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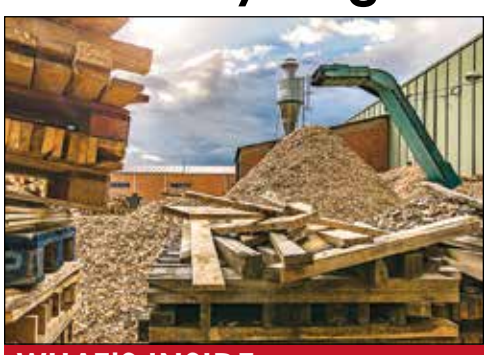

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High-tech developments in waste management

by MAURA KELLER

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The waste industry has seen significant evolution in efficiency, resource recovery and environmental sustainability, driven by key technological advancements

Never underestimate the power of incorporating new technology into well-established processes. The new generation of high technology solutions gracing the waste and recycling industries has taken hold – impacting industry players and consumers in ways never imagined.

Christopher Beaufait is president and chief executive officer of Heartland, a leading waste solutions provider. Heartland utilizes patented, cutting-edge systems that eliminate the "forever chemical" PFAS, reducing the waste volume by as much as 95 percent and, when necessary, delivering 100 percent assured PFAS destruction. In addition, the company is successfully converting food waste into turquoise hydrogen and ultra-pure synthesis gas, used to produce clean energy, reducing landfill mass, our reliance on foreign oil and our impact on climate change.

"Numerous technological innovations are reshaping the [waste] industry, but the ability to integrate advanced solutions 'at the source' is among the most transformative," Beaufait said. "These solutions enable customers to process waste where it is generated, reducing transportation costs and emissions while scaling alongside increasing waste volumes. This flexibility and efficiency demonstrate how advanced technologies can empower the industry to solve today's most pressing environmental and societal challenges."

As Beaufait pointed out, the waste industry has seen significant evolution in efficiency, resource recovery and environmental sustainability, driven by key technological advancements.

For example, Heartland's HelioStorm system embodies this shift with its compact footprint and modular scalability. It brings ultra-high temperature ionic reforming capabilities directly to waste removal sites. Here it can achieve plasma field temperatures between 3,000 and 10,000°C, allowing it to destroy persistent contaminants like PFAS and convert food waste, plastics and biosolids into high-value energy products, including turquoise hydrogen and ultra-pure syngas.

"Advanced technologies are transforming waste handling, making the work of waste solutions providers far more impactful than ever before," Beaufait says. "Robotics and automation are reshaping the industry, driving improvements in precision, safety and cost-efficiency."

The AI Revolution in Waste

Consider this – only 5 percent of plastic is recycled today in the U.S. One of the drivers of that massive problem is extremely low recycling efficiency within recycling facilities – where recyclable materials fall through the cracks and end up in landfills. Manual sorting, and the lack thereof, is one major reason for that. Only 1 percent of waste is monitored in facilities, and even in advanced economies, 40 percent of waste sorting is done by hand.

Greyparrot solves this problem with an AI-powered waste analyzer that is installed above waste streams within recycling facilities to identify materials in milliseconds, and then provides each item's data on 89 waste categories across seven layers, including financial value, brand, and GHG emissions to improve environmental-friendly recycling of each item.

However, in addition to AI-led sorting, this technology is also helping recycling facilities improve their efficiency facility-wide. For instance, according to Gaspard Duthilleul, chief operating officer of Greyparrot, AI waste identification can pinpoint the cause of waste stream blockages to eliminate downtime: As an example, waste composition data of waste obtained by AI waste identification can reveal that the volume of paper often spikes before a blockage. Operators can use that insight to isolate paper-sorting machinery for inspection. This type of data-assisted, proactive maintenance is crucial in avoiding costly downtime and extending the life of machinery, ensuring that the recycling process remains efficient and uninterrupted.

"The most significant tech developments in the last five to six years have been robotics (automation) and AI," Duthilleul said. "Around 2019, robotics really took off in the waste industry. It was the main topic at every industry event that year, just as AI has been the topic du jour at every event over the last year."

At the time, it was only one year since China banned imports of waste from the Western world, and the industry was looking for radical solutions to address a disrupted market. As Duthilleul pointed out, the focus became further automating the sorting and separation process at waste facilities with robots. This was the latest in years of continuous shifts away from manual to automated sorting solutions.

"MRFs worldwide quickly jumped on the robotics bandwagon to help address the soaring cost of recycling with automation and improve the purity of recyclables to boost revenue. The problem at the time was that many of these facilities were flying blind when they decided to implement robots, with little data on their waste streams to actually influence where and what type of robots they should integrate, if any," Duthilleul said. "The result was that some of the largest waste management companies in the world bought hundreds of robots and soon found that they weren't achieving the desired results."

However, Duthilleul said robotics and automation have really got "a shot in the arm" in the last year or two from AI as the use of computer vision, object detection models, and machine learning has uncovered the industry's blind spot to provide waste data and intelligence on almost every waste material.

"With 100 percent visibility, waste facilities can now truly understand the composition of their waste streams," Duthilleul said. "It's really changed the game in terms of how we understand and manage waste flows – allowing for more efficient sorting, contamination tracking, and recovery optimization in real time. Furthermore, AI-obtained waste

See WASTE MANAGEMENT, Page A4

EPA funds $2.4 million to 24 small businesses for the development of environmental technologies

The U.S. Environmental Protection Agency (EPA) announced $2,400,000 for 24 small businesses to develop technologies to address public health and environmental challenges. These companies are using innovative approaches that include treating PFAS in biosolids, reducing the amount of greenhouse gas emissions from building materials, and developing chemical alternatives that are safer for our environment.

These awards are part of EPA's Small Business Innovation Research program, an annual, two-phase competition for small businesses to develop and commercialize environmental technologies that help address the agency's mission of protecting human health and the environment. The 24 small businesses are receiving $100,000 of Phase I funding for six months for "proof of concept" of their proposed technology. Companies that complete Phase I can then apply to receive Phase II funding of up to $400,000 to further develop and commercialize their technology.

Some of the SBIR Phase I winners and their proposed technologies are below:

- Acadian Research & Development, LLC, Laramie, Wyoming, to create an innovative low-cost method to use strength enhancing biochar-derived graphene to lower embodied carbon in concrete.
- AxNano, LLC, Greensboro, North Carolina, to create a novel, field deployable treatment process for removing PFAS from biosolids allowing beneficial reuse.
- BetR-blok, LLC, Tempe, Arizona, to produce a building block alternative made from waste biomass and recycled materials.
- Bold Reuse, Portland, Oregon, to create a novel inventory management system to transition to reusable packaging.
- Circle Concrete Tech, Inc., Gilbert, Arizona, to design an engineered recycled steel fiber product that replaces rebar for concrete reinforcement with a significantly lower carbon footprint.
- Dynamo.AI LLC, Saratoga Springs, New York, to develop a technology that leverages biochar to extend the shelf life of fruits and vegetables to reduce food waste.
- EcoaTEX, LLC., Hull, Georgia, to create a technology that converts agricultural waste into high-performance biodegradable fibers.
- KLAW Industries LLC, Binghamton, New York, to develop a new paving material utilizing waste glass to replace high-embodied carbon materials.
- Pacific Reclaimed Lumber & Supply, Sebastopol, California, to design a cutting-edge web-based platform that facilitates the reduction of embodied carbon through the purchase of reclaimed lumber and building materials.
- Phospholutions, Inc., State College, Pennsylvania, to create an activated metal oxide technology to mitigate the environmental impact of phosphorus runoff into water bodies and enhance crop productivity.
- Symmetry Wood, PBC, Los Angeles, California, to create a method of upcycling food waste into high-performance wood.
- Talon/LPE, Ltd., Amarillo, Texas, to develop a sustainable method to treat PFAS in biosolids using biochar.
- Tetramer Technologies LLC, Pendleton, South Carolina, to create a bio-renewable high-performance tire rubber additive to replace the standard use of 6PPD and alleviate its associated ecotoxicity.

Veolia North America partners with GreenLabs Recycling

Veolia has partnered with MassBio and GreenLabs Recycling to support an innovative regionally-focused solution for recycling container lab plastics used in facilities that manage medical waste.

Under an agreement recently completed with GreenLabs and Veolia, the recycling solution for lab plastics is now being put in place, using the medical waste processing center that Veolia operates in Middleton, Massachusetts to aggregate the plastic for GreenLabs. This reduces the need to dispose of lab plastics in landfills, and also helps address the growing challenge around properly managing plastic waste, which has been intensifying in recent years due to restrictive global market conditions.

The plastics recycling idea in Massachusetts was conceived by GreenLabs, a startup innovator based in Concord, about 20 miles outside Boston. GreenLabs' solution works by creating a hyperlocal recycling and manufacturing ecosystem for lab plastic consumables. GreenLabs recycles pipette tip boxes into a lab product they manufacture outside of Boston called a tips transfer bin. Scientists in the lab use these bins so they can see what their plastic is being turned into every time they deposit their used tips into these benchtop bins made from 100 percent recycled plastic.

The lab plastics designated for GreenLabs recycling are shipped from the location of the waste generator to the Veolia Middleton facility, where the plastics are consolidated to ship to GreenLabs' recycling facility in Concord. The lab plastics are separated, granulated, and prepared for the 100-percent recycled plastic molding process. The granulated plastic material is then transformed into the transfer bins using their molds at a nearby plastic molding facility, keeping the circular economy solution hyperlocal and within a 50-mile radius of one of the world's largest life science hubs.

Schools nationwide turn trash into cash with TerraCycle

International recycling leader TerraCycle® is empowering K-12 schools across the country to turn hard-to-recycle packaging into cold, hard cash with a kid-friendly recycling fundraiser. Schools earn money by collecting and recycling a wide array of "unrecyclable" items that are not accepted in curbside recycling services – everything from personal care products to squeezable plastic pouches.

Cherry School in Iron, Minnesota teaches its special needs students valuable job skills and environmental stewardship through a hands-on recycling program. For three years, students have recycled paper, plastic, glass, and cans, recently adding items like worn-out socks and old toothbrushes through TerraCycle.

"This program gives our students a sense of pride and accomplishment while helping tackle waste challenges," said Jamie Herzmann, special education teacher at Cherry School. "Every effort, no matter how small, drives positive change for individuals, communities, and the planet when we work together."

Eastlake Middle School in Eastlake, Ohio, engages students and families in recycling efforts through the EMS Green Team, with collection bins throughout the school for hard-to-recycle items like snack packaging and bread bags. The team promotes sustainable habits at school and at home, making recycling accessible and impactful for the entire community.

The TerraCycle school recycling fundraiser is easy. Here's how it works:

1. Create a free TerraCycle account for your school – there's no cost to participate.
2. Sign up for as many free recycling programs as desired.
3. Set up a recycling station with collection bins to collect the accepted waste.
4. When the bins are full, download a free shipping label for each program and send the packaging to TerraCycle to be recycled for free.
5. Earn TerraCycle Recycling Rewards for each shipment, which you can redeem for cash for your school. The more packaging you recycle, the more money you raise.

"At TerraCycle, we see the inherent value in waste," said Tom Szaky, founder and chief executive officer of TerraCycle. "This recycling fundraiser is more than just a practical way for schools to raise money – it's a community-driven program that engages and empowers young people to help the environment by keeping waste out of landfills and incinerators."

Schools like Stewart School in Garden City, New York, and Sunset Primary in West Linn, Oregon, have already seen success. A fourth grader at Stewart School sparked the creation of a student ambassador program that collected nearly 50 pounds of snack pouches in just a few months. At Sunset Primary, a mother-daughter duo rallied the entire school community to recycle hard-to-process items such as contact lenses and disposable razors.

TerraCycle's school recycling program is open to any interested school community. For more information, visit www.terracycle.com/schools.

VLS Environmental Solutions pioneers pallet recycling program

VLS Environmental Solutions, a leader in sustainable waste management, has announced its innovative Pallet Recycling Program, an initiative designed to repurpose discarded pallets into clean, renewable energy sources. This breakthrough program offers significant environmental and economic benefits for manufacturers and industrial businesses across industries.

Revolutionary Recycling Process

At the heart of the program is an advanced five step recycling process. Wooden pallets are collected from businesses, metal components are removed, and the wood is shredded into sawdust. This sawdust is then converted into Alternative Engineered Fuels (AEFs), providing clean, efficient energy for demanding industrial applications such as cement and lime kilns.

"Our new Pallet Recycling Program is more than just a solution – it's an investment in a sustainable future," said Keith Cordesman, president of VLS. "This initiative exemplifies our commitment to finding innovative ways to help our clients reduce waste and meet their environmental objectives. It's a win for businesses, their communities, and the planet."

Benefits for Manufacturers and Industries

The program targets manufacturers and industries that frequently encounter the challenge of managing outdated or damaged pallets. By partnering with VLS, businesses can divert waste from landfills, achieve cost savings on disposal, and enhance their sustainability practices.

"This initiative isn't just about recycling pallets; it's about creating opportunities," explained Doug Dugan, regional vice president. "With this program, we're addressing a pervasive waste problem and delivering eco-friendly, cost-effective alternatives to traditional disposal methods. It's a game-changer for our partners and the environment alike."

By opting for pallet recycling, businesses can reduce their carbon footprint significantly. Each recycled pallet contributes to cleaner energy production.

NWRA and SWANA partner to address lithium-ion battery disposal challenges

The National Waste & Recycling Association (NWRA) and the Solid Waste Association of North America (SWANA) released a joint policy statement addressing the critical issue of lithium-ion battery disposal. Improper disposal of these batteries presents significant safety hazards, including fires that endanger people, property, and the waste and recycling infrastructure.

The statement reads, "Lithium-ion batteries require special handling for proper recycling and disposal. They should never be placed in waste or curbside recycling bins as they can cause fires, endangering people and waste and recycling infrastructure. The best solution is to use take-back programs designed for safe collection and recycling. NWRA and SWANA are committed to promoting awareness and supporting policy initiatives that ensure proper battery disposal to protect workers, communities and the environment."

NWRA president and chief executive officer Michael E. Hoffman emphasized the urgency of addressing this growing issue: "Improper disposal of lithium-ion batteries is a pressing safety and environmental concern. At NWRA, we are committed to raising awareness and supporting policy initiatives that promote effective take-back programs, ensuring these batteries are safely and responsibly disposed, with end-of-life certainty. Our partnerships with SWANA and others, aims to protect workers, communities, and the environment from the risks posed by these batteries."

SWANA executive director and chief executive officer Amy Lestition Burke, MA, FASAE, CAE, added: "Fires caused by lithium-ion batteries are one of the biggest issues facing our industry. Municipalities often bear the cost burden of collecting batteries and informing their residents of proper disposal methods for batteries. SWANA seeks to support its members with raising awareness of the fire hazards and to improve collection opportunities for batteries. This statement with our partners at NWRA provides a clear explanation of the issue. Our associations will use that statement as a baseline to elevate the issue and support our advocacy."

Batteries, particularly lithium-ion batteries, present unique challenges for recycling and disposal. Improper disposal can result in fires, posing serious risks to consumers, waste and recycling workers, and critical infrastructure. To mitigate these risks, NWRA and SWANA support effective take-back programs with clear end-of-life certainty and public awareness campaigns to educate consumers on safe disposal methods.

Waste management

■Continued from Page A1

intelligence is now serving as a roadmap for implementing waste robots that maximize ROI and minimize the amount of time it takes for robotics payback."

AI can also improve the purity of recycling bales: By accessing purity data in real-time from AI sensors, facility managers can spot and adapt to trends faster rather than waiting on intermittent manual samples. Even a small drop in purity – from 99 percent to 95 percent – can jeopardize customer contracts. Greyparrot recently saw a case where a facility faced such a drop but leveraged real-time data to resolve the issue in minutes instead of days. They ultimately saved about $65,000 by avoiding the need to reprocess 40 tons of aluminum cans.

"With the combined power of AI and automation, waste facilities, and more broadly, the waste industry as a whole can move to holistic plant optimization solutions with AI at the center of them," Duthilleul said. "We're seeing waste facilities use this AI-first approach to detect blockages and reduce downtime. In other areas, AI-powered data solutions offer significant cost efficiencies. Consider sampling costs: manual sampling of 4.6 tons of PET typically costs around $3,500, while AI-driven sampling reduces this to approximately $6.25."

Indeed, America's largest waste management organizations are now using automation to improve recycled product quality and navigate unstable commodity prices. And in Northern Ireland, AI and robotics have so dramatically improved sorting efficiency that waste professionals now advocate for simpler three-bin systems rather than more complex alternatives.

"So, this is much more than just a change of sorting and handling techniques," Duthilleul said. "We're seeing AI and automation unlock lean operations for waste and recycling facilities, enabling them to pinpoint waste stream blockage causes, transition from weekly manual sampling to real-time purity data use, and stabilizing throughput to minimize residue losses."

Future Advancements

Heartland's projections over the next decade include: 9 million tons of averted CO_2; 11 million tons or approximately 3.3 billion gallons of renewable fuel generation, including methanol and sustainable aviation fuel (SAF); 16 million tons of plastic waste redirected from landfills'; 37 million tons of biosolids containing the "forever chemical" PFAS destroyed; an avoidance of 51 million trucking miles, which reduce emissions through localized waste handling; and 9 billion gallons of wastewater treated.

"We believe high-tech integration will fundamentally reshape the waste industry by enabling new solutions, improving sustainability and unlocking economic value," said Beaufait, who pointed to three key trends that stand out:

- Renewable fuels at market-competitive prices: Policies aimed at reducing energy costs, such as those being introduced by the Trump administration, which provide a favorable environment for renewable fuel development. Heartland is leveraging this opportunity to produce market-competitive bio-methanol, sustainable aviation fuel (SAF) and turquoise hydrogen, paving the way for a cleaner, more sustainable energy economy.
- Transforming waste into energy-rich resources: By converting plastics, food waste and biosolids into high-value energy products, Heartland supports the circular economy, reducing landfill dependency and creating new revenue streams for its partners.
- Evolving the partnership model: The future lies in fostering partnerships based on a stakeholder model that benefits customers, society and the economy – a "win-win-win" approach. Prioritizing collaboration with municipalities, private enterprises and public agencies will help scale innovative solutions and create long-term value.

"Looking forward, the continued integration of advanced technologies such as AI for predictive analytics, automated waste-to-energy facilities and expanded public-private partnerships will unlock the full potential of waste as a resource," Beaufait said.

For Duthilleul and the team at Greyparrot, the future of waste management technology looks pretty exciting. As he explained, the industry is moving toward creating a standardized digital infrastructure that will track materials throughout their entire journey – from collection through processing and into new products. Duthilleul expects AI systems will play a massive role with the dynamic control and smarter material recovery facilities that take us to the next stage of optimization. Facility operators will be able to adjust and optimize operations in real time based on changing waste flow conditions to maximize recycling efficiency and revenue.

"This technology is also going to be crucial for helping manufacturers and CPG brands design more recyclable packaging through better feedback loops," Duthilleul said. "The ultimate goal is ambitious but certainly achievable: making recycling efficient and profitable enough to cut plastic pollution by 20 percent by 2040. With the recycling industry stepping up to fill the leadership void left by policymakers, technology is going to be at the heart of tackling our waste challenges."

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AUTOMOTIVE

ChargePoint and General Motors collaborate to install EV fast charging ports

ChargePoint, a provider of networked charging solutions for electric vehicles (EVs), and General Motors (GM) announced plans to further accelerate EV infrastructure growth in the U.S. The companies are joining efforts to install hundreds of ultra-fast charging ports at strategic locations across the U.S., featuring the latest innovations in EV charging to improve access to chargers and help drivers get back on the road faster than ever. ChargePoint and GM intend for the locations to be opened and available to the public before the end of 2025.

"The transition to electric mobility continues to be driven by leaders such as General Motors offering innovative EVs and committing to make chargers as ubiquitous as possible," said Rick Wilmer, chief executive officer of ChargePoint. "Our collaboration with GM represents a significant investment in the infrastructure to enable fast and easy charging for all. Together, ChargePoint and GM will deliver a seamless fast charging experience via reliable charging hardware managed by our industry leading software platform."

Branded GM Energy, many applicable locations will be equipped with ChargePoint's Omni Port system. Omni Port allows vehicles with CCS or NACS charging ports to seamlessly charge at any charger, without the need to carry an adapter or dedicate a parking space to a particular connector type. Many of the charging stations planned for the collaboration will feature ultra-fast charging through ChargePoint's Express Plus platform, which is capable of charging speeds up to 500kW.

"Continuing to provide customers with better charging options helps to remove barriers to EV adoption and improve the ownership experience. Today, GM drivers have access to hundreds of thousands of places to charge and we are proud that this collaboration with ChargePoint adds even more reliable, accessible and convenient charging experiences," said Wade Sheffer, GM Energy vice president. "With ultra-fast charging, Omni Port technology and excellent customer experiences, this collaboration should be another reason why EV drivers and the EV-curious should be excited."

Through the collaboration, ChargePoint and GM are accelerating the deployment of DC fast charging across the U.S. through an incentive program designed to make it easier for third-party charge point operators (CPOs) to own and operate EV charging infrastructure.

Toyota to receive $4.5 million in federal funding for electric battery recycling

Toyota Engineering & Manufacturing North America, Inc. (TEMA), inclusive of Toyota Motor North America (TMNA) R&D, has been selected to receive $4.5 million in funding from the U.S. Department of Energy, Advanced Research Projects Agency-Energy (ARPA-E). The funding is part of the Catalyzing Innovative Research for Circular Use of Long-lived Advanced Rechargeables (CIRCULAR) Program, designed to support a circular domestic supply chain for electric vehicle (EV) batteries.

TEMA's Toyota Research Institute of North America (TRINA) division will administer the project – Development of an Autonomous Robotic Disassembly Process for Applications in Battery Pack Circularity – in collaboration with Oak Ridge National Laboratory (ORNL), National Renewable Energy Laboratory (NREL) and Baker Hughes' inspection technology product line, Waygate Technologies to pursue the project goals.

This project aims to develop an industry-relevant template for a 3R (Reduce, Reuse, Recycle) facility of the future. The goal is to help resolve the primary bottlenecks in current battery supply chain circularity, which are the automation of battery pack disassembly, data-driven battery classification, and addressing cell degradation.

In support of this goal, the teams working on the project will develop tools and procedures. They will include an automated pack disassembly process, advanced diagnostic tools and protocols for module and cell 3R classifications, and a refabrication method for 3R cells into new energy systems. Together, these innovations envision a scenario where end-of-life lithium-ion batteries are systematically evaluated, classified and reused prior to being considered for recycling.

The concepts developed within this project will also be applied in industrial settings led by TMNA's Battery Lifecycle Solutions (BLS), Business Development Team.

As end-of-life and battery scrap volumes increase in the coming years, a new approach is needed to extend the useful life of many standard battery pack components, and conserve their initial techno-economic investments, paving the way for a more sustainable, circular battery supply chain.

New Jersey makes grants available for government vehicle electrification projects

The New Jersey administration announced the availability of $35 million in grants to help local governments electrify their shuttle, school bus and truck fleets to protect public health and the environment, leveraging proceeds from New Jersey's participation in the Regional Greenhouse Gas Initiative (RGGI).

The new funding is for the replacement of diesel vehicles owned by, or serving, local towns including shuttles, transit buses, garbage trucks, dump trucks and small school buses. Municipal and private fleets serving towns are encouraged to submit proposals for the Diesel Modernization Program, which accepts applications on a rolling basis. Grants that meet the eligibility requirements will be awarded on a first-come, first-served basis.

"While trucks and buses account for only four percent of all vehicles on the road, they generate nearly 25 percent of our transportation-sector greenhouse gas emissions and emit pollutants that are especially harmful to vulnerable populations such as children, the elderly and those with heart and lung conditions," said environmental protection commissioner Shawn M. LaTourette. "We encourage towns across the state, and the fleets that serve them, to take advantage of this funding to replace dirty diesel trucks with electric ones that will better protect our communities from harmful air pollution and bring us closer to meeting our climate goals."

Base incentive amounts reimburse the cost of purchasing a new electric vehicle and, if needed, a charging station and range from $15,000 to $270,000 depending on the size of the vehicle. Additionally, higher amounts are available for vehicles owned by small businesses and towns. Fleet owners are required to provide documentation that vehicles purchased with grant money replaced existing diesel vehicles.

Proceeds from New Jesey's participation in RGGI, a cap-and-trade pact among 11 northeastern states dedicated to reducing greenhouse gas emissions from the electricity-generating sector, will fund the projects. With this new funding, the state has invested $176 million of RGGI proceeds in electric vehicles to date.

To complement these projects, the state also offers the New Jersey Fleet Advisor program, which provides zero-cost assistance to help small fleets navigate key decisions around fleet electrification. This includes vehicle recommendations, cost projections and on-site infrastructure assessments. Applications are accepted on a rolling basis.

Both the RGGI funding opportunity and technical assistance program directly support New Jersey's Advanced Clean Trucks (ACT) Rule, which was adopted in December 2021 to accelerate the large-scale transition to electric medium- and heavy-duty trucks. Through the rule, manufacturers are required to sell zero-emission trucks as an increasing percentage of their annual sales from 2025 to 2035.

State Electric Vehicle Progress

Since 2019, the Murphy Administration has awarded nearly $540 million for the purchase of electric vehicles and charging equipment for personal, public, and fleet use. Last month, the Murphy Administration announced that New Jersey had reached a significant milestone by surpassing 200,000 electric vehicle registrations, demonstrating increasing consumer confidence in these vehicles and the availability of charging infrastructure.

Ongoing programs that support the transition to electric vehicles include:

- The Electric School Bus Grant Program, which provides $15 million per year for three years to replace diesel school buses with electric school buses. In the first year (2024), the program funded the purchase of 48 electric school buses and associated charging equipment at 14 schools. Another round of funding will be announced this spring.

Supporting this success are incentive programs for passenger vehicles and shared electric transportation, which include:

- The It Pay$ to Plug In program, which awards grants to offset the cost of purchasing and maintaining charging stations. Since its launch, the program has awarded over $26 million in grants to fund the construction of nearly 3,000 publicly available Level 2 charging ports and 635 DC fast charging ports at 1,400 locations across the state.
- The eMobility Grant Program, which provides funding for shared electric transportation. RGGI proceeds have funded nine electric ridesharing projects to date. Additionally, local governments and community organizations are encouraged to use the eMobility Planning Toolkit to better understand the transportation needs and preferences of their residents to develop community-driven solutions that may be eligible for eMobility grants.

To further support these ongoing efforts, DEP was awarded a $10 million federal grant to deploy charging stations throughout the state. The funding will also provide infrastructure to support more zero-emission, shared transportation options, such as electric carshares, rideshares, and other eMobility services.

AUTOMOTIVE

Aluminum: Driving efficiency and sustainability across all vehicle segments

Contributed by: Daniel Kern, vice president, Novelis

Traditionally, aluminum was reserved for luxury and high-performance vehicles. However, advancements in material science, recycling capabilities, and design innovation have transformed aluminum into a cost-effective and sustainable choice for all vehicle categories – from compact cars to SUVs and trucks.

Cost-Effective Lightweighting for Mass-Market Vehicles

Lightweighting with aluminum is both practical and economical. Modern manufacturing techniques, such as hot stamping and adhesive bonding, enable significant weight reductions without substantial cost increases. For example, incorporating aluminum components like doors and hoods into existing steel platforms can achieve up to a 50 percent weight reduction at a competitive cost.

Aluminum's lower density –approximately 67 percent less than steel—means that less material is required to achieve the same structural integrity. This reduction in material usage can offset the per-unit cost of aluminum compared to steel, leading to overall cost savings. Additionally, lighter vehicles benefit from secondary weight savings. For instance, replacing 400 kg of steel with 240 kg of aluminum results in a primary weight reduction of 160 kg, which can lead to an additional 40 kg to 60 kg reduction in other components, such as brakes and suspension systems.

Advancing the Circular Economy

We believe we are the world's largest closed loop aluminum recycling partner, returning automotive makers' production scrap to our facilities to be melted down and reintroduced into the supply chain. This process not only reduces costs but also significantly lowers carbon emissions, aligning with the growing sustainability priorities of both automakers and consumers. Recycling aluminum uses approximately 95 percent less energy than primary aluminum production, resulting in 95 percent fewer carbon emissions.

Beyond production scrap, Novelis is also pioneering end-of-life vehicle recycling initiatives. Through innovative scrap sortation and segregation technologies, we believe we can capture specific aluminum alloys from decommissioned vehicles, preserving their value and quality.

In collaboration with key industry partners, Novelis is driving an end-of-life vehicle circularity platform in order to optimize material flow, increase access to high-quality recycled aluminum from decommissioned vehicles, and minimize waste to landfill.

Recognizing that recycling starts with thoughtful design, Novelis also works closely with automakers to develop sustainable solutions like uni-alloy designs for components like hoods and doors, simplifying recycling processes and enhancing material recovery.

Customized Solutions for Diverse Automotive Needs

Recognizing that each vehicle has unique material requirements, Novelis collaborates with automakers to develop tailored aluminum solutions that meet specific performance, design, and sustainability objectives. We believe our low-carbon alloys offer exceptional versatility and strength, enabling innovation across a wide range of applications – from electric vehicle (EV) platforms to high-performance SUVs. Even smaller vehicles benefit from lightweighting, as reducing weight enhances fuel efficiency and lowers emissions.

For EVs, lightweighting is crucial to offset the significant weight of battery packs. The result is improved range and overall performance.

In commercial vehicles, the advantages of aluminum lightweighting are even more pronounced, as it enhances fuel efficiency, increases payload capacity, and helps fleets meet stringent emissions regulations.

Moreover, reducing any vehicle's weight with aluminum not only improves efficiency but also enables automakers to use smaller engines – or fewer batteries – and lighter suspensions and brake systems, resulting in additional weight and cost savings.

A Collaborative Approach to Innovation

Transitioning to aluminum extends beyond material supply; it necessitates partnership and innovation. At Novelis, we work closely with automakers, providing comprehensive support from early-stage design consultations to advanced R&D testing at our Customer Solution Centers around the world. Together, we seek to redefine the possibilities in automotive design and manufacturing.

Embrace the future of automotive manufacturing with Novelis. Partner with us to leverage aluminum's full potential, achieving cost efficiency, sustainability, and superior performance across all vehicle segments.

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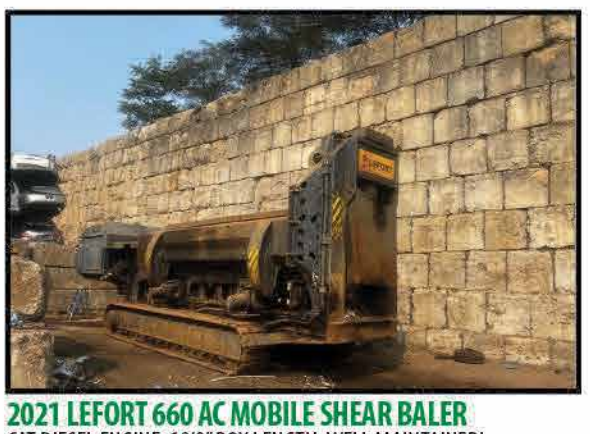

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METALS

Thyssenkrupp Aerospace and Novelis sign agreement

Thyssenkrupp Aerospace, a leading supply chain management and third-party logistics service provider for the commercial Aerospace industry, and Novelis, a sustainable aluminum solutions provider and a leader in aluminum rolling and recycling, have renewed their strategic partnership through a multi-year agreement.

Under the agreement, Novelis will supply specialized, aerospace-grade aluminum from its facilities in Koblenz, Germany, and Zhenjiang, China, to several Thyssenkrupp Aerospace key markets in Europe and Asia. The contract provides for the ongoing supply of premium, aircraft-grade aluminum plates and sheets from Novelis to Thyssenkrupp Aerospace, reinforcing Novelis' strategic importance as a supplier of innovative aluminum products for the aerospace sector.

Patrick Marous, chief executive officer of Business Unit Solutions at Thyssenkrupp Materials Services and responsible for the Aerospace business field, commented: "We are very pleased that our global Aerospace unit is prolonging our partnership with Novelis. Securing a reliable, long-term supply of high-quality aluminum is critical to ensuring that we can consistently meet the needs of our customers. This agreement reinforces our commitment to delivering excellence by ensuring material availability and reliability for our customers' supply chains, an important part of our Materials-as-a-Service strategy. We look forward to continuing this successful collaboration."

This long-standing collaboration is an important step in maintaining the well-established relationship between Novelis and Thyssenkrupp Aerospace. It strengthens the position of both companies in the global aerospace market.

ArcelorMittal to build electrical steel mill in Alabama

Alabama Governor Kay Ivey disclosed that ArcelorMittal, a leading steel producer, will invest $1.2 billion to build an advanced manufacturing facility in Mobile County to produce specialty electrical steel that's used in EV motors and other applications.

The project will create more than 200 jobs at ArcelorMittal Calvert, which will be capable of producing up to 150,000 metric tons of non-grain-oriented electrical steel (NOES) annually, depending on the product mix.

The mill's output will support the automotive/mobility industry, renewable electricity production and other industrial and commercial uses of NOES, including electric motors, generators and specialized applications.

The facility, wholly owned by ArcelorMittal, will be built near ArcelorMittal and Nippon Steel's existing joint venture in Alabama, the AM/NS Calvert steel mill in Mobile County.

"Iron and steel manufacturing put Alabama on the map as a key industrial leader more than a century ago. Today, ArcelorMittal's $1.2 billion investment not only strengthens Alabama's position as a key player in the steel industry but also paves the way for innovation in electric motors and renewable energy technologies," Ivey said.

"While creating over 200 new jobs, this project will also bring tremendous economic benefits to our state and underscores Alabama's commitment to supporting companies that drive progress and create opportunities for our citizens," she added.

Domestic production

ArcelorMittal said the project promotes U.S. manufacturing competitiveness and addresses a crucial market need by reducing U.S. dependency on electrical steel imports through the expansion of domestic NOES production.

"We recognize the importance of creating a resilient, sustainable domestic supply chain for this critical material," said John Brett, chief executive officer, ArcelorMittal North America.

Construction on the new facility is set to begin in the second half of 2025, with production anticipated to commence in 2027.

In addition to the permanent positions at the facility, the project is expected to create up to 1,300 jobs during the construction phase.

"We're committed to meeting the growing demand for high-quality electrical steels while helping customers overcome their supply chain challenges," said Peter Leblanc, chief marketing officer for ArcelorMittal North America.

"The new plant will greatly enhance our capacity to support manufacturers by providing a steady domestic supply of high-quality NOES, enabling them to produce superior products and avoid material shortages, extended lead times and cost volatility associated with overseas supply chains," he added.

NOES has been identified as a critical material for producing batteries in electric vehicles, plug-in hybrid vehicles, and a broad range of energy technologies and applications.

ArcelorMittal said the production of NOES requires specialized technical expertise, advanced manufacturing capabilities and rigorous quality control to meet stringent specifications for magnetic and mechanical performance.

Finished import market share at 25 percent in January

Based on the Commerce Department's most recent Steel Import Monitoring and Analysis (SIMA) data, the American Iron and Steel Institute (AISI) reported that steel import permit applications for the month of January totaled 2,922,000 net tons (NT). This was a 23.4 percent increase from the 2,369,000 permit tons recorded in December and a 36.8 percent increase from the December final imports total of 2,135,000. Import permit tonnage for finished steel in January was 2,227,000, up 22.2 percent from the final imports total of 1,822,000 in December. The estimated finished steel import market share in January was 25 percent.

Steel imports with large increases in January permits vs. the December final imports include reinforcing bars (up 178 percent), heavy structural shapes (up 174 percent), blooms, billets and slabs (up 122 percent), oil country goods (up 72 percent) and line pipe (up 66 percent).

In January, the largest steel import permit applications were for Canada (624,000 NT, up 20 percent vs. December final), Brazil (543,000 NT, up 377 percent), Mexico (407,000 NT, up 25 percent), South Korea (220,000 NT, up 5 percent) and Germany (117,000 NT, up 22 percent).

Steel imports up 2.5 percent in 2024

Based on preliminary Census Bureau data, the American Iron and Steel Institute (AISI) reported that the U.S. imported a total of 2,123,000 net tons (NT) of steel in December 2024, including 1,820,000 net tons (NT) of finished steel (up 2.7 percent and 14.3 percent, respectively, vs. November 2024). Full year 2024 total and finished steel imports were 28,858,000 and 22,500,000 net tons (NT), up 2.5 percent and 3.7 percent, respectively, vs. 2023. Finished steel import market share was an estimated 21 percent in December and is estimated at 23 percent for full year 2024.

Key steel products with a significant import increase in December compared to November are hot rolled sheets (up 67 percent), tin plate (up 61 percent), plates in coils (up 48 percent), wire rods (42 percent) and standard pipe (up 41 percent). Products with a significant increase in imports for the full year of 2024 vs. 2023 include sheets and strip all other metallic coated (up 52 percent), sheets and strip hot dipped galvanized (up 36 percent), tin plate (up 32 percent), cold rolled sheets (up 26 percent) and wire rods (up 19 percent).

In December, the largest suppliers were Canada (521,000 NT, up 10 percent from November), Mexico (327,000 NT, up 16 percent), South Korea (208,000 NT, up 17 percent), Brazil (114,000 NT, down 63 percent), and Vietnam (109,000 NT, down 9 percent).

For full year 2024 the largest suppliers were Canada (6,557,000 NT, down 5 percent vs. 2023), Brazil (4,498,000 NT, up 14 percent), Mexico (3,517,000 NT, down 16 percent), South Korea (2,809,000 NT, up 7 percent) and Vietnam (1,363,000 NT, up 143 percent).

U.S. Imports of Steel Mill Products by Country of Origin
(thousands of net tons)

COUNTRY	DECEMBER 2024 PRELIMINARY	NOVEMBER 2024 FINAL	% VAR. DECEMBER VS. NOVEMBER	FULL YEAR 2024	FULL YEAR 2023	% VAR. 2024 VS. 2023
Canada	521	475	9.6%	6,557	6,885	-4.8%
Brazil	114	306	-62.7%	4,498	3,942	14.1%
Mexico	327	281	16.3%	3,517	4,184	-15.9%
South Korea	208	179	16.7%	2,809	2,637	6.5%
Vietnam	109	120	-9.0%	1,363	560	143.4%
Japan	75	77	-2.3%	1,180	1,189	-0.7%
Germany	96	74	30.9%	1,074	1,042	3.1%
Taiwan	92	86	6.3%	1,011	579	74.6%
Netherlands	60	56	5.8%	614	508	20.9%
China	63	33	90.1%	508	598	-15.0%
Romania	98	1	7363.0%	478	375	27.3%
Turkey	17	11	46.6%	430	312	38.0%
United Arab Emir.	26	70	-62.9%	404	302	33.6%
Italy	22	23	-3.0%	336	440	-23.5%
Spain	19	19	-0.8%	289	290	-0.2%
All Other	276	256	7.7%	3,789	4,325	-12.4%
Total	2,123	2,067	2.7%	28,858	28,167	2.5%
memo EU-27	412	299	37.7%	4,276	4,002	6.8%

METALS

Trump imposes new tariffs on foreign steel and aluminum

President Donald Trump announced that he is imposing 25 percent import tariffs on all steel and aluminum entering the U.S.

The new U.S. duties will be enforced "without exceptions or exemptions", said the President. Trump originally imposed tariffs on foreign steel and aluminum during his first term and in 2018 introduced the Section 232 tariffs on aluminum and steel under the authority of the Trade Expansion Act of 1962, which is used to determine the effect of imports on national security.

President Biden continued metal tariffs throughout his presidency and called for higher tariffs on Chinese steel.

Trump warned there would be no exceptions, and said he was "simplifying" the rules, which are set to come into effect on March 12.

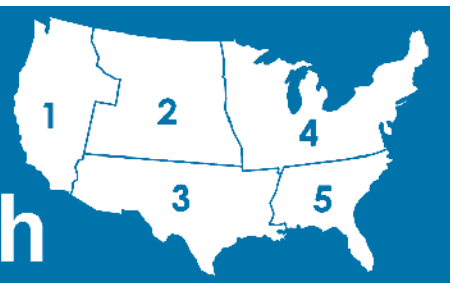
"This is a big deal, the beginning of making America rich again," Trump said.

"Our nation requires steel and aluminum to be made in America, not in foreign lands," he added.

"It's time for our great industries to come back to America... this is the first of many," he added, suggesting other tariffs could focus on pharmaceuticals and computer chips.

Canada is the largest supplier of steel to the U.S., followed by Brazil, Mexico, South Korea and Vietnam.

AR Scrap Metals MarketWatch



Commodity		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
FERROUS						
#1 Bushelings	per gross ton	$379.00	$381.00	$379.00	$380.00	$382.00
#1 Bundles	per gross ton	364.00	361.00	359.00	374.00	365.00
Structural	per gross ton	326.00	325.00	329.00	329.00	330.00
#1 & #2 Mixed Steel	per gross ton	305.00	310.00	309.00	301.00	305.00
Crushed Auto Bodies	per gross ton	217.00	219.00	218.00	219.00	220.00
Shredded Auto Scrap	per gross ton	358.00	369.00	355.00	349.00	350.00
NON FERROUS						
#1 Copper Bare Bright	per pound	4.07	4.05	4.00	4.01	4.18
#2 Copper Wire & Tubing	per pound	3.89	3.85	3.82	3.89	3.98
Aluminum Cans	per pound	.82	.79	.81	.82	.83
Al/Cu Radiators	per pound	1.75	1.73	1.70	1.73	1.75
Aluminum Radiators	per pound	.62	.62	.61	.60	.61
Heater Cores	per pound	1.43	1.49	1.51	1.53	1.55
Stainless Steel	per pound	.62	.61	.62	.60	.61

All prices are expressed in USD. Printed as a reader service only.

DISCLAIMER: American Recycler (AR) collects pricing and other information from experienced buyers, sellers and facilitators of scrap metal transactions throughout the industry. All figures are believed to be reliable and represent approximate pricing based on information obtained by AR (if applicable) prior to publication. Factors such as grades, quality, volumes and other considerations will invariably affect actual transaction prices. Figures shown may not be consistent with pricing for commodities associated with a futures market. While the objective is to provide credible information, there is always a chance for human error or unforeseen circumstances leading to error or omission. As such, AR is not responsible for the accuracy or completeness of the information provided, or for outcomes arising from use of this information. American Recycler disclaims any liability to any person or entity for loss or damage resulting from errors or omissions, including those resulting from negligence of AR, its employees, agents or other representatives.

METALS

Novelis releases third quarter results

Novelis

Novelis Inc., a sustainable aluminum solutions provider and a leader in aluminum rolling and recycling, reported results for the third quarter of fiscal year 2025.

"We continue to see strong demand across our markets as customers increasingly ask for lower-carbon, higher-recycled-content aluminum solutions as a way to reduce their carbon footprint," said Steve Fisher, president and chief executive officer, Novelis Inc. "With a leading industry average of 63 percent recycled content in our products in our last fiscal year, Novelis has been a pioneer in using recycled inputs to drive down carbon emissions. As others have begun to follow suit, competition for scrap aluminum has intensified and is creating significant pressure on scrap pricing, which is impacting our financial results. We believe we are well-positioned to face these challenges and have operational and cost efficiency initiatives underway to offset some of the pressures. At the same time, we are also developing new technologies that will allow us to expand the types of scrap inputs we can purchase for use in our system."

Third Quarter Fiscal Year 2025 Financial Highlights

Net sales for the third quarter of fiscal year 2025 increased 4 percent versus the prior year period to $4.1 billion, mainly driven by higher average aluminum prices as total rolled product shipments of 904 kilotonnes are largely comparable to the prior year period. Continued strong demand for beverage packaging sheet was offset by lower automotive and specialty shipments.

Net income attributable to their common shareholder decreased 9 percent versus the prior year to $110 million in the third quarter of fiscal year 2025. Net income attributable to common shareholder, excluding special items, was down 32 percent year-over-year to $119 million and Adjusted EBITDA decreased 19 percent to $367 million in the third quarter of fiscal year 2025. The decreases in net income attributable to our common shareholder, excluding special items, and Adjusted EBITDA are primarily driven by higher aluminum scrap prices and unfavorable product mix. Adjusted EBITDA per tonne was down 19 percent year-over-year to $406.

Net cash flow provided by operating activities was $263 million in the first nine months of fiscal year 2025 compared to $420 million in the prior fiscal year period, primarily due to lower net income and unfavorable changes in working capital. Adjusted free cash flow was an outflow of $915 million in the first nine months of fiscal year 2025, higher than the prior year period outflow of $517 million due to higher capital expenditures and lower cash flow from operating activities. Total capital expenditures were $1.2 billion for the first nine months of fiscal year 2025, a 22 percent increase versus the prior year period, primarily attributed to strategic investments in new rolling and recycling capacity under construction, most notably in the U.S. for Bay Minette. The company had a net leverage ratio (Adjusted Net Debt / trailing 12 months (TTM) Adjusted EBITDA) of 2.9x at December 31, 2024.

"Novelis is leading the industry in first-mover investments to capture growing market opportunities," said Devinder Ahuja, executive vice president. "We intend to fund those investments largely through internally generated cash flow while maintaining balance sheet discipline to ensure we stay in a net leverage ratio of approximately 3.5x during this strategic investment cycle."

The company had a total liquidity position of $1.6 billion, consisting of $791 million in cash and cash equivalents and $790 million in availability under committed credit facilities, as of December 31, 2024. In January, 2025, the company issued $750 million in senior unsecured notes due January 2030.

Steel Dynamics named one of World's Most Admired Companies

Fortune named Steel Dynamics, Inc. one of the World's Most Admired Companies for 2025. Steel Dynamics received high marks within the metals industry.

"We are honored by this recognition," said Mark D. Millett, chairman and chief executive officer. "This is the eighth consecutive year that we have been recognized, and that is testimony to the extraordinary passion and spirit of excellence exhibited by our teams. It is their drive, innovation, and dedication to each other, our customers and communities that propels Steel Dynamics to the highest standard of operational and financial performance. I thank each of them, and remind them, that their health and safety is our core value and primary focus."

The World's Most Admired Companies annual list is a ranking of the world's most respected and reputable companies. Fortune's World's Most Admired Companies are determined by a survey that evaluates corporate reputation based on nine key attributes, including innovation, people management, use of corporate assets, social responsibility, quality of management, financial soundness, long-term investment value, quality of products and or services, and global competitiveness. Executives, directors and analysts identify the companies with the strongest reputations within their industries and across industries.

Aurubis reports robust operating results

Aurubis AG, a global provider of nonferrous metals and one of the largest copper recyclers worldwide, achieved robust operating earnings before taxes (EBT) of € 130 million in the first three months of fiscal year 2024/25 (previous year: € 111 million). In the Multimetal Recycling segment, Aurubis achieved operating EBT of € 27 million (previous year: € 29 million) and a quarterly result of € 125 million (previous year: € 107 million) in the Custom Smelting & Products segment. The Group's operating ROCE (return on capital employed; determined taking the EBT of the last four quarters into consideration) rose to 11.7 percent (previous year: 9.7 percent) as at the December 31, 2024 reporting date. IFRS consolidated earnings before taxes (EBT) were € 339 million (previous year: € 72 million).

A significant rise in the metal result due to higher metal prices, considerably increased sulfuric acid revenues, robust earnings from copper product sales, and lower costs had a positive effect. These positive effects more than compensated for a year-over-year drop in treatment and refining charges with lower concentrate throughput, a mild decline in earnings from the processing of recycling materials, increased depreciation and amortization and personnel expenses related to investment in growth.

"The robust operating result of the first three months of the current fiscal year is another example of how Aurubis is continuing to build on its success. Our metals are the key to the energy and mobility transition," Aurubis chief executive officer Dr. Toralf Haag emphasized. "Our cash flow developed positively despite intense investment in our international smelter network. This endorses our solid business model, successful even in macroeconomically challenging times."

Key milestones achieved in strategic growth course

Aurubis' strategic goal is to continue solidifying and expanding its position as one of the most efficient and sustainable multimetal producers worldwide. The company has made significant progress too: By the end of Q1 2024/25, around € 1 2/3 billion of the € 1.7 billion total investment approved for strategic projects had been invested. These projects are expected to generate an additional EBITDA contribution of around € 260 million per year.

The company has also moved forward on realizing its growth strategy since the current fiscal year began. A new recycling plant at the Aurubis Olen site in Belgium opened as one significant milestone. The new facility uses a hydrometallurgical process to recover valuable metals like nickel and copper, enabling Aurubis to keep even more strategically relevant metals in the loop for European industry.

PLASTICS

Polystyrene Recycling Alliance launched to expand recycling

The Plastics Industry Association (PLASTICS) announced the formation of the Polystyrene Recycling Alliance (PSRA), marking a significant step toward improving polystyrene recycling across the United States. This collaborative effort unites the polystyrene (PS) and expandable polystyrene (EPS) industries together with a diverse group of stakeholders from brands, converters, and recyclers, united by a shared goal: achieving "widely recyclable status" for polystyrene.

"This collaboration is a huge step forward for polystyrene sustainability, enabling more Americans to recycle a wide variety of polystyrene items," said Matt Seaholm, president & chief executive officer of PLASTICS. "Polystyrene is inherently recyclable, is being recycled today, and will be recycled at much greater scale in the future. Recycling is real, and we are proud to pursue this initiative at the Plastics Industry Association (PLASTICS) to join the full value chain in working together to promote plastics sustainability."

In partnership with experts at Resource Recycling Systems (RRS), the PSRA established a comprehensive roadmap to guide this initiative. Initial data indicates that 32 percent of the U.S. population currently has access to recycle one or more polystyrene items. Several formats are on the brink of qualifying for a "check locally" recycling status. Furthermore, with ongoing and planned industry investments in recycling capacity, PSRA expects recycling access for several polystyrene formats and applications to approach "widely recyclable status" by 2030. We will work collaboratively across the value chain and invest in infrastructure and education to accelerate progress.

From preserving food quality and safety to enhancing pharmaceutical transportation and medical applications, enabling economical appliance manufacturing and transportation, and contributing to efficient building construction, polystyrene is integral to various industries and used across diverse sectors and applications.

"Polystyrene is an essential material that provides numerous life-enhancing benefits, and a favorable carbon footprint compared to other materials," said Richard Shaw, chair of the Polystyrene Recycling Alliance. "Our focus is to expand end-of-life recycling options for all types of polystyrene through strategic investments and partnerships with other stakeholders committed to a circular plastics economy."

To support these initiatives, the PSRA will establish a recycling investment and education fund aimed at expanding polystyrene recycling throughout North America. These investments will seek to develop and deploy innovative ways to enhance and modernize recycling systems.

Plastics releases job report

The Plastics Industry Association (PLASTICS) has released an official analysis of the December 2024 jobs report and its impact on the plastics industry, authored by PLASTICS chief economist, Dr. Perc Pineda.

In December, the U.S. economy added 256,000 nonfarm payroll jobs, according to the Bureau of Labor Statistics (BLS). Of these, 87.1 percent were in the private sector, while 12.7 percent were in government. Within the private sector, the goods-producing industries experienced mixed results: nondurable goods manufacturing added 3,000 jobs, but this was offset by a loss of 16,000 jobs in durable goods manufacturing, leading to a net decline of 13,000 jobs in manufacturing. Overall, the goods-producing sector lost 8,000 jobs in December, while the services sector drove private-sector growth with a gain of 231,000 jobs. For the year, monthly job losses in manufacturing were offset by job gains, resulting in a net annual loss of 87,000 jobs.

The U.S. economy's unemployment rate was 4.1 percent in December, while the manufacturing unemployment rate was 3.5 percent, consistently remaining below the overall unemployment rate throughout 2024. The manufacturing unemployment rate averaged 3.2 percent for the full year, fluctuating between 2.7 percent and 3.6 percent.

In the plastics and rubber products manufacturing sector, the unemployment rate rose to 5.9 percent in December. The monthly unemployment in this sector ranged from 0.3 percent to 5.9 percent in 2024, as illustrated in the chart below. Although the average monthly unemployment rate was 2.8 percent, the industry continues to struggle with filling vacant positions.

With the manufacturing workforce expected to remain a supply-side challenge in the foreseeable future, it is likely that many vacancies in the sector will go unfilled. According to the latest data from BLS, there were an estimated 412,000 job openings in manufacturing in November, while total hires for the month reached 289,000 – leaving 123,000 positions unfilled. It is unlikely that this scenario changed significantly in December.

Meanwhile, the labor component of U.S. manufacturing – including the plastics industry – has been decreasing, even as the sector faces the dual challenges of increasing output and competing globally. As manufacturing processes become more technical, the skills gap between labor supply and demand continues to widen. The demand for manufactured goods is not diminishing, as consumer spending continues to be a balance between goods and services. While the manufacturing workforce possesses some transferable skills, and labor mobility across manufacturing sectors can offer temporary relief, the demographic realities of the U.S. workforce make this approach unsustainable in the long term. For the U.S. manufacturing sector to thrive in domestic and global markets, it is crucial to address labor supply challenges strategically.

Revolution Sustainable Solutions acquires Island Plastics

Revolution Sustainable Solutions, LLC , a leader in sustainable materials and recycling solutions, has acquired Island Plastics, LLC, a producer of 100 percent post-consumer recycled (PCR) linear low-density and low-density polyethylene (LLDPE/LDPE) film grade resin. This strategic move aims to bolster Revolution's commitment to sustainable loop solutions and expand its recycling capabilities, particularly in the production of clear food-grade PCR for flexible food packaging and other applications.

Island Plastics, based in Flint, Michigan, operates a state-of-the-art mechanical recycling facility dedicated to producing high-quality LLDPE/LDPE PCR. As the largest film recycling plant in Michigan, Island Plastics has been instrumental in advancing plastic recycling technologies while maintaining stringent quality standards. Their expertise aligns seamlessly with Revolution's mission to create and champion sustainable loop solutions that preserve the environment.

In October 2023, Revolution received a Letter of No Objection from the U.S. Food and Drug Administration for its proprietary mechanical recycling method to produce clear food-grade PCR-LLDPE resin from stretch film. This approval allows the use of up to 100 percent recycled content in food contact applications across a broad range of food types and conditions.

Scott Coleman, president and chief executive officer of Revolution, stated, "The partnership represents a significant step forward in our mission to redefine possible for sustainable plastic solutions. By integrating Island Plastics' recycling capabilities and high-quality PCR products, we are poised to enhance our sustainable ecosystem and further contribute to a circular economy. We plan to leverage our recent FDA No Objection Letter to expand Island Plastics' PCR offerings to include clear food-grade PCR."

This acquisition is also expected to enhance Revolution's capacity to deliver sustainable products across various markets, including agriculture, facilities maintenance, and consumer goods. By incorporating Island Plastics' capabilities, Revolution aims to increase the use of certified recycled content in its products, thereby reducing reliance on virgin materials and minimizing environmental impact.

WASTE

EPA and DOJ settle with Stericycle for hazardous waste violations

The Environmental Protection Agency (EPA) and the Department of Justice (DOJ) announced a settlement agreement with Stericycle, Inc. for systemic, nationwide violations of the Resource Conservation and Recovery Act (RCRA), and related regulations in the operation of its former hazardous waste management business from May 5, 2014 through April 6, 2020. This settlement resolves Stericycle's failures to properly manage hazardous waste, accurately maintain required manifest records when transporting hazardous waste, and timely submit information for thousands of manifests to EPA's electronic manifest database, the E-Manifest system.

The proposed stipulation and order of settlement agreed to by Stericycle requires payment of a $9.5 million civil penalty, one of the largest civil penalties ever paid for RCRA violations. The settlement is subject to approval by the U.S. District Court for the Southern District of New York.

"Stericycle repeatedly failed to ensure the proper transport, management, and storage of hazardous waste – a job that they were paid to do and entrusted to perform on behalf of customers nationwide," said acting assistant administrator Cecil Rodrigues for EPA's Office of Enforcement and Compliance Assurance.

"We hold Stericycle responsible for flouting hazardous waste management requirements while operating a nationwide hazardous waste business and risking significant potential harm to human health and the environment," said attorney for the United States Matthew Podolsky, attorney for the U.S. Southern District of New York. "This penalty should put other waste management firms on notice that we will hold them accountable when they shirk their legal responsibilities and put the public and environment in harm's way."

Stericycle is a waste management company that operated a nationwide hazardous waste transportation, storage, treatment and disposal business until it sold the vast majority of the business on April 6, 2020. Stericycle operated 13 RCRA-permitted hazardous waste treatment, storage and disposal facilities (TSDFs) and 44 waste transfer facilities. On April 6, 2020, Stericycle completed the sale of its "Stericycle Environmental Solutions" hazardous waste business and, since that date, has largely ceased managing hazardous waste. However, Stericycle remains accountable for its systemic RCRA violations prior to that sale.

Between May 5, 2014, and the date of sale, Stericycle routinely violated RCRA requirements related to tracking and transportation of hazardous waste, as alleged in detail in the complaint. Stericycle routinely lost track of hazardous waste while transporting it, sent hazardous waste to disposal facilities that were not the ones its customers had chosen, or delivered hazardous waste shipments without the required manifests. Stericycle also failed to comply with requirements for resolving and reporting discrepancies between hazardous waste identified on a shipping manifest and the hazardous waste received by Stericycle at its facilities for disposal, and it failed to timely return signed manifests to generators and timely submit them electronically to the EPA. Stericycle also violated RCRA by storing hazardous waste in transfer facilities when not authorized to do so, either because the storage period was longer than the 10 days permitted by RCRA regulations or because overall transportation times for the hazardous waste shipment exceeded those constituting "the normal course of transportation" under RCRA regulations. All of this conduct violated RCRA hazardous waste regulations critical to preventing substantial risks to human health and the environment.

The hazardous waste manifest is the key to tracking who generated the waste, the kind of waste being shipped and any potential dangers the hazardous characteristics of the waste pose and where and how the waste is disposed. This information is critical for ensuring that hazardous waste is handled properly and safely, and in the case of an emergency, giving first responders the information needed to handle leaks or spills that may occur during transport or in the event of an accident.

The EPA's e-Manifest system is the database for all hazardous waste shipments in the United States that are generated, transported and disposed of in the United States. The system's requirements ensure that our nation's hazardous waste data is transparent, easily accessible, and publicly available. Complete and on-time submissions to the e-Manifest system by companies like Stericycle are required by RCRA and essential to maintaining awareness of the hazardous waste activities in our communities and on our highways and rail systems.

BUSINESS BRIEFS

Ashanti Hamilton joins Veolia North America

Veolia North America and The Water Council announced the addition of Ashanti Hamilton to support the Water & Wastewater Workforce Center initiative in Milwaukee, Wisconsin. As workforce development manager, Hamilton will reinforce Veolia's commitment to grow the local water workforce, increase the pool of diverse talent, and address workforce challenges in the water sector.

In his new role, Hamilton will provide seasoned direction and hands-on experience to connect underserved communities with a range of opportunities, as he develops a vision for Milwaukee that can serve as a model for other regions. A strategic leader with a strong commitment to improving health, educational, and economic disparities, Hamilton has dedicated his career to enhancing community well-being in Milwaukee.

Most recently, Hamilton served as the director of the Office of Community Wellness & Safety with the City of Milwaukee, where he developed and implemented community violence intervention strategies and managed strategic partnerships to address root causes of violence and promote wellness. His extensive experience includes nearly two decades as Alderman for Milwaukee's First District, during which he served as President of the Common Council from 2016 to 2020. In these roles, he oversaw billion-dollar budgets, led citywide anti-poverty initiatives, and negotiated major development projects.

Scott Mason appointed as EPA South Central regional administrator

U.S. Environmental Protection Agency (EPA) administrator Lee Zeldin announced that Scott Mason IV has been appointed to serve as the 14th regional administrator of the EPA's South Central Region, also known as Region 6. Mason will lead the implementation of the Trump administrations environmental agenda in Arkansas, Louisiana, New Mexico, Oklahoma and Texas and with 66 Tribal Nations.

This is Mason's second appointment to EPA, having served as the Director of EPA's American Indian Environmental Office during President Trump's first administration. He and his staff were charged with the protection of human health and the environment in Indian country, which includes all 574 federally recognized tribes and Alaska Native Villages. Additionally, he was a member of The White House Council on Native American Affairs, where he served as co-chair of the Council's Committee on Infrastructure.

Most recently, Mason was the deputy secretary of energy of Oklahoma. He has served at the local, state and federal levels of government in various capacities, including as a vice president and the executive director of federal programs at The University of Oklahoma and on the staff of Oklahoma Governor Mary Fallin.

Mason is a Citizen of the Cherokee Nation and a 5th generation Oklahoman, from Cordell.

BUSINESS BRIEFS

VLS Environmental adds Trent Sims as government commercial lead

VLS Environmental Solutions has added Trent Sims as the new government commercial lead, marking a pivotal step in the company's efforts to expand its environmental solutions into the U.S. government sector.

Sims brings more than 17 years of specialized expertise in environmental consulting and program management, having worked on high-profile projects for the Navy, Air Force, Marines, and Army. His career includes significant leadership roles at firms such as AECOM and CH2M HILL, where he managed large-scale programs addressing environmental challenges, including CERCLA site investigations and remediation, munitions cleanup, construction oversight, radiological investigations, and PFAS-liability management.

Throughout his career, Sims has demonstrated a remarkable ability to streamline environmental processes, foster cross-functional collaboration, and lead high-performing teams. His experience with Comprehensive Long-Term Environmental Action Navy (CLEAN) contracts reflects his exceptional program and technical management skills, making him uniquely qualified to guide VLS' expansion into the public sector.

At VLS, Sims will focus on developing strong partnerships with government entities and aligning VLS' cutting-edge environmental solutions with federal initiatives, such as the Department of Defense's nationwide efforts to address PFAS liabilities at installations. By leveraging his extensive experience, he will help VLS deliver sustainable results that support federal environmental priorities while expanding the company's footprint beyond its traditional private-sector focus.

Lindemann appoints Gunard Polite as general manager sales North America

Lindemann Metal Recycling announced the appointment of Gunard Polite as general manager of sales for its North American operations. Originally from Chicago, Polite's professional journey has been as dynamic as his early years.

After graduating with a degree and studies in broadcast and spending his formative years in media and marketing, Polite transitioned to a career in sales with Penske Truck Leasing. There, he honed his skills across transactional sales and long-term leasing agreements during a successful 10 year tenure. Most recently, he served as executive director of business development at XOS Trucks, a pioneering startup specializing in commercial electric vehicles.

In his new role, Polite is leading Lindemann's North American sales team, focusing on strengthening customer relationships, and underlining the company's position as the market's premier OEM partner.

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Tackling wood recycling in the C&D industry

by MAURA KELLER
mkeller@americanrecycler.com

The construction industry generates over 40 percent of global waste, with wood accounting for a significant portion of the disposed C&D materials. Most waste goes into landfills – why? Because waste disposal is expensive, manually damanding work and there just aren't enough recycling or biomass production facilities to handle all the waste. Some recycling companies have to haul their waste to another state to be processed. These challenges facing the wood recycling industry are enticing industry players to explore innovative ways of managing the wood recycling issue.

"Since post-World War II, traditional wood recycling has included creating a highly reprocessed product such as panel board, mulch and biomass fuel for energy generation," said Jimmy Mitchell, national sustainability manager at Skanska USA Building, which specializes in recycling and circularity. "In recent years, the industry has been exploring getting back to things our grandparents and older generations would have done with C&D wood, reusing it either as originally intended or in a less processed form. Two movements in the industry include regenerative design and construction and finding the best use of C&D materials."

When it comes to regenerative construction, imagine a new building is being built or renovated, and in the process of completing the project, there is less material in the landfill than if the project was not built – this is what Skanska accomplished in building the Kendeda Building for Innovative Sustainable Design at Georgia Tech. The team discovered 28 examples of waste materials that could skip the landfill and be reused in the new build. On the C&D waste side of executing the project, Skanska source separated the trash and studied what waste materials would result in each scope item. The result was a high level of recycled material, including wood, with a small percentage of hard-to-recycle products going to the landfill. In the end, the weight of the reused material that wasn't landfilled exceeded the weight of material sent to the landfill.

The project exemplifies the innovative use of C&D waste, but it is not without its challenges. "There have been advances in products that automate the process to remove foreign objects like nails from C&D wood. While it is important to quickly remove foreign objects from C&D wood in a fast and efficient manner, hitting metal in processing wood damages expensive equipment and in the best case results in the need to replace blades," Mitchell says.

He further explained that on a broader level, there have been strides toward a circular process when products are designed and built so at the end of their first use life, they can be reused again or lightly remanufactured circularly.

The highest quality wood can be reused in its current form in new projects. Hard woods, beams and 2x4s can be reused and clean wood can be processed into biomass for use in remanufacturing.

"These new circular products will also save costs in the future," Mitchell said. "When you take a step back, it is hard to believe that the industry traditionally disposes of 5 to 15 percent of material as a waste factor in constructing a project, and at the end of an 8 to 50 year period, 100 percent of this expensive material is guaranteed to cost us more money to throw it away. Designing and constructing with circularity in mind will contribute to a circular economy."

According to Todd Thomas, founder and chief executive officer at Woodchuck, the vast majority of construction wood waste goes to landfills. There is, however, growing pressure for change coming from end users.

"Big enterprise clients like Amazon, Ford and IKEA are putting pressure on their contractors to improve sustainability, reduce landfill use and provide tracking and reporting on these efforts," Thomas said.

Woodchuck uses AI image recognition to simplify waste management and diversion. The company identifies, diverts, sorts and segregates wood and other valuable materials from waste streams and ensures its highest and best use across remanufacturing, bioenergy, and carbon removal. Woodchuck is a year-old start-up addressing the demand for more diverse forms of biomass so energy companies produce renewable energy through their AI-powered platform.

Specifically, the Woodchuck.AI platform tracks diverted waste from origin to final dispensation, generating customizable sustainability reports. It validates total tonnage diverted, CO2 avoided, CO2 generated in transportation, net CO2 avoided, tonnage delivered to remanufacturing, bioenergy, and total BTUs of clean energy produced.

"The challenge and the opportunity is that this space is currently devoid of technology; it's manual, labor intensive, inefficient, and expensive. Most companies view sustainability as an expense," Thomas said. "The challenge is that wood is not homogeneous. The source, quality and cleanliness of wood can vary considerably. The way wood is collected can also vary considerably, further impacting quality and cleanliness. This impacts the potential highest and best use of the wood."

What's more, wood with permanent contaminants like oil-based paints, preservatives, and fire retardant has limited additional uses – primarily for use in industrial products like solidifier, friction, and sealant. Clean wood, on the other hand, has many potential uses and can be very valuable.

As Thomas explained, the highest quality wood can be reused in its current form in new projects. Hard woods, beams and 2x4s can be reused and clean wood can be processed into biomass for use in remanufacturing (i.e., turning recycled wood into new particle board or press board). Wood that isn't clean enough for remanufacturing can often be used for bioenergy production.

"There are many very exciting new technologies in bioenergy that encompass carbon capture – utilizing woody biomass to generate energy and at the same time capturing the carbon so that it is not released into the atmosphere," Thomas said. "The value of high quality recycled wood can be 10x that of low quality wood.

See WOOD RECYCLING, Page B6

Olympic House obtains LEED Platinum certification

Olympic House – the headquarters of the International Olympic Committee (IOC) – has recently achieved LEED Platinum v4.1 certification for its operations and maintenance. This certification represents the highest form of recognition within the renowned LEED (Leadership in Energy and Environmental Design) green building program, recognizing Olympic House's sustainability performance.

Since its initial project phase, Olympic House has striven to meet the highest sustainability standards, in line with the IOC's strategic roadmap Olympic Agenda 2020 and Olympic Agenda 2020+5. This has meant prioritizing resource efficiency, circular economy, respectful integration into the local landscape and user comfort. It was the first to obtain the LEED Platinum v.4 certification for Design and Construction, receiving 94 points – the highest score at the time. In addition, it was awarded the highest (Platinum) level of the Swiss National Sustainable Construction Standard (SNBS) and the Swiss standard for energy-efficient buildings.

This latest achievement, which focuses on the building's operations and management, further solidifies Olympic House's position as one of the world's most sustainable buildings. With 82 points out of 100, Olympic House achieved the highest LEED operations score in Switzerland, which places it amongst top 10 percent of certified buildings in Europe (according to LEED O+M v4.1).

World Cement Association challenges forecasts on long term cement demand

The World Cement Association (WCA) has published a landmark white paper authored by its chief executive officer, Ian Riley, analyzing the long-term outlook for global cement and clinker demand. The report challenges prevailing forecasts, projecting a significant decline in demand for cement by 2050 and offering actionable insights for industry stakeholders navigating the transition to a low-carbon future.

Titled "Long-Term Forecast for Cement and Clinker Demand", the white paper highlights pivotal changes driven by decarbonization technological advancements, and market dynamics. key findings include:

- Global cement demand is likely to decline to 3 billion tonnes per annum (tpa) by 2050, far below existing forecasts.
- Clinker demand, the main source of CO2 emissions in cement production, is expected to decrease even more steeply, reaching 1.5 billion tpa by 2050.
- The need for Carbon Capture and Storage (CCS) will consequently be reduced, impacting investment and policy priorities.

"The cement industry is undergoing an unprecedented transformation. As we move towards a decarbonized future, understanding the true demand for cement and clinker is critical to ensuring that policies, technologies, and investments align with reality. This white paper aims to provide industry leaders and policymakers with the clarity needed to plan effectively and sustainably", explains Ian Riley, chief executive officer of the World Cement Association and author of the report.

The report also examines disruptive factors such as alternative materials, supply chain optimization, and clinker-free technologies, which are reshaping demand patterns. By outlining three potential scenarios, it helps to provide a roadmap for stakeholders.

Nonresidential construction spending down 0.2 percent

National nonresidential construction spending decreased 0.2 percent in December 2024, according to an Associated Builders and Contractors (ABC) analysis of data published by the U.S. Census Bureau. On a seasonally adjusted annualized basis, nonresidential spending totaled $1.241 trillion.

Spending was down on a monthly basis in 9 of the 16 nonresidential subcategories. Private nonresidential spending increased 0.1 percent, while public nonresidential construction spending was down 0.5 percent in December.

"Public sector nonresidential spending fell sharply in the last month of 2024, but that decline was likely a short-term phenomenon as the transition between presidential administrations and cold weather delayed construction work," said ABC chief economist Anirban Basu. "While public sector activity should at least partially rebound in the coming months, high interest rates and an emerging trade war with Canada and Mexico will continue to weigh on many privately financed segments.

"What little private sector nonresidential momentum exists remains concentrated in just two segments," said Basu. "Data centers, which are part of the office category, and manufacturing accounted for 94 percent of the increase in total nonresidential construction spending from December 2023 to December 2024. Activity in these segments, and perhaps only these segments, will remain elevated regardless of upward pressure on construction costs."

Green building revolution could open $1.8 trillion global market opportunity by 2030

A World Economic Forum report outlines a roadmap for transforming the global building sector to combat climate change and protect biodiversity. Amid rapid urbanization worldwide, primarily driven by emerging economies, the report presents a timely case for the decarbonization of the sector, showing how it could generate significant economic gains for early adopters and a positive environmental impact for all.

Towards Green Building Value Chains: China and Beyond, published in collaboration with Boston Consulting Group (BCG), identifies 11 strategic transition levers across the entire value chain of buildings. These levers, when combined, could unlock over 80 percent of the sector's abatement potential and open a $1.8 trillion market opportunity, as per the new research.

"The new frontier of growth and competitiveness for players in the building sector will be to develop materials, design construction methods and achieve operational outcomes that are net-zero carbon, nature positive and resilient to extreme weather shocks while promoting community well-being and people-to-people connections," said Gim Huay Neo, managing director, World Economic Forum.

Buildings are responsible for 37 percent of global carbon dioxide (CO2) emissions, and 34 percent of the Earth's species are enduring habitat loss as a result of urban development. With rapid urbanization, especially in emerging economies, expected to continue over the next decades, the report calls for a comprehensive and holistic approach to the green transition throughout the global value chain of the construction sector and the entire life cycle of buildings, including construction, use and end of life.

The report identifies four characteristics of a holistic vision for green buildings:

- Net zero – minimizing whole-life emissions through innovative materials and technologies
- Nature positive – enhancing buildings' environmental performance by integrating natural elements
- Resilient – maximizing buildings' ability to withstand extreme weather and climate volatility
- Well-being oriented – boosting the physical and mental well-being of their occupants, enhancing community development and ensuring access for all

"The sheer complexity of the building value chain requires upstream and downstream players to work together on enabling actions such as standard alignment and technology breakthrough," said Yvonne Zhou, managing director and senior partner at BCG. "Only through this collaboration will the 11 levers be fully unlocked."

To realize this vision, several critical enabling factors need to be addressed. These include further policy on regulation and industry standards, data and advanced technologies such as artificial intelligence, biomaterials, and financing and upskilling support.

As the largest building market in the world, and with more than half of the global production capacity for many building materials, China has an important role in decarbonizing the building industry, as per the report. The green transition of China's building value chain will not only create value and new business opportunities for industry players in China, but could also help catalyse the development and adoption of green building products and services globally.

The report highlights case studies from businesses at different stages of the value chain such as real estate developers, design firms, energy management system providers and cement manufacturers. It also showcases best practices from China and other emerging economies, such as the United Arab Emirates and Brazil, in areas of material production, construction and operations, as well as policy tools that can be adopted or adapted by others.

The report builds on the Net-zero Opportunities of Value-chain Actions (NOVA) project in China, which was launched at the World Economic Forum Annual Meeting 2024 in Davos. The project promotes cooperation among upstream and downstream players across the entire value chain of key industries to pursue a coordinated net-zero transition in China. In its first phase, it has focused on two sectors, buildings and renewable energy.

Construction industry must attract 439,000 workers in 2025

The construction industry will need to attract an estimated 439,000 net new workers in 2025 to meet anticipated demand for construction services, according to a proprietary model developed and released today by Associated Builders and Contractors (ABC). In 2026, the industry will need to bring in 499,000 new workers as spending picks up in response to presumed lower interest rates.

"While the construction workforce has become younger and more plentiful in recent years, the industry still must attract 439,000 new workers in 2025 to balance demand and supply," said ABC chief economist Anirban Basu. "If it fails to do so, industrywide labor cost escalation will accelerate, exacerbating already high construction costs and reducing the volume of work that is financially feasible. Average hourly earnings throughout the industry are up 4.4 percent over the past 12 months, significantly outpacing earnings growth across all industries."

ABC's proprietary model uses the historical relationship between inflation-adjusted construction spending growth, sourced from the U.S. Census Bureau's Construction Put in Place Survey, and payroll construction employment, sourced from the U.S. Bureau of Labor Statistics, to convert anticipated increases in construction outlays into demand for construction workers at a rate of approximately 3,550 jobs per billion dollars of additional spending. This model also incorporates the current level of job openings, unemployment and projected industry retirements and exits into its computations.

"This represents improved labor availability relative to recent years," said Basu. "The improvement can be traced to two primary factors. First, construction spending is expected to grow at its slowest pace in years throughout 2025, especially in interest rate-sensitive segments like homebuilding. Interest rates will remain elevated in 2025 before likely beginning to dip next year. Second, the industrywide workforce has become significantly younger over the past several quarters, with the median construction worker now younger than 42 for the first time since 2011. As a result, the pace of retirements is expected to slow this year.

"Despite that improvement, contractors will struggle to fill open positions," said Basu. "This will be especially true in areas where manufacturing and data center megaprojects are underway. More than $1 in every $5 spent on nonresidential construction currently goes toward manufacturing projects, and those projects are absorbing a significant share of the labor force in their respective regions."

"The U.S. construction industry's efforts to hire more workers to replace retirees and meet the demand for new construction projects gained momentum in 2024," said Michael Bellaman, ABC president and chief executive officer. "That is fantastic news, but we still have a long way to go to shore up the talent pipeline. The data on the number of young people choosing a career in construction suggests that employing practical technology and innovation in educational programs and on jobsites helps maximize the productivity and efficiency of the construction workforce. ABC's all-of-the-above workforce development strategy is working to draw new entrants into the industry through hundreds of entry points and upskill them through both industry-driven and government-registered apprenticeship programs."

"There are also factors that could render this model overly conservative, meaning worker shortages could be more severe than predicted in 2025," said Basu. "While the consensus forecast has construction spending increasing by less than 3 percent in 2025, that same forecast has underestimated growth by a significant margin during each of the past three years. If inflation dissipates in coming months, borrowing costs will subside and construction volumes will increase. Faster-than-expected immigration over the past few years has also bolstered labor supply, and potential changes to immigration policy will likely constrain worker availability."

"Another solution to addressing the shortage is a merit-based, market-based visa system," said Bellaman. "ABC's goal is to work with the Trump administration and Congress to create a visa system that allows people who want to contribute to society and work legally in the construction industry to do so.

"President Trump and the 119th Congress have a significant opportunity to advance policies and regulations that protect free enterprise, reduce regulatory burdens, expand workforce development and create a fair and level playing field for all construction workers, regardless of their labor affiliation," said Bellaman. "Legislation like the Tax Cuts and Jobs Act, the Employee Rights Act, the Fair and Open Competition Act and permitting reform can create the conditions for the construction workforce to rebuild America's infrastructure. The construction industry thrives when all 8.3 million workers are given the opportunity to build America with fewer obstacles."

EQUIPMENT SPOTLIGHT

Material Handlers

by MARY M. THORNTON
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The demanding environment and tasks involved with construction and demolition processes require the use of robust, durable machines. The following material handler and excavator manufacturers not only offer such equipment, they're at the ready to provide a wealth of expertise and support to get the job done.

Bobcat offers a wide range of excavators with many compatible attachment configurations to help customers tackle their toughest jobs. The firm's 13 compact excavators range from 1 to 8 metric tons in size – with zero, reduced and conventional tail swing. Two larger excavators include a 14-metric ton E145 with reduced tail swing and a 16-metric ton E165 with conventional tail swing.

Adam Hulm, product development specialist, commented, "Our compact excavators are adaptable and versatile machines, significantly enhancing productivity while reducing the need for separate specialized pieces of equipment. Each model boasts impressive digging power and reach, coupled with smooth and precise controls for effortless attachment versatility. Our compact excavator lineup offers several unique features that provide advantages for owners and operators. Specifically, our optimally designed engine maximizes efficiency without a DPF (diesel particulate filter); saving owners the time and money associated with long-term DPF maintenance costs. Bobcat excavators can also be equipped with top-of-the-line features to ensure operators are comfortable and effective – this translates to cost efficiency and improved productivity. Options include features such as a depth check system and optional clamp, compatible, extendable arm."

Hulm also noted how excavator operators are typically challenged when navigating a job site – whether by government-imposed mandates and regulations or working with clients focused on sustainable site work, as required alternative energy solutions have become increasingly important. Bobcat offers two battery-electric compact excavators: The E10e and E19e. "These machines produce no emissions and so are ideal for indoor projects or working on regulated job sites. While delivering the power and versatility typical of compact excavators while minimizing environmental impact, the smaller size of electric excavators is beneficial for easy access to challenging job sites, providing a new level of flexibility across indoor and outdoor job sites. For example, these models feature a retractable undercarriage that can be adjusted to traverse tight property lines or fit through narrow openings such as doorways," said Hulm.

As Bobcat's compact excavator market growth increases, excavator model preferences vary, based on location, operator needs and application. The company's three and four ton excavators have gained significant popularity due to their power and maneuverability. Offering a mix of robust digging depth, reach and lifting capacity, they're well-suited for a wide range of construction, landscaping and utility projects. Their compact size also allows for easy transportation to and from job sites and effectiveness in confined spaces. From hydraulic breakers for demolition work to augers for drilling holes, these machines can switch between attachments easily, thanks to the Bobcat Hydraulic X-Change™ system. The system allows operators to retract and extend pins with the push of a button for fast attachment changes—making them indispensable machines across many sectors.

Bobcat Company

SENNEBOGEN LLC

"More recycling operators choose Sennebogen's purpose-built material handlers because of the durability, safety and flexibility they need for more precise, more efficient operations. Feedback we receive from operators exemplifies their appreciation of fine control over the hydraulics to perform precisely, quickly and powerfully," explained Constantino Lannes, president.

Sennebogen's diesel-fueled or electric-drive machines are available from 44,000 lbs. (24,000 kg) to 750,000 lbs. (300,000 kg) with reach options from 30' (9 m) to 130' (40 m), including Balance Cranes and Green Hybrid models. All material handling machines may be mounted on a full range of platforms, including rubber tired or tracked undercarriages, pedestal and stationary mounts, locomotives and gantries.

As well as moving more scrap, clients find that Sennebogen material handlers reduce yard costs as well – no machine downtime and lower fuel costs too – due to smooth, precise handling and fast cycle times. Innovations in fuel and power savings, long-life engineering and low-cost, off-the-shelf service parts cut operation costs and downtime, while meeting rigorous environmental standards. Modular engineering and manufacturing allow Sennebogen to produce custom boom and stick configurations, undercarriages and mounts and diesel and/or electric power to meet a variety of applications. Other features include compact swing radius, complete guarding packages, sliding door entries, dual safety cameras and demolition-duty safety cabs with windshield guard and bullet-proof glass.

For teardown projects, Sennebogen material handlers offer boom configurations up to 182-ft. vertical reach. The elevating cab and 30-degree tilt provide a safe, efficient, optimal view. Interchangeable attachments allow operators to adapt quickly to different tasks. The compact size and footprint ensure stability and maneuverability on challenging urban jobsites.

The company's compact, transportable machines simplify equipment logistics and planning, saving time and money. As a leader in specialized equipment solutions for recycling and scrap metal yards, demolition, transfer stations and waste facilities, Sennebogen has provided customer specific mechanical engineering services since 1952.

See Material Handlers, Page B5

Material Handlers

Continued from Page B4

Volvo Construction Equipment offers a large range of excavators, including standard crawler and wheeled excavators and models built specifically for demolition and material handling. Volvo CE recently unveiled a new series of excavators that represented the most significant update to its excavator lineup in 20 years. New models continue to be added to the series, including high-reach and straight boom demolition excavators. "The Volvo EW200 and EW240 models particularly, are purpose-built for waste and recycling applications. The EW200E is especially well-suited for handling lighter weight materials." John Waldron, product manager, stated. It weighs 22.6 tons and is powered by a Volvo D6J 6-liter Tier 4 final engine that provides 173 horsepower. This model offers three boom and arm configurations and the straight boom can be fitted with either a 13' gooseneck arm or an 11'6" sorting arm, providing a max reach of 33 feet and a max lifting capacity of 25,600 lbs.

Volvo Construction Equipment

The 26 ton EW240E model is designed for medium-duty applications. It includes a 23'9" straight boom and when combined with the existing 16'5" gooseneck arm, the total reach is over 39. A powerful Volvo D6J engine provides 173 horsepower. Both machines support ActiveCare Direct, the Volvo advanced telematics service. They also are backed by the Volvo Lifetime Frame and Structure Warranty, which covers the frame, boom and arm for the entirety of the initial ownership period.

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EQUIPMENT SPOTLIGHT

FEATURED EQUIPMENT

APR	Metals — Attachments
MAY	Metals — Magnets
JUN	Automotive — Crushers/Loggers
JUL	Metals — Aluminum Processing
AUG	Rubber — Shredders
SEP	Electronics — Pulverizers
OCT	Automotive — Fluid Removal
NOV	Paper/Plastics — Granulators
DEC	Metals — Eddy Currents

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American Recycler News is not responsible for non-inclusion of manufacturers and their equipment. Manufacturers are to contact American Recycler to ensure their company is listed in the Equipment Spotlight.

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To be listed in the appropriate spotlight, please call 877-777-0043 or e-mail sales@americanrecycler.com.

UPCOMING EVENTS

APRIL

4/9-4/11
PFAs Forum V
Rosen Centre Hotel
Orlando, Florida
www.pfasforum.org
850-386-6280

4/10-4/12
United Recycler's Group
Hyatt Regency Grand Cypress Orlando, Florida
www.u-r-g.com
303-367-4391

4/23-4/25
Aluminum Association Spring Meeting
The Biltmore Hotel
Coral Gables
Miami, Florida
www.aluminum.org
703-358-2960

MAY

5/5-5/8
WasteExpo
Las Vegas Convention Center
Las Vegas, Nevada
www.wasteexpo.com
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5/5-5/8
AISTech 2025
Music City Center
Nashville, Tennessee
www.aist.org
724-814-3000

5/20-5/21
CARE 23rd Annual Conference
Sea Bird Resort
Oceanside, California
www.carpetrecovery.org
706-428-2127

5/12-5/15
ReMa2025 Convention & Expo
San Diego Convention Center
San Diego, California
www.rema2025.org
202-662-8555

5/18-5/21
The Federation of New York Solid Waste & Recycling Conference & Trade Show
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www.nyfederation.org
518-813-5126

Wood recycling

■ Continued from Page B1

The capacity to identify, divert, sort and segregate wood from the waste stream is very valuable. The challenge is that this space is currently devoid of technology."

Mark Whitley, founder and chief executive officer of Whits Services Corporation, agreed that one of the biggest challenges of recycling wood is contamination. "Wood from C&D sites are regularly received combined with such things as concrete, drywall, and metal," Whitley said. Construction wood often arrives with complex chemical histories – paint residues, varnish treatments and unknown surface coatings create serious recycling barriers. Some sorting technologies within the recycling industry can now detect and separate wood types with remarkable precision.

Moving forward, Thomas thinks the C&D wood recycling industry will continue to involve growing pressure from large enterprise players to increase and improve sustainable options, increase waste diversion and recycling, reduce landfill usage, and the ability to track, report and validate the results of these efforts.

"Sustainability done well should not add costs, it should reduce cost by diverting valuable materials from waste streams and reusing them to capture more of their value," Thomas said.

Mitchell added that one area of industry focus regarding wood recycling is the impact on carbon emissions. Wood plays a key role as in the process of making lumber, tree converts carbon dioxide into oxygen and wood fiber is made of carbon. This carbon is sequestered in the wood until it gets released at the end of its life through either burning for power generation or decomposing in a landfill.

"The industry will evolve to include materials that not only lower emissions but sequester it," Mitchell says. "Again, imagine if we construct a building and some of the new products we purchase sequester carbon in the process of making them and others emit carbon. We will strive to industrialize this so that the net effect is balanced.

Construction employment increases in 38 states

Construction employment increased in 38 states and the District of Columbia in December from a year earlier, while 26 states added construction jobs between November and December, according to a new analysis of federal employment data released by the Associated General Contractors (AGC) of America. Association officials said that future employment levels in the construction industry could be impacted depending on the new administration's workforce and funding plans.

"Many firms are counting on strong public-sector demand this year and plan to hire as a result," said Jeffrey Shoaf, the association's chief executive officer. "But possible federal funding pauses and efforts to curtail lawful work authorizations could impact future hiring plans for many firms."

Between December 2023 and December 2024, 38 and D.C. states added construction jobs. Ten states shed jobs. Texas added the most construction employees (31,500 jobs or 3.8 percent), followed by Florida (28,900 jobs, 4.5 percent), Ohio (17,900 jobs, 7.6 percent), and Michigan (13,600 jobs, 7.2 percent). Alaska had the largest percentage gain over 12 months (18.9 percent, 3,400 jobs), followed by Oklahoma (8.6 percent, 7,400 jobs), Ohio (7.6 percent, 17,900 jobs), and Hawaii (7.5 percent, 2,900 jobs).

California lost the most construction jobs during the past 12 months (-12,400 jobs, -1.3 percent), followed by New York (-7,400 jobs, -1.9 percent), Maryland (-3,900 jobs, -2.5 percent), Arizona (-2,900 jobs, -1.3 percent), and Oregon (-2,500 jobs, -2.1 percent). The largest percentage loss was in West Virginia (-3.4 percent, -1,200 jobs), followed by Maryland, Oregon, New York, and California.

For the month, industry employment increased in 26 states, declined in 20 states, and was unchanged in Arkansas, D.C., Tennessee, Idaho, and Wisconsin. Washington added the most construction jobs (4,000 jobs or 1.7 percent), followed by Texas (2,300 jobs, 0.3 percent), Florida (1,800 jobs, 0.3 percent), Oklahoma (1,600 jobs, 1.7 percent), and Illinois (1,600 jobs, 0.7 percent). The largest percentage gains occurred in South Dakota (1.9 percent, 600 jobs), Washington, Oklahoma, Wyoming (1.7 percent, 400 jobs), and Iowa (1.0 percent, 800 jobs).

New York lost the most construction jobs from November to December (-4,400 jobs or -1.2 percent), followed by New Jersey (-2,100 jobs, -1.2 percent) and Arizona (-1,800 jobs, -0.8 percent). Mississippi also lost the highest percentage of jobs for the month (-2.2 percent, -1,100 jobs), followed by Minnesota (-1.3 percent, -1,700 jobs).

Association officials noted that a recently issued memo from the Office of Management and Budget appears to call for a temporary halt in many categories of federal funding for construction. They noted that the length of that pause could impact some construction projects. They also urged the Trump administration to support increased funding for construction education and training programs and temporary visa programs dedicated to construction to ensure there are enough development and infrastructure projects.

"While it is unclear what impact this new funding pause will have, we do know that any significant delays in federal funding for vital infrastructure and construction projects are likely to affect construction schedules," said Shoaf.

California recycling facility to transform cartons into building materials

A partnership between the Carton Council, Elof Hansson USA Inc. and the Upcycling Group will bring a new recycling manufacturing facility to Lodi, California, by the end of Q3. Designed to transform post-consumer food and beverage cartons into durable, sustainable building materials, the facility will support regional recycling efforts and help meet the growing demand for sustainable construction materials.

The manufacturing method involves shredding used gable top and aseptic cartons and bonding them into large, durable sheets. The high-pressure and heat treatment process eliminates the need for water, formaldehyde glues and hazardous chemicals, and relies entirely on cartons and other materials collected for recycling.

"The carbon footprint of our boards is at least 80 percent lower than the traditional building materials that we replace," said Jan Rayman, co-founder and chief executive officer of the Upcycling Group. "No mining, no tree cutting, and no water is used or contaminated, creating a variety of boards that can be used for roofing, wallboard and other building materials, all produced more sustainably than their traditional counterparts."

"We believe this facility will play a crucial role in supporting California's efforts to expand recycling by providing a new, regional end market," said Jason Pelz, vice president of recycling for the Carton Council. "By using collected, sorted and baled cartons from California and bordering states, we are not only making recycling more efficient for West Coast communities, but also ensuring these materials stay in use and out of landfills."

Once fully operational, the facility is expected to recycle approximately 750 tons (1,500,000 pounds) of food and beverage cartons each month and employ an estimated 15 people.

89.7 percent of U.S. construction workers are not union members

According to an Associated Builders and Contractors (ABC) analysis of the U.S. Bureau of Labor Statistics' (BLS) 2024 Union Members Summary, a record low 10.3 percent of the U.S. construction industry belongs to a union, a decrease from the prior historic low of 10.7 percent in 2023.

BLS reports that 7,978,000 construction industry workers were not members of a union in 2024, a 12,000 person increase from 7,966,000 workers in 2023, while union membership decreased by 38,000 to 916,000. The construction industry shrunk by 26,000 workers, from 8.92 million in 2023 to 8.894 million in 2024.

"It is remarkable that the construction industry's union membership dropped to a new historic low of 10.3 percent following four years of anti-competitive and inflationary Biden administration policy schemes pushing taxpayer-funded construction projects to union-signatory contractors through project labor agreements on new federal and federally assisted infrastructure, clean energy and manufacturing construction projects," said ABC vice president of regulatory, labor and state affairs Ben Brubeck. "Barriers to construction industry union membership are extremely low – workers can freely go to a local union hiring hall, join a union and be dispatched to union-signatory contractor jobsites in a short amount of time. What this says about American construction workers is that they are not wild about the product unions are selling.

"With construction materials prices up 38.6 percent since February 2020, higher interest rates and a workforce shortage of 439,000 in 2025, the headwinds currently facing the construction industry are considerable," said Brubeck. "Now is the time for the Trump administration to level the playing field in a way that creates more value for taxpayers through healthy competition for construction projects based on merit. One way President Trump can give the contracting community immediate regulatory relief is by fully eliminating former President Biden's harmful pro-PLA policies, one of which a federal court ruled against earlier this month because it reduced competition on 12 federal construction contracts and violated congressional intent. "

Construction jobs increase in metro areas in 2024

Construction employment increased in 244, or 68 percent, of 358 metro areas between December 2023 and December 2024, according to an analysis by the Associated General Contractors of America of new government employment data. Association officials cautioned, however, that most firms reported having a hard time finding enough qualified workers to hire even before the new Trump administration began to curtail work authorizations, among other measures.

"Construction firms are doing all they can to recruit and retain as many workers as possible to keep pace with demand," said Jeffrey Shoaf, the association's chief executive officer. "But it is hard when the government discourages students from pursuing those careers and won't let many people enter the country to lawfully work in construction but wants to build a lot of things."

Houston-The Woodlands-Sugar Land, Texas added the most construction jobs (15,200 jobs, 6 percent) between December 2023 and December 2024, followed by Northern Virginia (6,900 jobs, 8 percent); Orlando-Kissimmee-Sanford, Florida (6,100 jobs, 7 percent); Las Vegas-Henderson-Paradise, Nevada (6,000 jobs, 7 percent); and Miami-Miami Beach-Kendall, Florida. (5,200 jobs, 9 percent).

Anchorage, Alaska had the largest percentage gain (18 percent, 1,900 jobs), followed by Fairbanks, Alaska (15 percent, 400 jobs); Kahului-Wailuku-Lahaina, Hawaii (13 percent, 600 jobs); and Cheyenne, Wyoming (11 percent, 400 jobs).

Construction employment declined over the year in 63 metro areas and was unchanged in 51 areas. The largest job loss occurred in New York City (-9,700 jobs, -7 percent), followed by Phoenix-Mesa-Scottsdale, Arizona (-5,100 jobs, -3 percent); Portland-Vancouver-Hillsboro, Oregon-Washington (-4,400 jobs, -5 percent); Anaheim-Santa Ana-Irvine, California (-4,100 jobs, -4 percent); and Riverside-San Bernardino-Ontario, California (-3,700 jobs, -3 percent).

The largest percentage decrease occurred in Ithaca, New York (-9 percent, -100 jobs), followed by Silver Spring-Frederick-Rockville, Maryland (-7 percent, -2,300 jobs); Duluth, Minnesota-Wis. (-7 percent, -600 jobs); New York City, New York (-7 percent, -9,700 jobs); and 5 percent declines in San Francisco-Redwood City-South San Francisco, California (-2,000 jobs); San Jose-Sunnyvale-Santa Clara, California (-2,600 jobs); Pueblo, Color. (-200 jobs); Portland-South Portland, Maine (-500 jobs); Portland-Vancouver-Hillsboro, Oregon-Washington. (-4,400 jobs).

Association officials noted the federal governments invests four times as much annually, urging students to attend college, than it does preparing them for careers in fields like construction.

Cross laminated timber market is anticipated to reach $3.0 billion by 2031

The global cross laminated timber market is estimated to flourish at a CAGR of 10.6 percent from 2023 to 2031. Transparency Market Research projects that the overall sales revenue for cross laminated timber is estimated to reach US$ 3.0 billion by the end of 2031.

Insurance companies increasingly recognize the safety and reliability of CLT structures, leading to reduced premiums. As CLT gains prominence for its fire-resistant properties and structural integrity, insurers offer more favorable terms, boosting CLT adoption in construction projects.

Cross Laminated Timber Market: Competitive Landscape

The cross laminated timber market showcases robust competition driven by key players like Stora Enso, Binderholz, and KLH Massivholz GmbH. These industry leaders offer diverse CLT products, emphasizing sustainable and high-quality construction solutions. Emerging contenders such as Structurlam Mass Timber Corporation and Nordic Structures disrupt the market with innovative CLT applications and environmentally conscious designs.

Market consolidation and strategic collaborations among manufacturers foster technological advancements and global market expansion. Increased adoption of CLT in construction, propelled by its eco-friendly nature and structural versatility, intensifies competition, fueling continual innovation in the competitive landscape of the CLT industry.

Evolving forestry practices represent an emerging driver. Sustainable forest management strategies, particularly in regions like Latin America and the Asia Pacific, prioritize responsible timber sourcing. Collaborative efforts between CLT manufacturers and forestry stakeholders ensure a continuous and sustainable timber supply, mitigating environmental concerns and supporting long-term market growth.

The influence of cultural shifts in architectural preferences drives cross laminated timber demand. A growing preference for natural and aesthetically pleasing materials fuels the interest in CLT structures. Architects increasingly integrate biophilic design principles, leveraging CLT's natural aesthetic and sustainability to create harmonious and environmentally conscious living spaces, fueling cross laminated timber's market expansion.

Key Findings of the Market Report

- Adhesive-bonded CLT emerges as the leading type segment in driving the cross laminated timber market due to its widespread application.
- Residential buildings lead the cross laminated timber market due to increased adoption in sustainable housing projects and construction initiatives.
- Europe emerges as the leading region segment in driving the cross laminated timber market due to established timber construction traditions.

Cross Laminated Timber Market Growth Drivers & Trends

- Increasing demand for eco-friendly building materials drives the adoption of cross laminated timber, promoting green construction practices and carbon-neutral structures.
- Rising urban populations propel the need for efficient and sustainable housing, boosting cross laminated timber's market prospects.
- Government initiatives favoring sustainable construction materials and incentivizing timber-based structures augment cross laminated timber market growth.
- CLT's versatility encourages creative architectural designs, fostering its utilization in various construction projects worldwide.
- Continuous R&D efforts result in improved manufacturing techniques and fire-resistant coatings, enhancing CLT's structural properties and safety standards.

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