but gained 5.9% back in July and was $439,400 for that month, 8.2% above what it was in July 2021. The inventory of unsold homes at the end of August was 1.28 million and was equivalent to 3.2 months of sales in both July and August.

Table 2

US housing market

	Jul 22	Aug 22	% ch	Aug 21	% ch	Average YTD 2022	Average YTD 2021	% ch
Housing starts (millions, SAAR)								
Total	1.404	1.575	12.2%	1.576	-0.1%	1.635	1.590	2.8%
Single-family	0.904	0.935	3.4%	1.095	-14.6%	1.082	1.128	-4.0%
Multifamily	0.500	0.640	28.0%	0.481	33.1%	0.553	0.462	19.6%
Mobile home production (millions, SAAR)	0.115	0.101	-11.7%	0.105	-3.9%	0.117	0.105	11.2%
Existing homes sales indicators								
Home sales (millions, SAAR)	4.82	4.80	-0.4%	5.99	-19.9%	5.49	6.09	-9.9%
Inventories of unsold homes (monthly rate)	3.20	3.20	0.0%	2.60	23.1%	2.41	2.31	4.3%
Median home prices (thousand dollars)	399.20	389.50	-2.4%	361.50	7.7%	387.96	341.15	13.7%

	Jun 22	Jul 22	% ch	Jul 21	% ch	Average YTD 2022	Average YTD 2021	% ch
New homes sales indicators								
Home sales (millions, SAAR)	0.59	0.51	-12.6%	0.73	-29.6%	0.67	0.81	-17.7%
Inventories of unsold homes (monthly rate)	9.20	10.90	18.5%	6.00	81.7%	7.94	4.89	62.6%
Average home prices (thousand dollars)	457.30	546.80	19.6%	462.10	18.3%	516.70	430.70	20.0%
Mortgage rates (%)								
30-year fixed	5.52	5.41	-2.0%	2.87	88.5%	4.65	2.93	58.6%
5/1 adjustable rate mortgage	4.28	4.29	0.2%	2.49	72.3%	3.57	2.71	31.6%

- Mobile homes are an attractive option at the lower end of the shelter market when rents and home prices are skyrocketing. Mobile home production increased by double digits in 2016 and 2017 and then by 3.6% in 2018. However, discriminatory zoning, placement restrictions and a lack of policy support are headwinds for the industry, and production declined by 1.8% in 2019. The economic impact of COVID-19 and the measures to curb it put further pressure on the industry, and production was flat in 2020. In 2021, production increased 11.8% to 105,900 units. After a relatively strong first half of the year, our forecast is now for mobile home production to grow 7.4% in 2022 for an annual production total of 113,700. Our forecast for 2023 remains at 107,000 units.

- The sharpest decline in the National Association of Home Builders (NAHB)/Wells Fargo Housing Market Index (HMI) came in July with a drop of 12 points. The index fell further to 49 in August and 46 in September. As of September, the only component still above 50 on the 100 scale is current single-family sales. The components measuring single-family sales and traffic of prospective buyers each fell 1 point in September to 46 and 31, respectively. August and September are the first months with negative overall HMI ratings since April and May of 2020. An HMI reading above 50 indicates a favorable outlook on home sales, while one below 50 indicates a negative outlook.

- Throughout 2020 and 2021, low mortgage rates allowed housing demand to remain strong despite increasing home prices. In 2022, inflation concerns have led the Federal Reserve to begin raising interest rates. The 75-basis-point hike in the federal funds target rate on June 15 was the largest single increase since 1994. The target rate was increased by another 75 basis points in late July, and again the day after August housing starts were released. The average 30-year fixed rate mortgage rate had flirted with 6% in June, declined somewhat in July and August, then finally broke 6% in mid-September for the first time since 2008.

US repair and remodeling

We have made some revisions to our estimates of US repair and remodeling (R&R) spending in 2022 as well as our forecast going forward. After increasing 6.9% in 2020 and 1.4% in 2021, we are calling for real R&R spending to decline in 2022 by 3.8% to $138.1 billion (2005 dollars). We are also calling for spending to be flat in 2023. This is a considerable downward shift from our previous forecast, which had R&R spending remaining at 2021 levels for the next few years. Inflation is eating away at consumer budgets, and spending priorities are shifting from goods to services. The DIY boom of 2020, which we have discussed at length, also shifted some future demand into that time period.

- Retail sales at building materials, garden equipment and supplies dealers, a reasonable proxy for R&R expenditures, grew more than 12% per year in 2020 and 2021. On a seasonally adjusted basis, year-to-date sales through August were up 7.4% in nominal terms, with both July and August registering increases of just over 1% from the months prior. Fastmarkets estimates year-to-date sales in real terms through August are down 8.9% from 2021.

- Home Depot and Lowe's gave their second quarter earnings calls in mid-August. Home Depot reported a year-over-year change in net sales of 6.5%, with comparable transactions up 5.8% after an 8.4% year-over-year decline in the first quarter. Lowe's reported second-quarter sales were virtually identical to the second quarter of 2021, with comparable transactions down 6.4%.

- The median sales price of existing homes in August was $389,500, a decline of 0.4% after July's larger drop and up 7.7% from August 2021, according to the NAR. The year-over-year change in existing home prices has been declining since February, when it was 17.1%. The Case-Shiller 20-City Composite Home Price Index for June showed an 18.7% year-over-year increase in home prices.

- The NAHB's Remodeling Market Index (RMI) declined from 86 in the first quarter to 77 in the second. The current conditions index fell 6 points to 83. The future indicators index dropped 10 points to 72.

- The Leading Indicator of Remodeling Activity (LIRA), released by the Joint Center for Housing Studies (JCHS) of Harvard University, projects home improvement spending will continue to grow at a rapid pace through 2022 and the first quarter of 2023 before leveling off and declining slightly in the second quarter of 2023. This most recent projection shows a smoother growth profile than the first-quarter LIRA projection. The LIRA projects rolling four-quarter home improvement expenditures will grow from $405 billion in the second quarter of the year to $446 billion in the second quarter of 2023.

Industrial production

- Since our last edition of the *Particleboard and MDF Commentary*, the Federal Reserve issued its annual revisions to the industrial production indices, which brought downward revisions to the data since April. Total industrial production decreased 0.2% in August after increasing 0.5% in July. Manufacturing was up 0.1% after increasing 0.6% in July, mining was flat following a 1.0% increase the previous month, and utilities lost 2.3% in August following a 1.2% drop in July. After this round of revisions, industrial production in August was up 3.7% from its year-ago level, while manufacturing was up 3.3%, mining was up 8.4% and utilities were down 1.6%. Our industrial production forecast calls for 4.2% growth in 2022 and 1.4% growth in 2023.

- Manufacturing production increased 0.1% from July to August and was up 4.5% year-to-date through August.

- The Institute for Supply Management's Purchasing Managers' Index (PMI®) measured 52.8% in both July and August, with both months tied for the lowest reading since June 2020. While the index is slipping closer to 50%, it has been showing growth in manufacturing activity for 27 months straight. A reading above 50% indicates that the manufacturing sector is generally expanding, while a reading below 50% indicates that it is generally contracting.

Nonresidential construction

- With the outbreak of COVID-19 in early 2020 and the measures introduced to curtail it, nonresidential construction spending declined by an estimated 19.8% to $161.7 billion (2005 dollars) for the year. As the economy struggled to fully recover in 2021, we estimate nonresidential construction expenditures grew 8% to $174.6 billion (2005 dollars) for the year. Our forecast has not changed much this month, but with some data revisions that mostly impacted the early months of 2022, we now estimate 2022 spending will increase 1.9% overall to $174.6 billion (2005 dollars), before declining 3.6% to $171.5 billion (2005 dollars) in 2023.

- The American Institute of Architect's Architecture Billing Index (ABI) was 53.2 in June, declined to 51.0 in July, and was back up to 53.3 in August. The new projects inquiry index declined from 58.2 in June to 56.1 in July, then rose to 57.9 in August. The new design contracts index read 52.2 in June, 52.9 in July and 52.3 in August. A score above 50 indicates an increase in business, and the ABI has been above 50 every month since February 2021.

- The value of nonresidential construction starts increased 79% in July, according to Dodge Data and Analytics. August figures have not yet been released as of this writing. The numbers were boosted by four large manufacturing projects but would have increased by 16% even without those. Institutional starts rose 28%, while commercial starts fell 11%. Year to date through July, nonresidential construction starts were up 22% from the first seven months of 2021, institutional starts were up 2%, commercial starts were up 13% and manufacturing starts were up 185%.

Furniture production

Following two years of consecutive declines, furniture production in the United States returned to a growth trajectory in 2021. Production grew 3% last year, after declining by 6.5% in 2019 and 9.6% in 2020. The annual revision of industrial production and capacity utilization issued in June lowered the profile of furniture production for 2019-20, while the 2021 index was revised upward from the previous growth of 1.8% to 3%. Further revisions since then show furniture production year-to-date through August up 4.6% from the first eight months of 2021, rather than the 7% it had been on pace for. Furniture production in August was down 2.1% from July's downwardly revised figure and was down 0.5% from the previous August. Revisions also show a clearly negative trajectory, and the number of furniture manufacturing employees has been trending down since March as well. According to Smith Leonard PLLC's Furniture Insights survey of furniture producers and distributors, cancellations increased in May and again in June. This has helped clear backlogs, which were down 17% year over year in June. New orders were down 27% year to date through June, and shipments were up 7%. Even with these signs that furniture production is slowing, the strength of the first half of the year leaves our forecast at 3.1% growth in 2022 overall followed by 0.8% growth in 2023.

- US furniture production decreased 2.1% in August, and the Federal Reserve's revisions reveal it has been declining since March. August production was down half of a percent compared to August 2021.

- Furniture production year to date through August was up 4.6%.

Non-structural panel consumption

Prices of non-structural panels continued to stay elevated over the last month, although they have begun to show some slight downward movement in the US South. Persistent pressure on the supply chain and demand have sustained the higher price levels, which have also attracted a spike in imports from abroad, particularly of medium density fiberboard (MDF). Costs seem to have stabilized a little, though we expect them to continue to steadily increase through 2023. Broader economic headwinds are contributing to uncertainties in the market, and all segments are working down their inventories, especially retail stores. The price differentials between MDF and particleboard stand at historical highs of more than $350/thousand square feet (MSF) in the US South and West. This is encouraging substitution of particleboard for MDF where possible. We expect this gap to narrow somewhat in the spring months as MDF prices face more downward price pressure than particleboard. At the same time, the tight supply of MDF due to high demand is helping sustain its high price, as substitution is not possible in several applications. But the big gap could hamper further price growth. Our housing forecast shows a double-digit decline in single-family starts in 2022 coupled with double-digit growth in multifamily starts. We anticipate declines on both sides of the housing market in 2023. Given the fact that nonstructural panels are used later in the building process and that there is currently a record number of homes under construction, we expect nonstructural panel demand to hold up pretty well in 2022, with declines in 2023 affecting particleboard more than MDF. Imports continue to play a large role in establishing market dynamics, particularly for MDF.

Particleboard consumption

After falling in 2020, particleboard consumption recovered strongly in 2021, growing 10.2% over the previous year. Our outlook calls for particleboard consumption to be flat through the rest of 2022 and then contract next year.

- US particleboard consumption is expected to grow by 1.8% year over year in the third quarter of 2022 (Table 3).

- Growth in furniture production and repair and remodeling (R&R) will drive US particleboard consumption higher this year. Through the end of the year, particleboard consumption will be more or less flat as year-over-year gains in furniture production and R&R offset reduced demand for new home construction. For 2022, Fastmarkets RISI anticipates US particleboard consumption will increase by 3.3% to 3.41 billion square feet (BSF).

- US particleboard consumption will slow down in 2023, registering a decline of 4.0% to 3.28 BSF, as the declines in new housing outweigh increases in furniture production and R&R.

MDF consumption

After two years of declines, MDF consumption recovered in 2021, increasing by 6.5%. Consumption is expected to grow another 2.1% in 2022 and then contract 2.5% in 2023. The strength of the US dollar will weigh on domestic producers, as competition with imports will remain an issue. And substitution of MDF with cheaper products could pose a risk to consumption as well.

- US MDF consumption is forecast to grow 1.2% year over year in the third quarter of 2022 (Table 3).

- Improving furniture production and growth in multifamily construction will maintain MDF at 3.19 BSF in 2022.

- US MDF consumption will contract by 3% in 2023 to 3.1 BSF, with the reduction due to the declining single-family housing market.

US furniture imports

- In July, US furniture imports declined 12.4% year over year and 9.8% month over month in nominal terms.
- After nearly two decades of being the largest furniture exporter to the United States, China lost the top spot to Vietnam in 2020. Although Vietnamese furniture exports have been growing, Chinese exports have also likely been suppressed as a result of the pandemic and the existing tariffs on US imports of Chinese products.
- Year to date through July 2022, furniture imports declined 5.7% in real terms while domestic furniture production expanded 5.3%, indicating that domestic producers are gaining market share so far this year.

US furniture production

- US furniture production in August decreased 2.1% from July and was down 0.5% from August 2021. Still, furniture production year to date was up 4.6% through August.
- Furniture production is projected to increase 3.1% in 2022, as the 4.6% growth so far comes with the caveat that furniture production has been declining since February. This is a change from the last issue of the *Particleboard and MDF Commentary* and comes after revisions to the furniture production index. We have revised our

Table 3

US demand indicators and panel consumption

	Quarterly						Annual		
	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2021	2022	2023
Housing starts									
Millions, SAAR	1.65	1.45	1.38	1.37	1.36	1.36	1.61	1.55	1.36
% change, year ago	3.5%	-7.5%	-17.6%	-20.2%	-17.4%	-6.4%	15.4%	-3.9%	-11.9%
Manufacturing index									
2007=1	0.95	0.95	0.95	0.96	0.96	0.96	0.92	0.95	0.96
% change, year ago	4.2%	3.5%	2.4%	1.7%	1.0%	1.1%	5.7%	3.6%	1.3%
Mobile home production									
Thousands, SAAR	124.66	107.57	107.08	106.57	106.65	107.22	105.90	113.64	107.02
% change, year ago	17.3%	0.6%	0.0%	-7.7%	-14.4%	-0.3%	11.7%	7.3%	-5.8%
Nonresidential construction									
Billion 2005 $	47.54	46.00	42.87	36.18	45.63	45.86	174.63	177.98	171.50
% change, year ago	-6.3%	4.3%	-1.6%	-13.0%	-4.0%	-0.3%	8.0%	1.9%	-3.6%
Residential improvements									
Billion 2005 $	36.40	38.48	33.78	29.02	36.37	38.72	143.60	138.08	138.13
% change, year ago	-9.0%	-2.5%	-1.0%	-1.4%	-0.1%	0.6%	1.4%	-3.8%	0.0%
Furniture and related production									
2007=1	0.68	0.66	0.67	0.66	0.67	0.69	0.66	0.67	0.68
% change, year ago	5.4%	0.7%	0.0%	-4.0%	-1.6%	5.2%	3.1%	3.0%	0.8%
Exchange rate									
USD/CAD	0.78	0.78	0.77	0.77	0.76	0.77	0.80	0.78	0.77
US particleboard consumption									
Billion square feet	0.84	0.86	0.87	0.80	0.78	0.83	3.30	3.41	3.28
% change, year ago	5.4%	1.8%	-0.1%	-4.5%	-7.1%	-3.5%	10.3%	3.4%	-4.0%
US MDF consumption									
Billion square feet	0.77	0.81	0.83	0.77	0.74	0.79	3.13	3.19	3.11
% change, year ago	2.7%	1.2%	0.9%	-2.2%	-3.6%	-2.8%	6.5%	2.1%	-2.5%

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Table 4

US wood furniture imports, July 2022

Millions of US dollars (2021)

	2021 total	Household	Office	Other	2022 YTD	2021 YTD	% ch
Vietnam	10,880.46	3,938.94	35.91	2,295.39	6,270.24	7,374.54	-15%
China	7,331.43	1,894.60	97.83	1,897.64	3,890.06	4,148.63	-6%
Mexico	2,225.92	669.75	30.58	685.27	1,385.60	1,171.46	18%
Canada	1,679.87	447.13	203.30	278.44	928.87	952.15	-2%
Malaysia	1,511.54	760.20	21.53	207.27	989.01	1,090.78	-9%
Italy	1,218.42	397.21	9.38	321.88	728.46	732.44	-1%
Indonesia	1,060.02	440.25	0.99	276.59	717.82	635.73	13%
India	529.05	123.98	2.54	221.92	348.44	285.67	22%
Thailand	478.15	185.20	3.62	119.60	308.42	282.23	9%
Poland	390.19	117.97	1.54	108.99	228.50	236.98	-4%
Brazil	351.92	128.10	0.86	51.94	180.91	193.35	-6%
Taiwan	217.39	56.13	6.37	38.72	101.22	127.81	-21%
Germany	186.75	64.21	5.30	30.16	99.68	102.90	-3%
Lithuania	175.34	56.63	7.39	53.00	117.02	103.41	13%
Portugal	87.68	14.31	0.26	37.41	51.98	49.95	4%
Spain	74.07	16.51	0.68	27.65	44.84	43.83	2%
France	68.02	15.11	0.63	34.50	50.24	35.67	41%
United Kingdom	62.46	13.60	10.21	19.01	42.81	33.83	27%
All others	1,289.89	411.46	28.56	334.81	774.83	700.59	11%
Total	29,818.59	9,751.29	467.48	7,040.18	17,258.95	18,301.93	-6%

furniture production forecast down in 2023 and are now calling for furniture production to grow 0.75% next year.

- While we had called for "on-shoring" of furniture production to help drive domestic production higher, this has simply not materialized. However, the ongoing supply-chain and logistics disruptions may force some companies to rethink the location of their production facilities.

Figure 2

Furniture and related production

Seasonally adjusted annual rate (SAAR), 2007 = 1.00

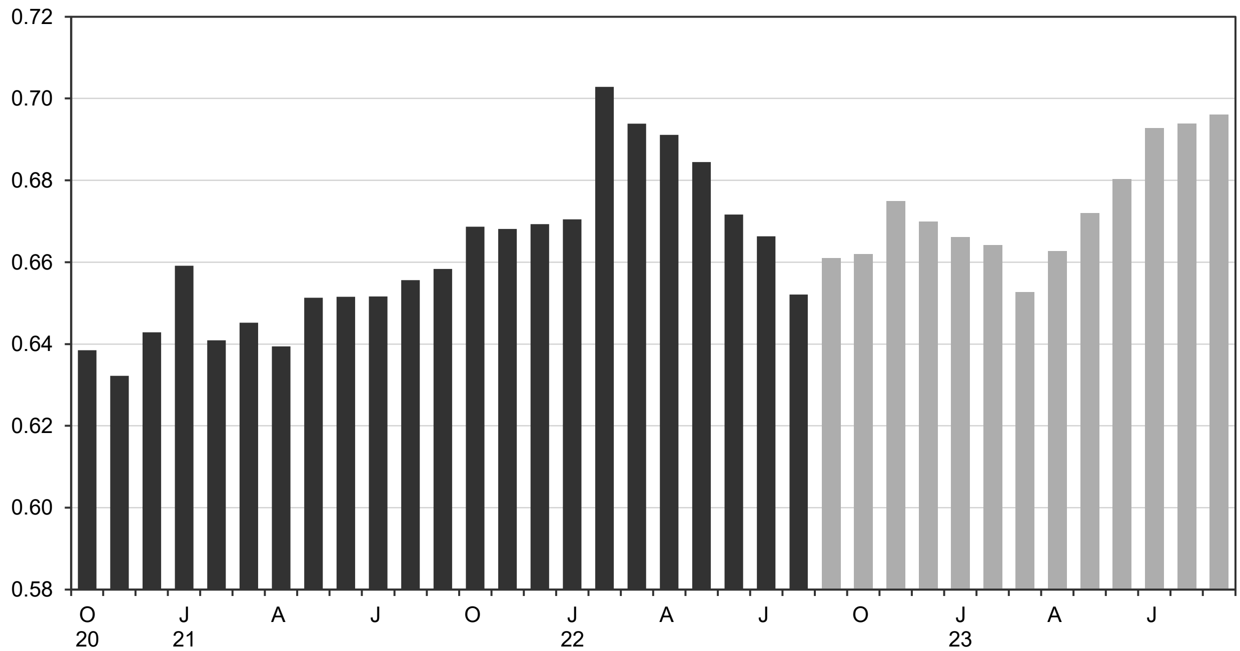


Figure 3

US MDF imports

Billion square feet, 3/4-inch basis

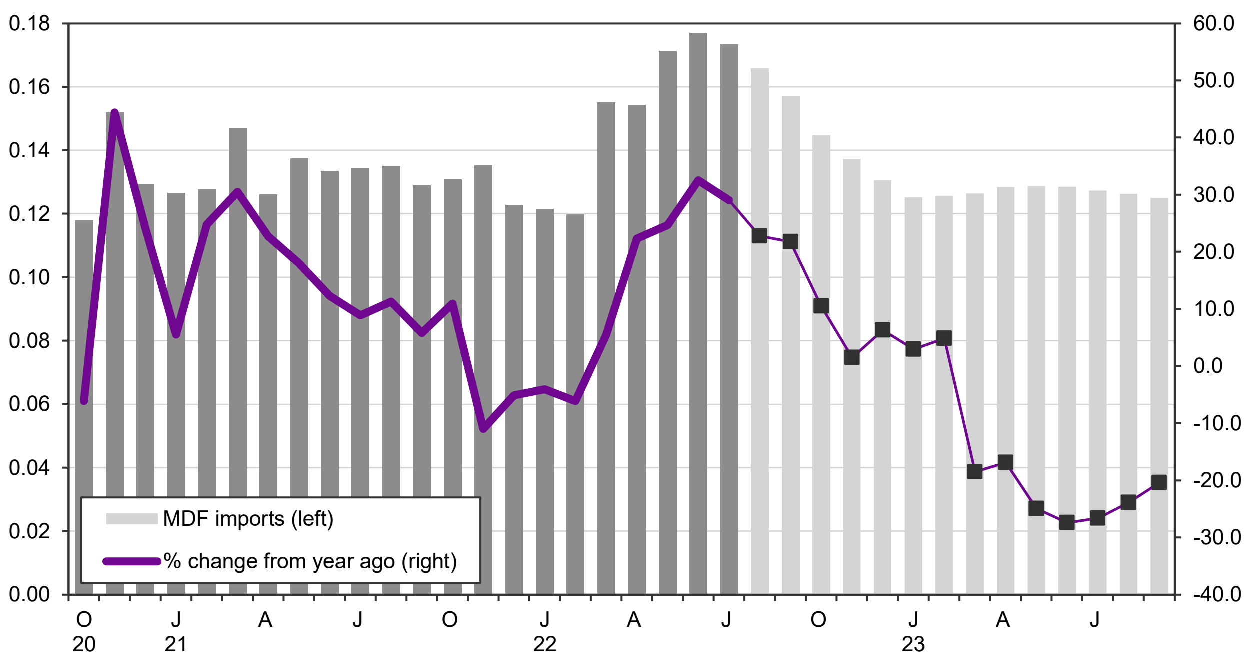


Table 5

US particleboard and MDF exports

Million square feet, 3/4-inch basis

	Total	Apr	May	Jun	Jul	YTD			Shares YTD	
	2021	2022	2022	2022	2022	2022	2021	% ch	2022	2021
Particleboard										
Canada	180.8	16.4	15.2	18.2	15.3	107.1	101.2	6%	66%	72%
Mexico	62.0	6.8	8.3	7.0	7.9	52.3	29.5	78%	32%	21%
Other	15.6	0.3	0.5	0.5	0.4	2.7	10.6	-74%	2%	8%
Total	258.4	23.5	23.9	25.7	23.6	162.2	141.3	15%	100%	100%
MDF										
Canada	108.5	9.6	8.7	9.5	7.6	59.6	67.7	-12%	37%	52%
Mexico	109.9	11.3	13.8	14.9	15.7	94.2	59.2	59%	58%	45%
Europe	2.3	0.5	0.3	0.2	0.5	2.1	1.2	68%	1%	1%
Oceania	0.7	0.1	0.0	0.1	0.2	1.2	0.3	256%	1%	0%
Other	4.2	0.5	1.4	0.5	1.1	5.1	1.8	179%	3%	1%
Total	225.6	22.0	24.2	25.1	25.2	162.2	130.3	24%	100%	100%

Table 6

US particleboard and MDF imports

Million square feet, 3/4-inch basis

	Total	Apr	May	Jun	Jul	YTD			Shares YTD	
	2021	2022	2022	2022	2022	2022	2021	% ch	2022	2021
Particleboard										
Canada	411.6	36.6	36.7	30.1	34.0	232.7	241.4	-4%	58%	48%
Europe	250.4	15.8	19.9	20.8	12.0	100.6	175.6	-43%	25%	35%
Brazil	36.5	0.0	0.0	0.1	0.1	0.5	29.3	-98%	0%	6%
Mexico	22.7	2.2	2.4	1.8	1.4	12.8	14.7	-12%	3%	3%
China	7.0	3.7	0.7	0.8	1.2	8.4	4.1	107%	2%	1%
Other	80.0	4.1	7.4	4.3	2.8	48.1	42.4	13%	12%	8%
Total	808.2	62.4	67.3	58.0	51.5	403.1	507.5	-21%	100%	100%
MDF										
Canada	459.6	39.3	42.9	43.1	39.5	281.3	268.4	5%	26%	29%
Other Europe	249.7	17.0	21.1	24.5	19.2	129.3	157.3	-18%	12%	17%
Chile	313.3	40.1	44.0	39.9	31.3	234.9	183.7	28%	22%	20%
China	106.0	13.2	18.9	15.1	20.7	93.8	59.6	58%	9%	6%
Germany	136.2	10.0	6.5	7.7	10.4	64.3	87.3	-26%	6%	9%
Brazil	40.1	5.7	10.0	9.0	13.7	53.7	21.6	148%	5%	2%
Argentina	23.5	1.6	2.5	1.3	2.4	12.6	14.6	-14%	1%	2%
Mexico	33.2	3.2	4.4	4.8	5.0	28.3	16.5	71%	3%	2%
Oceania	10.2	0.4	1.0	0.2	0.8	4.0	7.4	-46%	0%	1%
Other	214.2	23.9	20.1	31.4	30.4	170.4	116.7	46%	16%	13%
Total	1,586.0	154.4	171.4	176.9	173.4	1,072.6	933.0	15%	100%	100%

Particleboard and MDF trade

Particleboard exports and imports

- At 23.6 million square feet (MMSF), US particleboard exports in July 2022 were 8.2% lower than in June but 12.8% above year-ago levels (Table 5).
- US particleboard imports in July 2022 contracted 11.1% month over month to 51.5 MSF, 20.0% below the level of imports in July 2021 (Table 6).
- Year to date through July, US particleboard exports were up 15% year over year, while US particleboard imports were down 21% in the same comparison.

MDF exports and imports

- US MDF exports increased 0.44% month over month in July 2022 to 25.2 MMSF. MDF exports were up 17.5% from the previous July (Table 5).
- Canada and Mexico remain the largest export markets for US MDF, accounting for 93% of total exports in July.
- US MDF imports in July were down 2.0% from June to 173.4 MMSF. After having grown at a rapid pace in earlier in the year, MDF imports were still up 29.1% year over year (Table 6).
- US MDF imports were up 15% through July 2022, while exports were up 24%. Import

Table 7

Particleboard and MDF demand and supply

Billion square feet, 3/4-inch

	Jun 2022	Jul 2022	Aug 2022	Aug 2021
Particleboard				
Total demand	0.286	0.284	0.289	0.285
Demand on US mills	0.228	0.233	0.234	0.207
Capacity	0.271	0.268	0.268	0.272
Ratio of demand to capacity[1]	0.841	0.869	0.872	0.760
Mill stocks	0.579	0.611	0.612	0.490
Production	0.224	0.236	0.219	0.233
Shipments[2]	0.230	0.204	0.227	0.218
Imports	0.058	0.052	0.075	0.078
Import share of total supply	0.201	0.202	0.249	0.262
MDF				
Total demand	0.259	0.264	0.271	0.267
Demand on US mills	0.082	0.091	0.105	0.132
Capacity	0.164	0.164	0.164	0.162
Ratio of demand to capacity[1]	0.501	0.555	0.640	0.812
Mill stocks	0.562	0.571	0.570	0.491
Production	0.145	0.131	0.122	0.145
Shipments[2]	0.143	0.122	0.125	0.133
Imports	0.177	0.173	0.166	0.135
Import share of total supply	0.553	0.587	0.571	0.504

1. Demand on US mills/capacity.
2. CPA data.

volumes continued to be significantly higher than export volumes.

MDF and particleboard markets

Particleboard shipments declined 11.2% month over month and 7.6% year over year in July 2022. Particleboard production increased 5.3% from June and was 1.8% above July 2021. For 2021 as a whole, shipments posted growth of 15.3% and production improved 17.6%, both reaching their highest levels since 2008. While the rate of increase has slowed, the upward momentum has continued so far in 2022, with shipments up 3.6% year to date through July and production up 1.6% over that same time frame. The share of particleboard consumption accounted for by imports has been declining steadily since 2021. Year to date through July, particleboard imports are down 20.6%. As a result, the 5.7% increase in overall demand through the first seven months of the year raised demand on mills by 15.5%.

MDF shipments and production finished strong in 2021, growing 4.3% and 7.8%, respectively. In July 2022, MDF shipments were down 14.6% from June and 12.7% from July 2021. MDF production contracted 9.4% from June and 12.7% since July 2021. In the first seven months of the year, shipments were up 0.2% compared to the same period in 2021, while production had fallen 0.9%. Overall demand was up 2.9% year to date as of July. With imports up 15% through July, demand on mills was down 10.7%. There has been a greater volume of MDF panels imported into the US than produced domestically in every month since March 2022.

The past couple of years have seen significant changes to capacity. Arauco North America started up its Grayling, Michigan, particleboard mill at the end of 2018, adding 451 MMSF of production capacity. A catastrophic fire at the Georgia-Pacific particleboard mill in Thomson, Georgia, resulted in the company deciding to not rebuild the mill. Georgia-Pacific also closed two other particleboard mills in Hope, Arkansas, and Monroeville, Alabama, removing a total of 500 MMSF of production capacity with these three closures. Arauco North America closed its particleboard mills in St

Figure 4

US particleboard demand

Billion square feet, 3/4-inch basis

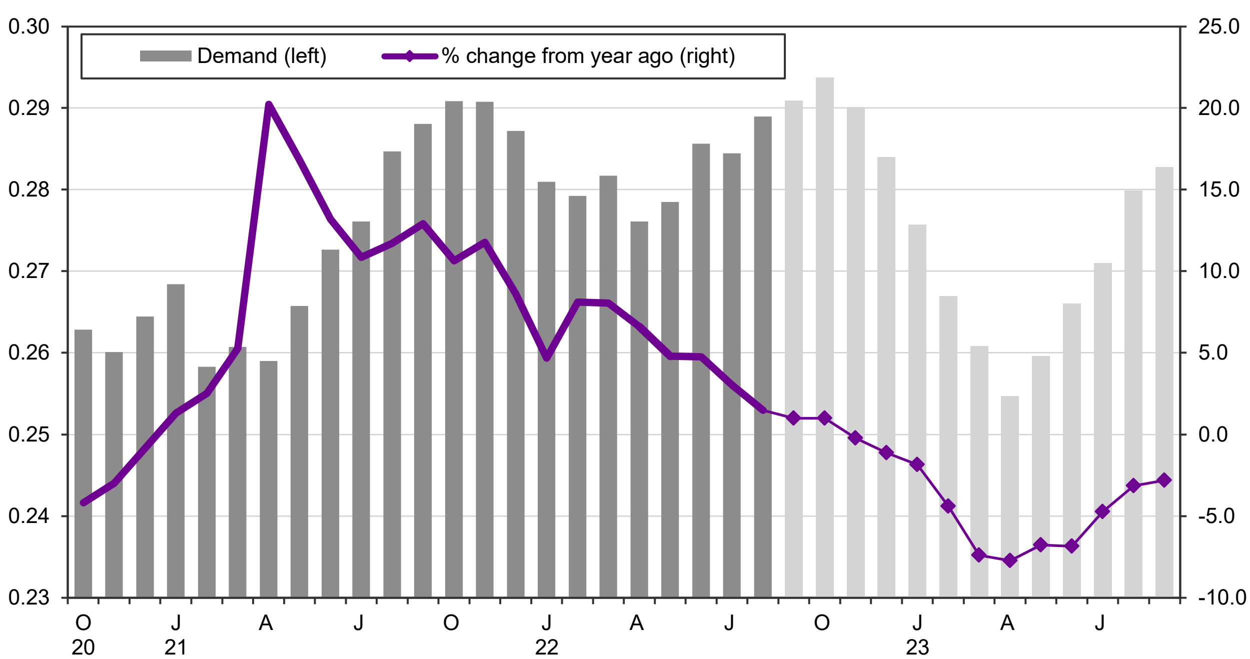
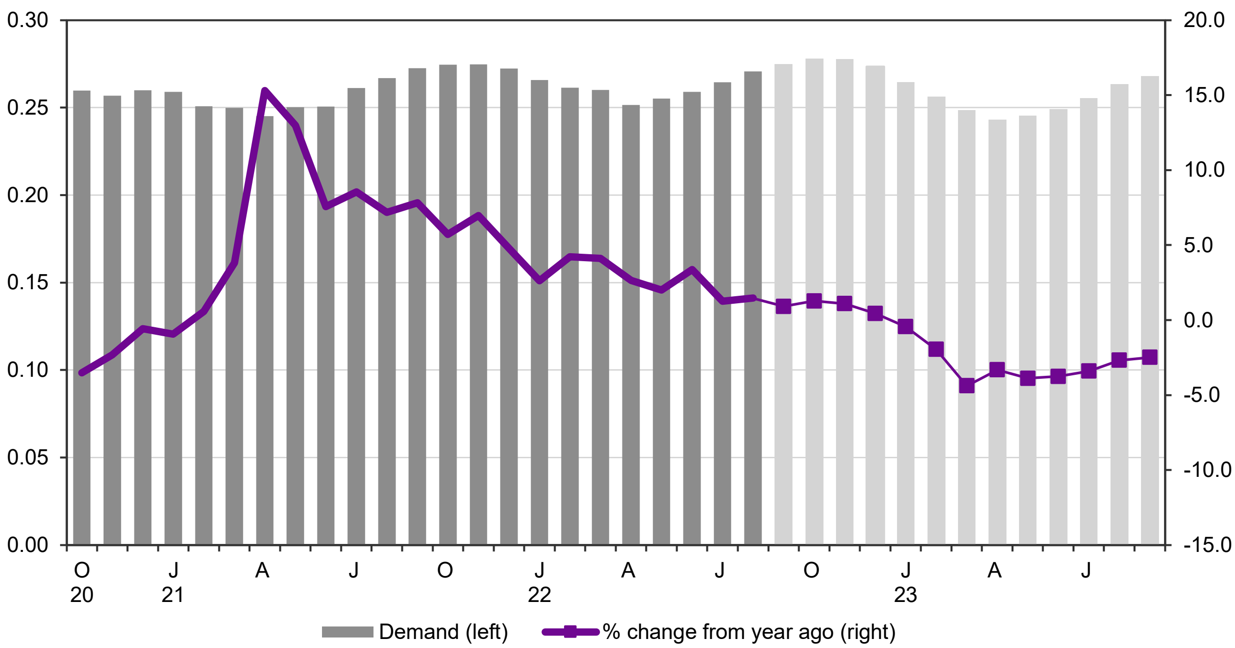


Figure 5

US MDF demand

Billion square feet, 3/4-inch basis



Stephen, New Brunswick, and Moncure, North Carolina, taking a combined 270 MMSF of production capacity out of the North American market. Kronospan added its first particleboard line at its facility in Eastaboga, Alabama, which can produce 311 MMSF annually; the first panel came off the line in October 2019. EGGER Wood Products built a 339-MMSF-capacity particleboard mill in Lexington, North Carolina, that began production in September 2020. Roseburg closed its mill in Dillard, Oregon, at the end of 2021, removing another 280 MMSF of capacity from the market. Most recently, there was a fire at Timber Products' Ampine mill, removing 200 MMSF of particleboard capacity from the US West. The net effect of all of these capacity changes has been a decline in nameplate particleboard capacity in North America of 295 MMSF since 2018.

As to upcoming capacity, Uniboard announced plans to invest $250 million and install a new particleboard line at its Val d'Or plant in Quebec. Construction was set to begin this summer and start-up is targeted for 2025.

Fastmarkets RISI estimates that the average **particleboard demand/capacity (D/C) ratio** in 2021 was 77%. Demand from residential usage and furniture production as well as management of operational capacity levels will help push the D/C ratio higher to 83% in 2022. At the same time, elevated prices and the potential strength of the US dollar could translate to imports playing a more significant role in US particleboard supply than they have in the past.

In 2023, demand will contract, reducing the D/C ratio to 71%. If operational capacity growth accelerates faster than anticipated, the market could loosen more quickly than forecast. Significant increases in prices could expose producers to greater competition from imports. Consequently, any tightening of the particleboard market will likely be slow and steady rather than precipitous.

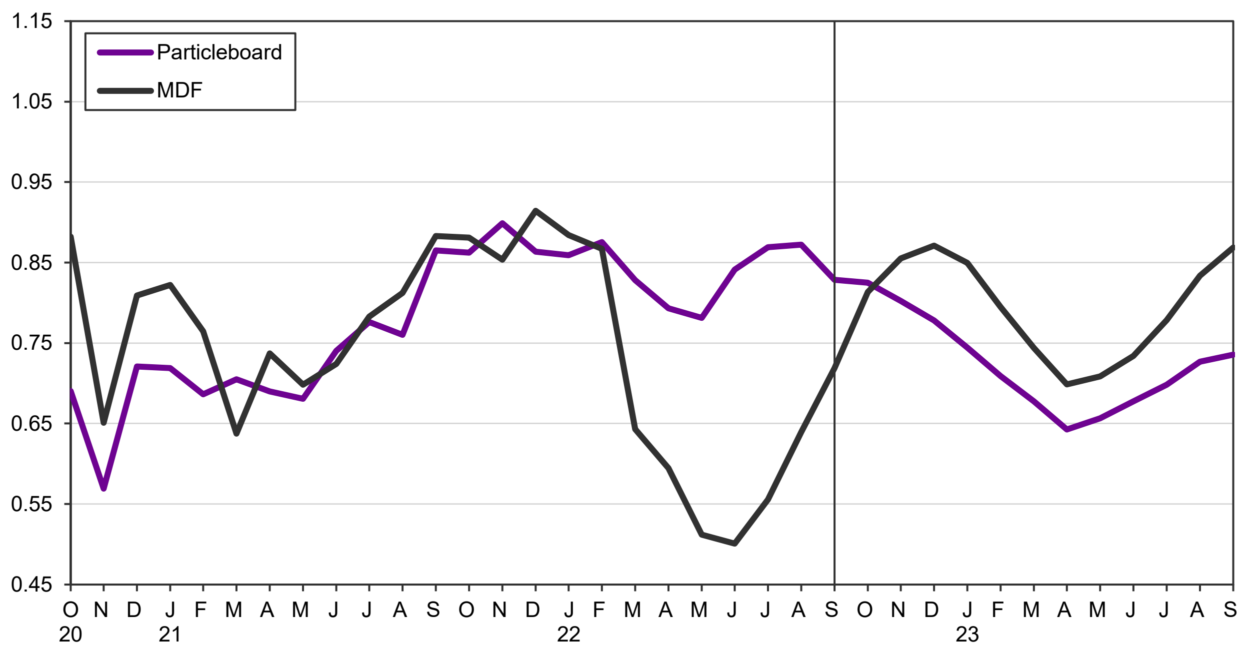
In 2020, Arauco North America announced the closing of its MDF mills in Eugene, Oregon, and Bennettsville, South Carolina, removing a total of 229 MMSF of capacity. However, in November 2020, production began at CalPlant 1 LLC's mill in Willow, California, which added 140 MMSF of annual capacity. Combined with the 158 MMSF of capacity added at the Swiss Krono mill in Barnwell, South Carolina, in 2019, the net increase in US MDF capacity is 69 MMSF. Recently, Roseburg announced it is exploring the feasibility of constructing an MDF or bioenergy plant within its Western operational footprint.

The **D/C ratio for MDF** in 2021 was an estimated 79%. High prices in 2022 have attracted a sharp increase in MDF imports. With this forecast, we are assuming the recent high level of MDF imports will persist through most of the rest of the year. As a result, our forecast for demand on mills for 2022 has decreased 12.2%, and our estimate of the D/C ratio for MDF has slid to 70.5%. We do expect to demand/capacity ratio to return to 81.2% as imports finally fade back toward recent historical levels. The uncertainty around trade flows is one of the risks for this forecast. If MDF imports persist at current levels or at higher levels, it will be that much harder for producers to maintain price levels near where they are now, regardless of how much costs increase in the future. The negative pricing pressure from import volumes will be much more acute if demand falls more than the 2.6% we are forecasting in 2023. Our current forecast shows an increase in demand from the furniture sector offsetting declines in demand from new residential construction and R&R. Furniture production not holding up is another risk to the MDF forecast.

Fastmarkets RISI's estimates of effective operating capacity (EOC) for MDF reflect the current operating reality rather than nameplate capacity, which assumes an average operation of 20 shifts and 7 days per week. The Fastmarkets RISI estimates of EOC are utilized in our forecast models to determine the demand/capacity ratios shown in Table 7 and Figure 6. Combining the Fastmarkets RISI demand, EOC and import forecasts provides the estimates of the monthly D/C ratios illustrated in Figure 6. The seasonality in imports tends to distort the real D/C ratios, particularly for MDF, as imports arrive in the US in relatively large batches but are

Figure 6

Demand/capacity ratios



consumed over several months rather than immediately. Consequently, the quarterly data for both the MDF and particleboard D/C ratios tend to be better measures of market tightness than the more volatile monthly data.

Particleboard and MDF prices

Particleboard prices

- Particleboard prices had been relatively unchanged since the spring of 2014, until the surprise closure of three mills combined with other mills going down for repairs sent traders scrambling to find supply in June 2019 and caused the biggest single-week price increase in particleboard since May 23, 2008.

- In the US West, ¾-inch prices rose from $355/MSF in mid-June 2019 to $395/MSF in August, where they held steady for the rest of that year. Prices declined in the first quarter of 2020 to $375/MSF in early March and held at that level until they began to rise in mid-October in response to production quantities slowing due to limited resin availability. The rising cost of resin, transportation issues and labor shortages, as well as the closure of the Dillard mill, all pushed prices higher in 2021. Particleboard producers in the West have historically seen lower margins compared with those in the South, but the spread between prices in the West and South started narrowing in the second quarter of 2021 and reversed on July 23, 2021, when the ¾-inch price in the US West rose above that in the South. The price in the West has been around $20-30/MSF higher than that in the South in recent months. Particleboard prices in the US West have been holding steady at $620/MSF since May.

- In the US South, ¾-inch prices had been at $410/MSF for 16 consecutive months, but in the second half of June 2019 prices increased to $430/MSF, where they remained before dropping slightly to $425/MSF in the beginning of March 2020. Prices held at this level until mid-January 2021, when they began to rise again. Prices reached $605/MSF in mid-May 2022 and have stayed at that level through August. In the second week of September, ¾-inch particleboard prices fell by $10/MSF to $595/MSF. In the third week of September, prices in the US South fell another $5/MSF to $590/MSF.

- We anticipate prices will stay elevated in the near term in the face of tight supply and healthy demand, declining only gradually over the next several months. Given that natural gas prices have come down and costs seem to have stabilized somewhat, we believe particleboard prices have peaked in both the US South and US West. We anticipate that particleboard prices in 2022 overall will be 20.5% higher in the US South and 26.1% higher in the US West, with prices in the fourth quarter down 1.3% in the South and flat in the West.

- Prices are expected to cool in 2023. Particleboard demand will continue to be relatively robust despite the downturn in the housing cycle through at least the first half of 2023, and we anticipate particleboard prices will remain at or near $600/MSF through March in the US south and through July in the US West. We do not foresee prices dropping as quickly as they have gone up. The primary downside risk to this outlook is the pressure that will come to bear on particleboard pricing if demand declines more than we anticipate. After prices find a new equilibrium, we expect particleboard pricing in the second half of 2023 to be within 1% of where it was in the first half of 2022, averaging $574/MSF in the US South and $602/MSF in the US West.

MDF prices

- The MDF market will be tighter than particleboard because there is less excess capacity, but competition with imports will play a significant role.

- MDF prices in the US West had been steady at $605/MSF since the third week of January 2020 but rose to $615/MSF in the second week of October. A shortage of resin began affecting producers' ability to operate and pushed prices higher. Strong demand, tight supply, rising costs and logistical constraints drove prices to a historically high level of $985/MSF as of the third week of May 2022 and they have stayed there since (Table 8, Figure 8).

- For producers in the US South, prices held at $595/MSF from March 2020 through that summer but started moving higher amid increased demand in September and October. By November 2020, the resin shortage began to affect MDF prices. Rising costs, tight supply and continued strong demand drove prices up to $960/MSF in the third week of May 2022 where they had stayed until the third week of September, when they eased slightly to $955/MSF.

- On average, MDF prices in 2022 are forecast to rise by 23.2% in the US South and by 21.7% in the US West over 2021 levels. We do not anticipate prices will climb much higher than their current levels given that the price differential between MDF and particleboard is at a historical high. There are also signs that costs are stabilizing a little. We also anticipate some softness in demand in 2023 along with the broader economic headwinds. These could prevent producers from raising MDF prices further.

- For 2023, our outlook calls for regional ¾-inch MDF prices to come down from historical peaks but still stay elevated, declining by an annual average of 1.7% in the US South and 1.9% in the West. There is downside risk to this forecast from increased substitution of MDF with cheaper boards due to these elevated price levels. At the same time, prices could rise if natural calamities like hurricanes hamper production.

Table 8

Monthly 3/4-inch particleboard and MDF prices

US dollars per thousand square feet, FOB mill

	History			Estimates and forecast		
	Jun 2022	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022
Particleboard						
Southeast	605	605	605	598	596	594
West Coast	620	620	620	620	620	620
MDF						
South	960	960	960	960	961	960
West	985	985	985	985	985	985

Figure 7

Industrial particleboard prices

US dollars per thousand square feet, 3/4-inch basis

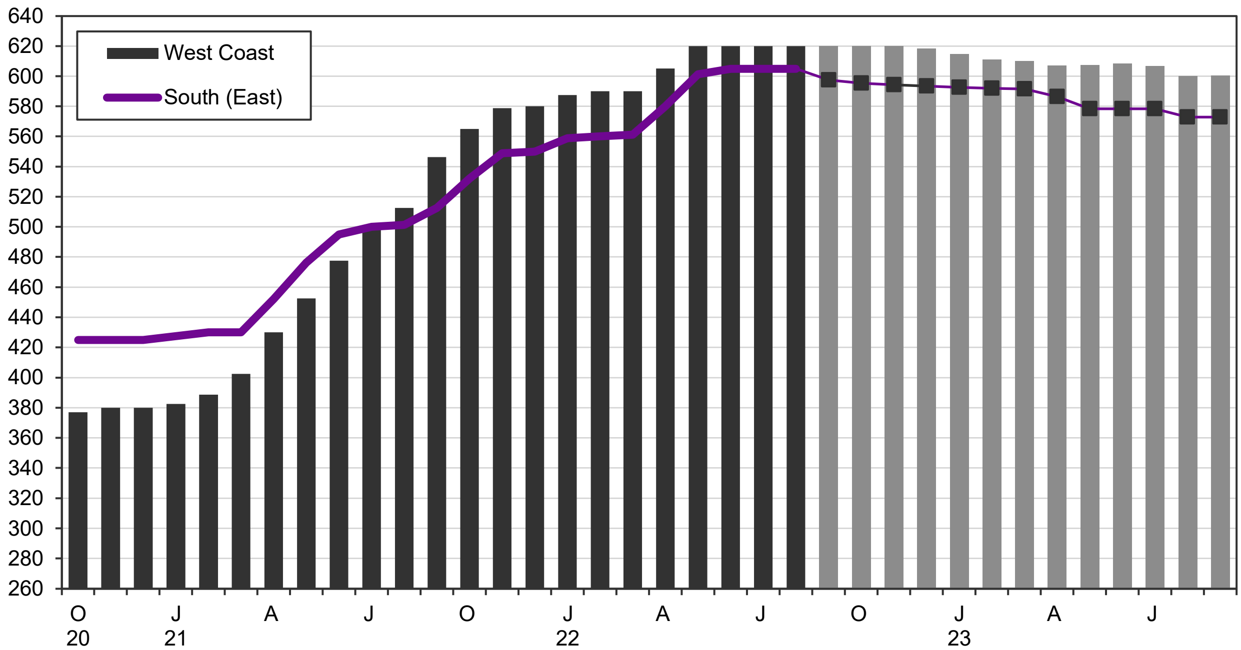


Figure 8

MDF prices

US dollars per thousand square feet, 3/4-inch basis

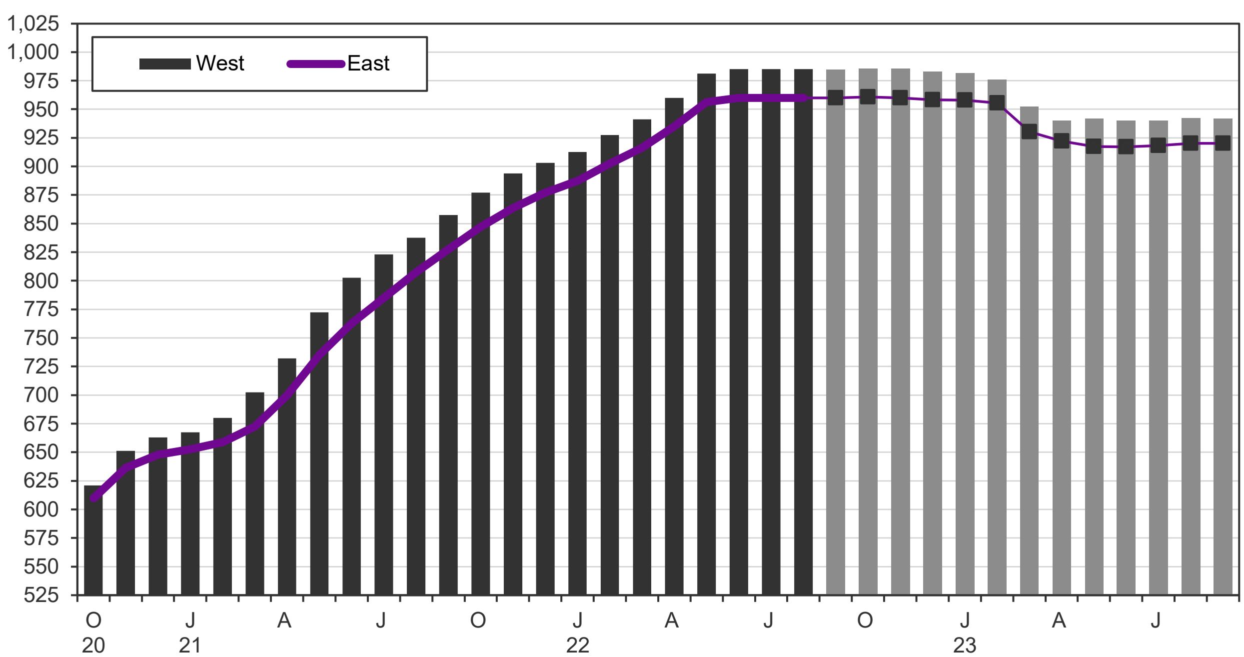


Figure 9

MDF/particleboard price ratios

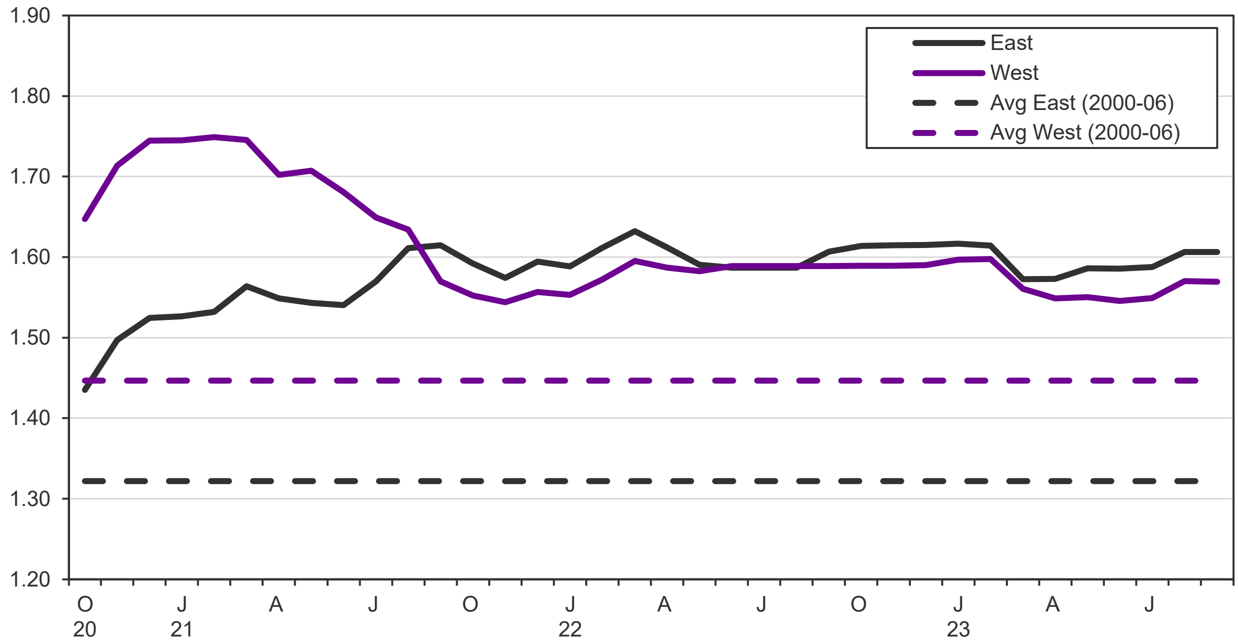


Table 9

Quarterly 3/4-inch particleboard and MDF prices

US dollars per thousand square feet, FOB mill

	Quarterly					
	2022 Q2	**2022 Q3**	**2022 Q4**	**2023 Q1**	**2023 Q2**	**2023 Q3**
Particleboard						
Southeast	595	603	594	592	581	575
% change	6.3%	1.2%	-1.3%	-0.4%	-1.9%	-1.1%
West Coast	615	620	619	612	608	603
% change	4.4%	0.8%	-0.1%	-1.2%	-0.7%	-0.9%
MDF						
South	950	960	960	948	919	920
% change	5.4%	1.0%	0.0%	-1.3%	-3.0%	0.1%
West	975	985	985	970	941	942
% change	5.2%	1.0%	0.0%	-1.5%	-3.0%	0.1%

ACKNOWLEDGEMENTS

The forecast data in the *Particleboard and MDF Commentary* were all generated by Fastmarkets RISI's industry models. Much of the historical data presented here were also developed by Fastmarkets RISI (e.g., end-use consumption, use factors, regional demand, etc.). However, the Fastmarkets RISI models and forecasts also rely on the accurate and timely reporting of macroeconomic and industry data. In this regard, Fastmarkets RISI would like to acknowledge and thank several trade associations and government agencies for the use of their reports of production, shipments, orders, mill stocks, capacity and other data. While Fastmarkets RISI uses these data for purposes of its analysis, only a very limited portion are reproduced by Fastmarkets RISI in its quarterly and monthly publications. Readers should contact the respective associations or agencies for the full statistical reports.

In alphabetical order, these organizations are:

AF&PA: American Forest and Paper Association
APA: APA – The Engineered Wood Association
CPA: Composite Panel Association
COFI: Council of Forest Industries
SFPA: Southern Forest Products Association
Statistics Canada
US Department of Commerce
WWPA: Western Wood Products Association

Price data for history are as reported in ***Random Lengths Weekly Report***. All price forecasts are proprietary to Fastmarkets RISI.

Regional costs of production data are collected and reported annually by Fastmarkets RISI.

The *Particleboard and MDF Commentary* provides economic analysis of the North American particleboard and MDF markets and is written and prepared by Hema Kalathingal, Jennifer Coskren and Emerson Paradee.

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Table A1

Demand indicators

	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Aug 2023	Sep 2023
Starts + mobiles																	
SAAR (millions)	1.519	1.676	1.481	1.476	1.491	1.506	1.485	1.477	1.469	1.469	1.465	1.465	1.465	1.466	1.467	1.628	1.633
Housing starts (SAAR, millions)																	
Total starts	1.404	1.575	1.374	1.369	1.384	1.398	1.378	1.371	1.362	1.362	1.359	1.358	1.358	1.359	1.360	1.521	1.526
Single-family	0.904	0.935	0.824	0.824	0.832	0.839	0.834	0.843	0.842	0.849	0.849	0.846	0.847	0.849	0.860	1.022	1.027
Multifamily	0.500	0.640	0.550	0.545	0.552	0.559	0.544	0.528	0.520	0.513	0.510	0.512	0.511	0.510	0.500	0.499	0.499
Housing starts (actual, thousands)																	
Total starts	126.1	140.5	119.7	117.2	107.2	98.8	100.9	97.5	112.9	123.7	122.3	124.7	121.8	121.2	118.3	135.0	132.5
Single-family	83.5	83.1	70.5	70.0	62.2	57.7	58.8	59.1	70.7	79.4	76.5	80.9	78.3	75.5	73.5	91.5	87.8
Multifamily	42.6	57.4	49.3	47.3	45.0	41.0	42.1	38.5	42.1	44.4	45.8	43.7	43.5	45.7	44.9	43.6	44.7
Mobile home production																	
SAAR (millions)	0.115	0.101	0.107	0.107	0.107	0.108	0.107	0.106	0.107	0.107	0.106	0.107	0.107	0.107	0.107	0.107	0.107
Actual (thousands)	8.1	8.6	8.9	9.9	8.8	7.7	9.1	8.5	9.8	9.1	9.0	9.3	7.5	9.1	9.0	9.4	9.0
Residential improvements																	
Actual, billion 2005 $	12.9	12.9	12.6	11.8	11.3	10.7	9.6	9.5	9.9	11.6	12.2	12.6	13.0	13.0	12.7	13.9	13.4
% change, year ago	-3.9	-2.3	-1.3	-1.3	-0.9	-0.8	-1.5	-1.4	-1.1	-0.4	-0.1	0.2	0.5	0.6	0.7	1.6	1.8
Nonresidential construction																	
Actual, billion 2005 $	15.5	15.4	15.1	14.8	14.3	13.7	12.0	11.9	12.3	14.6	15.3	15.7	15.4	15.3	15.2	15.3	15.2
% change, year ago	-6.5	14.7	6.9	-14.5	3.8	10.3	-9.6	-25.7	-0.1	-4.0	-7.1	-0.8	-0.7	-0.9	0.7	-0.9	0.5
Industrial production index (2007=1)																	
SAAR	1.032	1.030	1.033	1.033	1.034	1.034	1.036	1.036	1.037	1.038	1.038	1.039	1.040	1.041	1.043	1.037	1.039
% change (annual)	6.4	-2.0	2.9	0.3	0.9	1.0	1.4	1.0	0.9	0.5	0.9	1.1	1.1	1.4	1.6	3.3	3.2
Actual	1.029	1.043	1.033	1.033	1.034	1.034	1.036	1.036	1.037	1.038	1.038	1.039	1.040	1.041	1.043	1.037	1.039
Manufacturing index (2007=1)																	
SAAR	0.949	0.950	0.952	0.953	0.953	0.954	0.955	0.956	0.957	0.957	0.958	0.959	0.960	0.961	0.962	0.943	0.945
% change (annual)	7.8	1.0	2.6	0.3	0.8	1.0	1.4	1.0	0.9	0.4	1.0	1.1	1.2	1.5	1.8	3.2	3.2
Actual	0.938	0.959	0.952	0.959	0.950	0.943	0.943	0.956	0.966	0.948	0.958	0.976	0.948	0.969	0.962	0.952	0.944
Furniture and related production index (2007=1)																	
SAAR	0.666	0.652	0.661	0.662	0.675	0.670	0.666	0.664	0.653	0.663	0.672	0.680	0.693	0.694	0.696	0.707	0.706
% change (annual)	-9.1	-22.8	17.7	1.8	26.3	-8.5	-6.7	-3.5	-18.8	20.1	18.0	16.0	24.3	1.9	3.9	0.2	-1.3
Actual	0.676	0.662	0.652	0.660	0.674	0.678	0.657	0.649	0.647	0.644	0.674	0.689	0.703	0.705	0.687	0.722	0.697
Interest rates																	
Prime rate	4.85	5.50	5.49	5.45	5.51	5.54	5.50	5.50	5.50	5.58	5.52	5.41	5.09	4.98	4.93	5.48	5.48
10-year T-bond	2.90	2.90	3.33	3.37	3.42	2.93	2.90	2.88	2.86	2.87	2.83	2.77	2.63	2.57	2.53	2.53	2.53

Table A2

Particleboard summary report

Billion square feet, 3/4-inch

	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Aug 2023	Sep 2023
Demand																	
Single-family	0.034	0.035	0.036	0.036	0.035	0.033	0.031	0.029	0.027	0.025	0.024	0.024	0.024	0.026	0.027	0.030	0.032
Multifamily	0.010	0.010	0.010	0.011	0.011	0.011	0.011	0.011	0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.010	0.010
Mobile homes	0.008	0.009	0.010	0.011	0.009	0.008	0.010	0.009	0.011	0.010	0.010	0.010	0.008	0.010	0.010	0.010	0.010
Nonresidential	0.019	0.019	0.018	0.018	0.018	0.017	0.016	0.015	0.014	0.015	0.016	0.018	0.018	0.018	0.018	0.018	0.018
Industrial	0.119	0.118	0.117	0.118	0.120	0.121	0.118	0.118	0.118	0.117	0.122	0.125	0.127	0.128	0.125	0.130	0.126
Res. improvements	0.070	0.074	0.078	0.080	0.080	0.078	0.076	0.072	0.068	0.066	0.067	0.069	0.073	0.077	0.081	0.083	0.088
Exports	0.024	0.023	0.022	0.020	0.017	0.015	0.014	0.013	0.013	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011
Total demand	0.284	0.289	0.291	0.294	0.290	0.284	0.276	0.267	0.261	0.255	0.260	0.266	0.271	0.280	0.283	0.293	0.296
Supply variables and key market ratios																	
Mill stocks	0.611	0.612	0.613	0.609	0.609	0.610	0.606	0.603	0.604	0.604	0.610	0.617	0.618	0.619	0.619	0.601	0.601
Production	0.236	0.219	0.219	0.214	0.180	0.178	0.207	0.196	0.212	0.227	0.215	0.210	0.198	0.194	0.200	0.212	0.219
Shipments	0.204	0.227	0.218	0.218	0.180	0.177	0.211	0.200	0.212	0.226	0.210	0.202	0.197	0.193	0.199	0.211	0.218
Imports	0.052	0.075	0.075	0.074	0.074	0.074	0.074	0.075	0.076	0.078	0.079	0.079	0.079	0.078	0.078	0.070	0.069
Import share	0.202	0.249	0.255	0.253	0.291	0.293	0.260	0.271	0.263	0.257	0.274	0.282	0.285	0.289	0.282	0.249	0.241
Demand/capacity ratio																	
Demand on US mills	0.233	0.234	0.216	0.220	0.217	0.210	0.202	0.192	0.185	0.177	0.181	0.187	0.193	0.202	0.205	0.223	0.227
Capacity	0.268	0.268	0.261	0.267	0.270	0.270	0.271	0.271	0.273	0.275	0.275	0.275	0.276	0.277	0.278	0.284	0.285
Demand /capacity	0.869	0.872	0.829	0.825	0.802	0.778	0.744	0.709	0.678	0.642	0.657	0.678	0.698	0.727	0.735	0.786	0.796
3/4-inch price ($/thousand square feet, FOB mill)																	
South (East)	605	605	598	596	594	593	593	592	592	586	578	578	578	573	573	586	586
West	620	620	620	620	620	619	615	611	610	607	608	608	607	600	600	611	611

Fastmarkets RISI

Table A3

MDF summary report

Billion square feet, 3/4-inch

	Jul 2022	Aug 2022	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sep 2023	Aug 2023	Sep 2023
Demand																	
Single-family	0.042	0.043	0.044	0.044	0.043	0.040	0.037	0.035	0.032	0.030	0.029	0.029	0.030	0.031	0.033	0.036	0.039
Multifamily	0.009	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
Mobile homes	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Industrial	0.094	0.093	0.092	0.094	0.095	0.096	0.093	0.093	0.092	0.092	0.095	0.097	0.099	0.099	0.097	0.093	0.090
Res. improvements	0.092	0.098	0.102	0.104	0.103	0.101	0.097	0.092	0.088	0.085	0.085	0.087	0.092	0.098	0.103	0.106	0.112
Exports	0.025	0.025	0.025	0.024	0.024	0.024	0.024	0.024	0.024	0.025	0.025	0.025	0.024	0.024	0.024	0.022	0.022
Total demand	0.264	0.271	0.275	0.278	0.278	0.274	0.265	0.256	0.249	0.243	0.245	0.249	0.255	0.264	0.268	0.268	0.274
Supply variables and key market ratios																	
Mill stocks	0.571	0.570	0.576	0.578	0.585	0.590	0.592	0.594	0.592	0.600	0.607	0.613	0.620	0.623	0.632	0.584	0.590
Production	0.131	0.122	0.130	0.127	0.116	0.113	0.130	0.126	0.139	0.147	0.142	0.143	0.138	0.129	0.140	0.136	0.147
Shipments	0.122	0.125	0.124	0.125	0.108	0.109	0.128	0.124	0.140	0.139	0.135	0.136	0.132	0.126	0.131	0.136	0.141
Imports	0.173	0.166	0.157	0.145	0.137	0.131	0.125	0.126	0.126	0.128	0.129	0.129	0.127	0.126	0.125	0.126	0.125
Import share	0.587	0.571	0.559	0.536	0.559	0.546	0.495	0.502	0.474	0.479	0.488	0.485	0.491	0.501	0.488	0.482	0.469
Demand/capacity ratio																	
Demand on US mills	0.091	0.105	0.118	0.133	0.140	0.143	0.139	0.131	0.122	0.115	0.117	0.121	0.128	0.137	0.143	0.142	0.149
Capacity	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.164	0.165	0.165	0.165	0.165	0.165	0.166
Demand /capacity	0.555	0.640	0.719	0.813	0.855	0.871	0.849	0.795	0.744	0.699	0.709	0.734	0.779	0.834	0.869	0.858	0.900
3/4-inch price ($/thousand square feet, FOB mill)																	
South (East)	960	960	960	961	960	958	958	956	930	922	917	917	918	920	920	920	920
West	985	985	985	985	985	983	982	976	952	940	942	940	940	943	942	943	942