# MAGAZINE

## Changing Course

Green evolution drives decisions for fleet and farm



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**ON THE COVER:** Carbon reduction goals are affecting fuel decisions and fleet management. While policy changes and technological advancements have helped put more electric cars and light-duty trucks on the road, how the shifts will play out in heavy-duty vehicles is less clear.

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CHS is the nation's leading farmer-owned cooperative and a global energy, grains and foods company. *C* is published quarterly by CHS, 5500 Cenex Drive, Inver Grove Heights, MN 55077.

Please send address changes to *C* magazine, CHS, 5500 Cenex Drive, Inver Grove Heights, MN 55077; call 212-600-3508; or email cmagazine@chsinc.com.

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*Jay Debertin, president and CEO, CHS*

# Empowering Through Change

The connection between energy and agriculture has never been more important — or more complex — than it is today. While we will continue to need energy inputs to plant, harvest, transport and process crops, the demand for crops to produce renewable fuels is changing the dynamic quickly and significantly.

In some ways, this trend is similar to the rise of ethanol production two decades ago. But the drive for low-carbon fuels to reduce greenhouse gas emissions puts the current situation in much sharper focus.

At CHS, we have a unique view of this changing landscape.

Our energy business continues to evolve to meet the needs of owners on farms and ranches and customers on and off the road. While today that means producing as much diesel fuel as possible, we are prepared to produce renewable diesel using soy oil or other crop-based inputs as that demand grows and as it makes sense for our owners and customers.

Our ethanol production facilities are turning our owners' corn into high-quality ethanol to produce E15 and other higher ethanol blends.

Our soy processing facilities are already among the largest in the U.S. and we are adding even more capacity to help meet the need for soy oil for food and renewable fuels.

Our transportation teams put new heavy-duty vehicle technologies to the test every day as they move fuel, propane, grain and other commodities across America. We will share what we learn with owners and customers.

While there are still many questions about how all these changes will affect rural America, CHS will be instrumental in finding answers that are right for our company, our owners, our communities and our planet.

We know this will require significant investments, not only in facilities and technology, but in diverse thinking and creative problem-solving. It's a challenge we welcome and one that promises new opportunities as we continue working together to create connections to empower agriculture.

**Have a question or feedback for the CHS management team? Get in touch with us at feedback@chsinc.com.**


*New technology, upcoming policies and shifting industry demand will affect decisions for fleet operators like Carl Opelt, co-owner of G&S Trucking in Neillsville, Wis., right, and his data consultant Joe Ebben with Mack Trucks.*

# TRANSFORMING AN INDUSTRY


*By Megan Gosch*

**The push to reduce emissions is poised to shape the future of fleets.**

As the global effort to reduce carbon dioxide and greenhouse gases gains momentum, tailpipe emissions are a core target.

While emission standards narrow in on a zero-emissions future, the automotive industry is sprinting to deliver new solutions through advanced technologies and alternative energy sources.

Most of those changes currently take aim at passenger and light-duty vehicles, but a transformation in the trucking industry is soon to follow.

## Messy Middle

How will new technologies and policies shape the future of the heavy-duty vehicles the ag supply chain relies on? "The truth is, no one knows," says Gary Tucker, director of environmental health and safety, CHS transportation and logistics, "and the jury will be out for a while." >

> Tucker draws from years of fleet management experience to track advances across the transportation industry and gauge sustainable large-scale solutions.

"We're in a time the industry is calling 'the messy middle,'" says Tucker. "There are several emerging options when it comes to propulsion, but the technology's not yet viable for mass adoption by the average fleet operator."

While electric vehicle (EV) manufacturing, sales and charging infrastructure continue to grow with the help of government credits and incentives, EV batteries remain too heavy and their energy density remains too low to meet the range and weight fleet operators need.

Hydrogen fuel cell technology could offer much-needed range and acceptable vehicle weights, but advancements in technology, price and commercial availability currently remain far out of reach for the average fleet.

"Those technologies could be a fit further down the road," says Tucker. "Ten years from now, we could see maturing electric battery and hydrogen technologies, but we're not likely to see a front-runner emerge until closer to 2040 or later. It's too soon to say where the industry will settle.

"Once that front-runner emerges, it will still take years to turn over the 3 million tractor-trailers currently on the road. It's safe to say we're in for a long ride."

While a trucking transformation won't happen overnight, a few key trends offer clues to the industry's evolution.

## Policy Sets Tall Order

Just as emissions standards have driven demand for passenger and light-duty EVs and created new markets for alternative fuels, new rules will soon accelerate zero-emissions truck technology.

In late 2022, the U.S. Environmental Protection Agency (EPA) finalized the first rule of its Clean Trucks Plan, which aims to reduce air pollutants emitted by heavy-duty trucks. Under the new rule, heavy-duty truck manufacturers are required to cut nitrogen oxide emissions beginning with model year 2027. The mandate is designed to cut nitrogen oxide emissions from those vehicles >

## PROPELLED BY PURCHASE POWER

While heavy-duty and passenger vehicles face different opportunities and challenges on the path to a low-carbon future, consumer trends could hold more sway over fleets than professional operators may realize.

"Millennial and Gen Z consumers could be the strongest guiding force impacting the future of fleets," says Gary Tucker, director of environmental health and safety, CHS transportation and logistics.

"Recent studies show younger consumers aren't just eager to invest in technology that's marketed as ecofriendly, like EVs [electric vehicles]. They're also more likely to put their purchasing power toward suppliers that are using greener technology. In some cases, shippers are seeing consumers dictate use of greener transportation practices."

As younger consumers demand greener technology for personal vehicles, Tucker says heavy-duty fleets are likely to experience a "trickle-up" effect.

"The more EVs on the road and the greater the demand for new tech, the more momentum there is behind that tech and the faster that tech will advance," Tucker says. "The more trial and error and innovation that takes place in the passenger and light-duty space, the more heavy-duty fleets can benefit and learn from it. It's much easier to engineer an electric compact car than an electric Class 8 tractor-trailer."

"Demand that drives advancement in the passenger vehicle space is where we can learn how to charge faster and build a more efficient battery," adds Ron Batey, director of pricing and economics for refined fuels at CHS. "We're likely to see a 15-year lag between mass adoption in passenger vehicles and mass adoption in heavy-duty trucks, but innovation in light applications has the power to fund the breakthroughs needed to transform trucking technology."

*Key learnings from general consumer vehicle owners will influence future Class 8 vehicle technology used by fleet operators including Carl Opelt, co-owner of G&S Trucking in Neillsville, Wis., left, shown here with Mack Trucks data consultant Joe Ebben.*

# ELECTRIC EVOLUTION

Could the truck industry go all electric? "Maybe," says Ron Batey, director of pricing and economics for refined fuels at CHS. "Right now, the industry is focused on battery electrics and there's much more research and innovation needed before that's an affordable fit for the masses."

You can find electric fleets on the road today — PepsiCo was the first to deploy the Tesla semitractor and Amazon Rivian delivery vans are making deliveries in more than 500 cities — and you can expect to see more (especially with a new California mandate requiring that truck sales go all electric by 2035). But Batey notes most large-scale successes have come with light-duty applications.

"There will be some scenarios where battery-powered electric vehicles [EVs] will work out," he predicts, "but today Tesla trucks appear to be primarily hauling bags of chips for Frito-Lay. To see that same tech work for the average medium- or heavy-duty fleet, you've got some big barriers to overcome."

Key obstacles for medium- and heavy-duty battery EVs include the following:

**Weight:** Batey notes there's a key conflict at the center of today's battery technology. "Current EV batteries are too large and weigh too much to be viable at the medium- and heavy-duty scale, but you can't drop weight without losing the energy that provides fleets with the driving range they need. It's a catch-22."

Battery weight also poses a risk when it comes to road maintenance. "EVs are heavier than traditional internal combustion engines. It's one thing to run errands with a vehicle containing a 1,000-pound compact EV battery and another thing entirely to haul potentially a 10,000-pound heavy-duty battery. Heavy-duty EVs can cause more damage and raise a serious question on how we'll maintain our roads if EV trucks go mainstream."

**Charge time:** EV charge times vary widely (from minutes to days) depending on vehicle size, battery type, charging equipment and available power output. In all cases, the larger the vehicle, the more time and electricity needed to fully charge.

"We're seeing EV passenger cars charge in 40 minutes with high-power superchargers," says Batey. "Charge times for light-duty vehicles may be more feasible for fleet operators, but charging for the average heavy-duty application could take three hours or more. It's a trade-off; faster battery charging means less battery longevity. A significant breakthrough in battery technology will be needed to help the average fleet owner avoid excessive charging times."

*Access to adequate charging options is one factor setting the pace for the future of electric fleets.*

**Infrastructure:** Fleet operators keeping their vehicles close to home could have an advantage, but heavy-duty fleets running long hauls aren't likely to see sufficient charging infrastructure for years. "We don't have enough widespread charging infrastructure in place to fully support passenger vehicles yet," Batey adds. "To scale charging for the kind of range and power a heavy-duty fleet needs will be a slow, massive, ongoing lift.

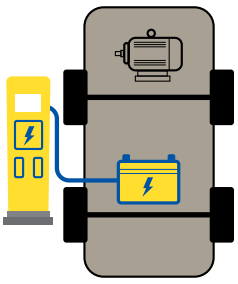
"Battery electrics will certainly play a role in the automotive landscape, but we need science to push technology, price and logistics in the right direction. The cost benefit just isn't there yet."

Beyond batteries, another option shows more promise for fleets, he says. Without a heavy lithium-ion battery, the hydrogen fuel cell is an EV technology that could eliminate carbon emissions in heavy-duty applications while bypassing weight and charging challenges.

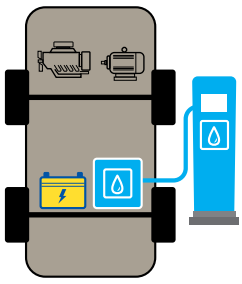
Advancements are still needed in the technology used to compress and liquify hydrogen and to build out the infrastructure needed for mass adoption, but "this alternative would be a much stronger fit for heavy-duty fleets where every pound matters," says Batey. "That could be a technology that takes the debate from 'Will electric win?' to 'What kind of electric will win?' "

## ELECTRIC VEHICLE TYPES

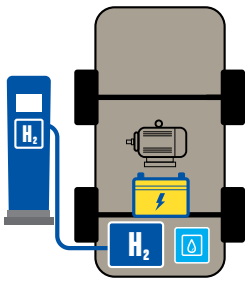
Electric vehicles can be powered by several types of fuel technology.



**Battery EV**
Powered by an electric battery with no gas engine parts. Zero emissions.



**Hybrid EV**
Uses an electric motor to assist a gas-powered engine. Low emissions.




**Fuel Cell EV**
Uses fuel cell technology to create energy needed to power the vehicle. Zero emissions.

*Sources: EVgo, Intellipaat*

**Upcoming rules are designed to cut nitrogen oxide emissions from heavy-duty vehicles by 48% by 2045.**

> by 48% by 2045. The new rule is more than 80% stronger than current standards. Heavy-duty vehicles may also soon be subject to new greenhouse gas emissions standards expected for model year 2027 and beyond.

"It's a lofty goal the industry is unlikely to meet, but it's also the looming stake in the ground that's pushing everyone in the industry to work toward greener technologies," says Tucker.

"We're just four years away from this rule without a solution that's ready to be mass produced and meet the new standard. The industry doesn't have an answer yet."

## Embracing Experimentation

What happens when a standard is set with no long-term solution in sight?

"We're bound to see a mixed approach of short-term interim solutions while we wait for a long-term zero-emissions winner to emerge from the pack," says Tucker.

> "It's much easier to engineer an electric compact car than an electric Class 8 tractor-trailer."
>
> — *Gary Tucker*

"The next 10 years will be filled with experimentation," says Ron Batey, CHS refined fuels pricing and economics director. "We'll see hydrogen fuel cell trucks on the road. We'll start to see electrified trains and trucks working out the kinks. We'll see lots of testing taking place across the board to see what works."

This transition period is reminiscent of an earlier era, when the EPA enacted its 2010 emissions standards.

"These new rules will be much more disruptive to the fleet business than the standards we faced in 2010, but we could see solutions like hybrids, natural gas and propane emerge in the next phase of experimentation," says Tucker.

Before 2010 emissions standards took effect, some vehicle operators invested in model year 2009 vehicles to pad their fleets with familiar technology, rather than taking a risk with newer technologies designed to cut emissions.

"No one wanted to be the guinea pig and take a risk with the unknown, so they deliberately acquired and maintained those older models for as long as possible to bide their time," says Tucker. "The supply market is tight today, but I fully expect we'll see more of the same stock-up strategy as the industry prepares for 2027."

## Competing Resources

Batey notes that growing demand from consumers for new technology could become an environmental double-edged sword.

From the buildout of a fully connected electric charging network to mining rare earth minerals needed to create EV batteries, more options will be needed to deliver necessary resources and infrastructure for mass-scale solutions.

"Today many of the same materials are needed for assets like EV chargers or batteries or wind turbines or electric motors. Global supply is limited by existing mines and refineries," says Batey.

"Growth in one part of the market could wind up pilfering resources from another. A heavy-duty electric truck is going to require more minerals and much more robust charging resources than the average passenger EV, but if those resources have already been tapped to satisfy general consumer demand, that could slow progress for fleets."

> "The next 10 years will be filled with experimentation."
>
> — *Ron Batey*

While serious competition for resources across the automotive space is likely years down the road, Batey notes the dynamic could pose a larger issue as fleet technology evolves.

"Today, we don't know if passenger vehicles and fleets will ultimately rely on the same technology and resources, but convergence in that technology could create an additional barrier in delivering technology for heavy-duty vehicle operators."

## Invest Accordingly

With years of innovation, exploration and uncertainty ahead, experts agree there's no silver bullet strategy to predict what the future holds for fleet technology or how fleet owners should invest.

"Today, when most fleet operators invest in a diesel truck, they know it can do it all — it has the range and infrastructure they need — and there's no need to think through how it will be used," says Tucker.

But, he says, as the industry diversifies and emerging solutions come into play, operators will need to think intentionally about how vehicles will be used and invest accordingly. >

*With the ability to track and manage valuable assets in real time, data holds the key to optimal efficiency for future fleets.*

## DRIVEN BY DATA

With full fleet connectivity and real-time data collection capabilities coming to the forefront in nearly every new type of vehicle, it's never been easier for fleet operators to visualize their full fleet and identify ways to optimize performance.

"The more data you have, the more avenues you have to find cost savings, efficiencies and opportunities to grow," says Kevin Hall, CHS vice president of supply chain and continuous improvement. "Operators who aren't tracking and utilizing their data are leaving money on the table."

The team behind G&S Trucking in Neillsville, Wis., began tracking data on their heavy-duty haul trucks and sand and gravel payloaders five years ago with the help of Mack Trucks data consultant Joe Ebben. They wanted to better understand their fleet's performance and find ways to boost efficiency.

Through software that tracks fuel use, miles per gallon and idle time over the lifetime of each vehicle, the team no longer needs to spend time tracking metrics by hand.

"Using these tools, we almost immediately had an idea of miles per gallon and the performance we saw when trucks fueled up on the road versus back at home base," says G&S co-owner Carl Opelt. The metrics have not only shown a return on investment in Cenex Roadmaster XL® premium diesel fuel, but have helped the team plan ahead for future fuel needs and have given G&S drivers clear direction on when and how to fuel up.

"Before tracking, the co-op only had a record of what the G&S team was using through the course of the year," says Isaac Brown, certified energy specialist at ProVision Partners Cooperative in Hixton, Wis. "With this new data, we can see exactly what the efficiency of that fuel was and be much more precise in planning for fuel needs and understanding how that evolves as the G&S fleet grows."

A close look at the numbers showed the G&S team a surprising proof point that helped them rethink their strategies for pricing and route efficiency. "We were working to keep our trucks loaded at all times for optimal route efficiency, but when we saw a boost in our fuel efficiency on the legs where our trucks were empty, we knew we needed to start charging accordingly for the difference we didn't realize we were paying," says Opelt.

The team has also found opportunities to optimize by reducing idle time.

"If your equipment's sitting still, you're losing money, plain and simple," says G&S Quarry Manager Nick Opelt. "With our new systems, we realized just how much time and fuel we were burning by keeping our equipment idling. That's something you don't realize while you're out working, but back at your screen it's hard to miss," he says. The team has now leveraged an automatic shut-off feature to kick in after a maximum five minutes of idle time.

With these operational wins, the G&S team notes the early logistical improvements are just the start for the company's data-driven strategies. "These metrics are valuable for real-time problem-solving," says Carl Opelt. "Data is the future."

> "Producers will need to ask themselves, 'How will this truck work for me? What kind of range do I actually need?' If your truck will be hauling crops from on-farm storage to a nearby terminal, an electric vehicle could someday be an ideal fit. If you'll be making longer hauls regularly, maybe a hybrid or fuel cell or propane vehicle will be your best fit," says Tucker.

"There's no more one-size-fits-all approach. It's a new way of thinking about your investment, but the better you understand how you're utilizing your trucks today, the faster you'll be prepared to act as new solutions emerge." ■

**LEARN MORE: See how CHS is advocating for owners on carbon reduction policies at chsinc.com/advocacy.**

"Ten years from now, we could see maturing electric battery and hydrogen technologies, but we're not likely to see a front-runner emerge until closer to 2040 or later."

— *Gary Tucker*

## POWERING UP WITH PROPANE

Today, propane may be more commonly used to heat homes and dry corn than to power fleets, but the fuel holds plenty of potential for future fleet operators as new policies call for a cleaner transportation footprint.

Propane autogas burns cleaner than diesel and gasoline, cutting greenhouse gases by 6% to 21%, depending on the type of vehicle used, and reducing emissions of other harmful gases such as sulfur dioxide and nitrogen oxide (NOx). New propane engine technology already offers solutions today that hold up to the strict EPA emissions standards of 0.02 grams NOx set to go into effect in 2027.

While major engine manufacturers are working to build heavy-duty propane-powered engines, light- and medium-duty fleets from Las Vegas taxis and UPS delivery trucks to school buses and co-ops across the country have already embraced autogas.

"The environmental benefits are only going to be a bigger sell in a future focused on carbon-cutting, but you can't beat the cost savings," says Tim Lease, energy division manager for Premier Cooperative in Mt. Horeb, Wis. The cooperative's energy division runs its fleet of pickup, service and crane trucks on autogas and saves more than $15,000 each year by spending less on fuel and maintenance.

"Burning propane makes the engine much cleaner with less particulate, so you're able to extend the life of your engine and need less day-to-day maintenance," says Lease. "That's something you don't see right away, but with a high-mileage fleet, you're going to see the payoff in your bottom line."

The Iowa County (Wis.) sheriff's office, a long-time Premier customer, runs 11 squad cars on propane autogas and plans to convert new vehicles as they come on board.

"Our squad cars are running all the time. The savings on oil changes and overall maintenance is a big win," says Sheriff Michael Peterson, "not to mention the extra fuel capacity it gives us so we don't have to stop in the middle of a call to refuel."

As customers get started with autogas, Lease and his team help set up each vehicle with a conversion kit that allows it to run on either gasoline or autogas. Lease also works with customers to build autogas refueling infrastructure where they'll need it most.

"Propane autogas is a solution that's slowly changing the game for fleets; it just takes time to realize its full potential," says Lease. "Once customers get started and track the results for themselves, they're calling me with the make and model of the next vehicle they want to convert."


*For fleets running on propane autogas, fueling up is simple, safe and convenient with infrastructure that can be built where operators need it most.*

# AUTONOMOUS VEHICLES: THE NEXT COMPETITIVE ADVANTAGE

What role will autonomous vehicles (AVs) play in the future of fleets? Most industry experts agree driverless technology will make a significant mark on the trucking industry, but when and what it might mean for small fleet owners is up for debate.

"This technology will be a game-changer," says Kevin Hall, CHS vice president, supply chain and continuous improvement. "The last time we saw a disruption of this magnitude in transportation was the invention of the steam locomotive in the 1830s, which dropped transportation costs by 70% and fueled the first industrial revolution. It won't happen overnight, but autonomous vehicles will become an industry standard."

From self-steering tractors to drones that serve as an eye in the sky for precision agriculture, autonomous technology is already at home on farming operations, but the technology is now making headway on the road. Benefits could include the following:

**Transparency:** "AV technology gives you the power to see your full fleet and inventory geographically connected in real time, so you can make decisions faster and more efficiently," says Hall. "You have full line of sight to your assets."

**Safety:** Early data suggests autonomous technology may decrease the number of incidents logged en route. Some insurance providers believe the technology has the potential to make roads safer.

**Efficiency:** AV route technology could help farmers and ranchers without requiring them to invest. For example, grain pickup via an autonomous vehicle could streamline work on the farm and at the co-op.

**Operating costs:** From better fuel economy and lower maintenance costs to more efficient vehicle routing, autonomous vehicles are estimated to cut up to 35% in operating costs, depending on fleet size and vehicle use.

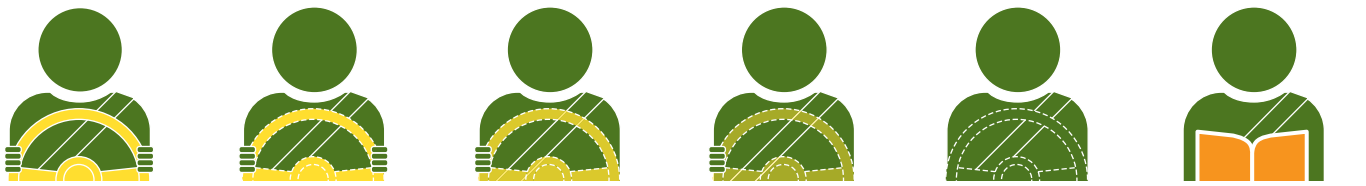
With five levels of automation, ranging from minimal to full automation, current technology development spans from Level 2 (partial automation) to Level 4 (high automation). "From Levels 1 to 3, a driver monitors the vehicle and takes action when needed, whereas Level 4 requires minimal interaction, especially during specific weather conditions. At Level 5, the vehicle can perform all operations without human interaction," says Diego Balmoriz, CHS supply chain innovation program manager.

"Widespread commercial availability will be highly dependent on legislation, and legislation will move as fast as players in the industry can execute pilots and demonstrate the technology is safe," Balmoriz says. Legislation in 44 states addresses autonomous technology, but the specifics of that legislation vary widely. "There's a clear path ahead, but it's a slow uphill climb."

Ongoing driver shortages make that battle one worth fighting. According to the U.S. Bureau of Labor Statistics, job participation is at a 40-year low and will continue to decline in the next 10 years.

With a mature labor force and many drivers retiring, the national driver shortage currently exceeds 80,000. Experienced drivers are leaving the industry and few new drivers are taking their places. "Autonomous vehicles won't be a way to get rid of drivers, but AVs may be a tool to help fill the gap," Hall says.

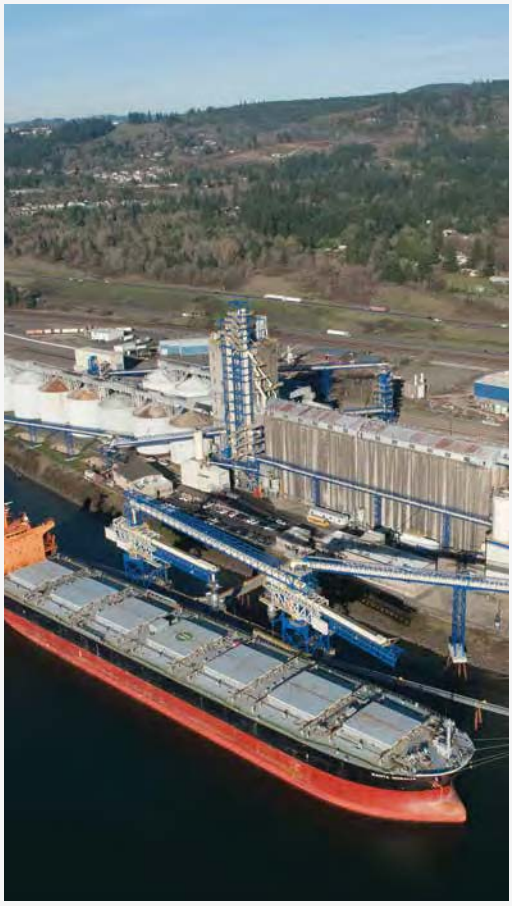
## Levels of Driving Automation



| 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **NO AUTOMATION** | **DRIVER ASSISTANCE** | **PARTIAL AUTOMATION** | **CONDITIONAL AUTOMATION** | **HIGH AUTOMATION** | **FULL AUTOMATION** |
| Manual control; a human performs all driving tasks | Single automated system (e.g., monitors speed through cruise control) | Vehicle can perform steering and acceleration; human monitors driving tasks and can take control at any time | Environmental detection capabilities; vehicle can perform most driving tasks, but human override still required | Vehicle performs all driving tasks under specific circumstances; geofencing required; human override an option | Vehicle performs all driving tasks under all conditions; zero human attention or interaction required |
| Human monitors driving environment | | | Automated system monitors driving environment | | |

*Source: Synopsys*

# WHEN YOU'RE A CO-OP OWNER

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# RODEO SILENCE

At any rodeo across the globe, you are likely to see dirt flying from bucking broncos, excited children playing games and a clown rolling around in a barrel. You'll hear the pounding of hooves, bells on fences and the witty call of the announcer echoing through the speakers. You'll be able to taste salty popcorn, mustard on hot dogs and a cool beverage on a warm summer night. But before all of those sensations come alive, everyone shares a moment of silence for reflection and gratitude.

*— Adam Hester*





*From propane to ice cream to school sweatshirts, Northern Star Cooperative Services provides goods and services important to northern Minnesota communities. Northern Star played an integral role in keeping a pharmacy in Deer River, Minn., to serve residents including Vic Williams Jr., shown at right.*


# COMMUNITY PRESCRIPTION

*By Matthew Wilde*

**Outside-the-box thinking benefits co-op and community.**

Vic Williams Jr. is thankful he only needs to drive a couple of miles to pick up medications at the Essentia Health pharmacy in tiny Deer River in northern Minnesota. When the local drug store's former owner announced plans to retire and close the business four years ago, the town faced the possibility of losing an essential service.

"Our community is aging," says Williams, a recent retiree. "Medication is an integral part of our existence, including mine. Convenience is important."

The former Itasca County sheriff could easily drive 15 miles to Grand Rapids, Minn., the closest city with a drug store. But that trip would be burdensome for many elderly Deer River residents, he says, especially during harsh Minnesota winters.

Northern Star Cooperative Services, based in Deer River, played a key role in keeping the pharmacy. While cooperatives are mainstays in rural communities, medications and health care products are not traditional co-op offerings. But Northern Star leaders say they are willing to do whatever is necessary to help area residents.

"We do things to ensure our community remains alive and well," says Williams, a co-op board member. "It's one of the main missions of Northern Star Co-op. The strength of our business relies on the strength of the people around us, our customers."

## Healthy Community

The co-op initially signed a purchase agreement to buy the pharmacy business, but not the storefront. Shortly after that, Essentia Health, based in >


*Brad Box, CEO of Northern Star Cooperative Services, says the co-op has transformed to meet customer needs, while continuing to provide traditional services such as propane delivery.*

Duluth, Minn., offered to buy the enterprise to complement its hospital and clinic in Deer River. Knowing Essentia Health has considerable pharmacy expertise — the company operates 25 pharmacies in the Upper Midwest — Northern Star struck a deal that's a win for all.

With the co-op's blessing, Essentia Health bought the pharmacy and relocated it to Northern Star Market Place, a co-op-owned and -managed retail operation that was being remodeled and expanded at the time. Essentia Health signed a long-term lease for $3,000 per month. The town kept its pharmacy, Essentia Health expanded, and Northern Star generates more revenue through rental income and extra foot traffic in the store.

"Access to pharmacy services is important to providing high-quality health care and ensuring continuity of care," says Kenzie Hohman, who heads up ambulatory care pharmacy services for Essentia. "We are proud to offer our patients these services in the communities we are privileged to serve."

The pharmacy is just one example of Northern Star's willingness to adapt and provide products and services area residents need.

## Survive and Thrive

Rural communities often struggle to retain businesses and essential services as demographics change. Young people move out to find better opportunities and small farms and businesses dissolve and consolidate.

Michael Darger, a University of Minnesota Extension community economic specialist and business retention and expansion expert, says health care, grocery, hardware and lumber businesses are often the hardest for small towns to keep. Competition from online and big box retail giants have contributed to rural business struggles, he adds.

"Once a business leaves a rural community, it's not likely another will take its place," Darger says. "I won't call it a crisis, but a lot of business owners at the end of the baby boomer generation are getting ready to retire and communities need to deal with that."

> "Our board has always been very good at figuring out what we need to do to survive and thrive."
>
> — *Brad Box*

Northern Star has embraced change to survive, says CEO Brad Box. Established as an agricultural co-op 100 years ago, Northern Star has transformed into an energy and consumer/retail operation to meet the needs of its changing customer base.

Small farms, especially dairy farms, mostly disappeared near Deer River in the 1980s, Box says. With them went the need for livestock feed and crop inputs.

Tourism, timber and mining industries became the driving economic forces in the region. Itasca County is a wooded area that's home to more than 1,000 lakes and is a popular vacation and weekend destination. The need for fuel, propane, lubricants and convenience stores grew.

"For the cooperative to survive, we had to adapt and figure out ways to provide value to member-owners," Box says.

In the early 1990s, Northern Star took on debt to acquire the Solar Gas propane plant in Deer River from CHS. "That started our meteoric rise as a cooperative," Box says. Other energy acquisitions followed. Today, Northern Star business ventures include:

- Four convenience stores
- Three bulk petroleum facilities

- Seven propane branches
- Mini storage buildings with 174 units
- Northern Star Market Place with a pharmacy, deli and foodservice; merchandise ranges from gifts made by local artisans, clothes and home decor to locally produced foods
- Launch Marketing, a full-service social media, marketing and e-commerce management company that helps local businesses build brand and product awareness

Northern Star sales grew from $7 million in 1993 to $67 million in 2022. Co-op membership increased from hundreds to 8,000, Box reports. The propane customer base grew from zero to 13,000.

"Sometimes it can be a big hurdle to get co-op boards to understand the need for change," says Box. "Our board has always been very good at figuring out what we need to do to survive and thrive."

## Creative Thinking

As a consumer-driven co-op, Box realized aggressive marketing and social media efforts were needed for continued success. The cooperative hired his daughter and former intern, Shelby Box, three years ago to develop a marketing program that was productive and cost-effective. This includes regular social media posts to boost brand awareness, ad campaigns, a revamped website and an e-commerce site for Northern Star Market Place. Recently, Shelby Box incorporated digital advertising into the cooperative's marketing plan.

Sales have grown by millions of dollars in the past few years, and a focus on marketing is a big reason why, Box says. He hopes to parlay that success with a co-op-owned business called Launch Marketing, which began taking on clients in March 2023.

"Many small businesses don't have the know-how or time to do marketing and things necessary to be successful," Box says. "We can use our expertise to help."

Blueberry Hills Golf Course and Blueberry Hills Campground in Deer River, owned by Northern Star Office Manager Nikki Osse and her husband, Jordan, served as a beta test in 2022 for Launch Marketing. The goal was to boost business by increasing awareness through targeted advertising and social media posts on Facebook and Instagram.

It worked. Social media views increased from 3,000 views to nearly 11,000 per month. Ad campaigns and specials also helped draw customers.

"We've never been as busy as we were last year," reports Nikki Osse. "It's hard to know how much it was because of Launch, but it helped."

Box adds, "If our community succeeds, we succeed." ■

**READ MORE:** Learn more at northernstarcoop.com.

### Northern Star Cooperative at a Glance

- Energy and consumer/retail cooperative
- Headquartered in Deer River, Minn., with a service area from International Falls to Alexandria
- 8,000 members
- 13,000 propane customers
- Sales of $67 million in 2022
- Since 2009, Northern Star has paid nearly $19.4 million in cash dividends and equity retirements to member-owners, including more than $1.2 million in January 2023. The co-op's average annual dividend over the last 10 years was nearly 6%.
- Businesses include fuel, propane, lubricants, convenience stores, Northern Star Market Place, storage units and Launch Marketing
- Focused on community, supporting other local businesses and emphasizing philanthropy

*Nikki Osse, left, and Shelby Box work on marketing and social media strategies for Osse's businesses.*

*Ag instructor Amelia Hayden, right, will use a CHS Foundation grant to help renovate the greenhouse at Osseo-Fairchild High School in Osseo, Wis.*

# Teacher Grants Spur Ag Education

*By Matthew Wilde*

## CHS Foundation celebrates 75 years with ag education grants.

Fifteen teachers recently received CHS Foundation grants to provide students with ag education and skills to help feed a growing world.

The CHS Foundation has focused on developing agricultural leaders for more than 75 years. To celebrate its diamond anniversary, the foundation recently awarded $75,000 to the winning teachers to bolster ag education programs at their respective schools.

During the 2022 CHS Annual Meeting in December, attendees voted to award three top grants of $20,000, $15,000 and $10,000 to support experiential agricultural education and projects that align with the foundation's purpose. Another 12 honorable mention finalists received $2,500 each.

The foundation develops ag leaders for life by investing in innovative cooperative education projects, ag leadership programs, scholarships and university partnerships.

"It's a true privilege to support the incredibly important work of agriculture teachers as they educate and inspire the next generation of leaders for our industry," says Megan Wolle, CHS Foundation president. "The CHS Foundation has invested $84 million in developing a robust agricultural talent pipeline over its 75-year history, and we look forward to continuing those efforts for the next 75 years."

More than 140 teachers applied for grants in 2022. Meet the top award winners.

### Biotech Focus

First-year teacher Amelia Hayden at Osseo-Fairchild High School, Osseo, Wis., received the $20,000 first-place grant to help educate students about ag biotechnology.

As an agriculture instructor, Hayden says she has the best job in the world. Dairy science, horticulture and ag mechanics were traditionally taught (and still are) in her rural school district.

Hayden introduced a biotechnology course in 2022, hoping to inspire students — even those without ag backgrounds — about opportunities in agriculture.

"By providing students with biotechnological skills and knowledge, they are better equipped to work in every aspect of agriculture, from farming to agronomy to marketing to research," Hayden wrote in her grant application. "It will open up agriculture to a diverse set of students who never before considered agriculture careers."

Hayden's grant proposal was aimed at introducing students to CRISPR (clustered regularly interspaced short palindromic repeats) gene editing. Scientists use the technology to selectively modify the DNA of living organisms. For example, researchers use CRISPR to genetically modify crops to influence yield or become more drought-tolerant.

The grant will support the biotechnology curriculum and buy materials and laboratory equipment, including a thermal cylinder to make millions of copies of specific DNA sequences, upgrades to the school's greenhouse and a medical freezer. Students will perform plant science, gene editing and evaluation experiments.


*Instructor Amelia Hayden, center, hopes to inspire students to consider ag careers by teaching biotechnology.*

"I'm so grateful for the CHS Foundation for offering up this opportunity to ag teachers to allow us to [help] students and give them once-in-a-lifetime experiences and opportunities," Hayden says. >


*Ag instructor Desi Severance teaches students life skills like canning vegetables as part of the Wyndmere (N.D.) High School ag program.*

## > Students Learn Food Processing Skills

Producing and processing food at home, such as canning vegetables, is a waning skill in rural America. Families in the Wyndmere Public School district, Wyndmere, N.D., expressed those concerns, which inspired high school ag instructor Desi Severance to offer a new ag products and processing class.

The class sparked Severance to apply for a CHS Foundation teacher grant to outfit a mobile produce processing lab for the school, which will be shared with eight other school districts. The idea garnered the second-place award of $15,000, which will also be used to implement the ag processing curriculum.

"Almost all of us [area school districts] started planting orchards, school gardens and building high tunnel greenhouses within the last three years so soon there will be an excess of produce that some programs do not have the ability to deal with," Severance wrote in her grant application. "A mobile processing lab, along with supplements and a shared curriculum for an ag products and processing course, would help programs expose their students to the world of food preservation.

"Anytime we can get our students to get their hands dirty and delve into the process of anything hands-on, we are igniting the spark of interest in them," she continued. "Learning different methods of freezing, canning and trying recipes for different products is an experience not many receive at home anymore."

Severance says she hopes the experience will encourage students to process and consume homegrown food and consider careers in food science and food production.

The new semester-long ag processing course focuses on fruits, vegetables, honey, dairy products, cereal grains, fiber products and more. The mobile processing lab will put learned skills to use.

# Here's to the Future of Agriculture

Since 1947, the CHS Foundation has supported students and ag leadership programs — within and beyond the classroom — to strengthen the ag talent pipeline.

"We take seriously our role as the giving arm of the leading farmer-owned cooperative," says Megan Wolle, president, CHS Foundation. "It's our responsibility and privilege to support programs that get students interested in ag careers."

With CHS Foundation support, thousands of students have learned about agriculture, starting in elementary school through programs like National Agriculture in the Classroom and cooperative education camps. While students engage in camp staples like canoeing and campfires, they also create cooperatives, learn how co-ops work and hear about cooperative careers.

As students explore careers through middle school and high school, the CHS Foundation continues its support through FFA, 4-H and other youth programs. At the collegiate level, the foundation supports 225 scholarships each year for students studying agriculture at 25 colleges and universities and helps fund cutting-edge research and curricula.

"CHS Foundation investments in the future of agriculture are broad — just like the industry we support," says Wolle. "We need to help develop a robust pipeline of individuals across multiple disciplines in agriculture from agronomy and precision ag to finance and information technology."

*— Tera Stoddard*

The grant will help buy a 7-by-16-foot trailer, a freeze-dryer starter kit, an apple grinder and fruit press, canning equipment, knives and other equipment. More than 150 students are expected to use the lab and benefit from the learning experience.

"This mobile processing lab will allow us to take [what's produced from] our gardens and orchards and allow us to go to the next level. [Students will] really experience the food science side that sometimes gets forgotten," Severance says.

**The following honorable mention finalists each received $2,500 from the CHS Foundation to support their experiential ag education programs.**

**Kevin Cross**, Sullivan High School, Sullivan, Ind. — tractor for school farm

**Breanna Pastir**, Southeast Region Career and Technology Center, Wahpeton, N.D. — hydroponic plant growth chambers

**Shannon Miller**, R.L. Turner High School, Carrollton, Texas — hands-on farm experience for elementary students

**Kally Koch**, Riverdale Schools, Muscoda, Wis. — corn/soybean planter

**Justin Mills**, Woodbine Community Schools, Woodbine, Iowa — more hogs and goats at school farm

**Eric Sawatzke**, West Central Area High School, Barrett, Minn. — meat processing lab

**Adam Riddle**, North Valley CTC, Drayton, N.D. — vet science program improvements

**Natalie Utsch**, Paynesville Secondary School, Paynesville, Minn. — new irrigation system

**Elizabeth Johnson**, Tracy High School, Tracy, Minn. — aquaponics equipment to grow fish and plants

**Andrew Boersma**, Wolsey-Wessington School, Wolsey, S.D. — welding shop renovation

**Duane Melton**, Republic School, Republic, Mo. — swine barn restoration

**Julia Scolari**, Coquille Junior/Senior High School, Coquille, Ore. — agriculture program start-up

**LEARN MORE:** See how the CHS Foundation is helping develop future ag leaders at chsfoundation.org.

*Ag teacher Andrew Jensen opens urban students' eyes to agriculture in Sioux Falls, S.D., as he introduces them to new career paths.*

## Opening Eyes to Ag

Agriculture is the number one industry in South Dakota, but many students in the state's largest school district know very little about farming, ranching and other ag industries. The Sioux Falls School District, with the help of the CHS Foundation, is working to change that.

Ag instructor Andrew Jensen was awarded the third-place grant of $10,000 to get the urban district's new ag program off the ground. Students from the city's four high schools will attend ag classes — natural resources, small animal science, agricultural leadership, etc. — during the inaugural year through the district's Career and Technical Education Academy. An FFA program is also being started.

"We have noticed our students have a disconnect between where their food comes from and eating it," Jensen says in his grant application. "The funds will provide the foundation for our ag program and will allow students to jump into plant science and animal science pathways and provide the instructional materials we need."

Jensen titled his grant proposal "Cultivating Our Future," and it will do just that. Besides curriculum and material assistance, the funding will help buy a movable high-tunnel structure and related equipment to increase the ag program's ability to grow plants, extend the growing season and provide hundreds of students with hands-on experiences in horticulture and plant science.

Funds will also be used to purchase a farrowing pen, rabbit hutches, wireless cameras and other equipment to help raise and observe animals. Students will benefit from putting what they learn in small and large animal science classes to practical use.

"The ability to farrow pigs and raise rabbits will allow students to connect with potential careers in veterinary sciences, food production and much more," says Jensen. "The addition of livestream cameras will give students across the district a peek inside a world many have never seen before," including elementary and middle-school students. ■

# Laying a Foundation for a Sustainable Future

CHS owners have the opportunity now to make changes that will build a stronger, more sustainable equity program for the owners who will lead this industry and CHS into the future.

## The Challenge

As many of you have heard over the past year, the CHS Board of Directors has identified challenges with the current CHS equity program. In short, CHS is issuing allocated equity faster than it can redeem that equity. Since 2007, the amount of allocated equity — equity assigned to specific owners — has nearly tripled to about $5.4 billion. At the same time, the Board has too few tools and too little flexibility to manage equity in a way that will serve the best interests of CHS and its owners.

If we continue without changes to our equity program, there will be several implications, including the expectation that time to redeem equity would increase and could eventually grow to many decades. That would make CHS equity less valuable to owners. This situation is not sustainable.

## Proposed Solution

After months of reviewing the equity program, consulting with experts within and outside CHS, benchmarking how other cooperatives manage equity and speaking with CHS owners, the Board has decided to bring a proposed solution to owners at the 2023 CHS Annual Meeting in December. In particular, the Board has identified two updates to the CHS Bylaws that would provide a more sustainable approach to equity management:

- Allow earnings before taxes to be reduced by the amount of preferred stock dividends paid when calculating patronage (similar to how interest expense is treated for patronage calculation purposes).
- Give the CHS Board the necessary flexibility to manage equity by allowing a holdback each year of up to 35%, instead of the current holdback maximum of 10%. The holdback percentage — from zero to 35% — would be determined annually by the Board based on circumstances at the time.

Two important notes: These changes would not impact the amount of cash CHS generates or returns to owners in a given year. And the changes would only impact future equity issued — currently allocated equity would not be redeemed faster or slower if the proposed changes go into effect.

You may have heard the Board's original proposal was to allow a holdback of up to 45%. After hearing feedback from some owners who said they would be more comfortable with a lower maximum holdback, the Board decided on the final proposal to allow a holdback range of zero to 35%. The Board believes this level helps address the equity challenges and balances the range of input we received from CHS owners.

## Next Steps

We are sharing the proposed solution now so owners have time to consider the proposal and make an informed decision at the 2023 CHS Annual Meeting.

We welcome your questions and comments. Please reach out to any CHS Board member, attend a CHS owners forum this summer and visit **chsinc.com/equity** to learn more.

Thank you for supporting the cooperative system and CHS. We look forward to continuing to work together to create strength that will serve current owners and future generations of owners. We are committed to creating connections to empower agriculture today and tomorrow.

Dan Schurr
Chair
CHS Board of Directors

David Johnsrud
Chair
CHS Capital Committee


With all the uncertainties in farming, you need the right broker on your side. One who understands your operation, risk tolerance and opportunities. At CHS Hedging, our experienced advisors offer insightful advice backed by deep market intelligence. So you grow more and worry less. Learn about professional pricing, customized marketing plans and more at **chshedging.com.**

CHS Hedging

# CHS REPORTS SECOND QUARTER EARNINGS

CHS Inc. has reported net income of $292.3 million for its second quarter of the fiscal year that ended Feb. 28, 2023, compared to $219.0 million in the second quarter of fiscal year 2022.

For the first six months of fiscal year 2023, the company reported net income of $1.1 billion and revenues of $24.1 billion compared to net income of $671.0 million and revenues of $21.2 billion recorded in the first half of fiscal year 2022.

Key financial drivers for Q2 were:

- Revenues of $11.3 billion compared to $10.3 billion in the second quarter of fiscal year 2022, a year-over-year increase of 9%.
- Strong refining margins and market conditions in our refined fuels business drove significantly improved earnings in our Energy segment.
- Decreased prices for agronomy products and ethanol contributed to lower earnings in our Ag segment.
- Our CF Nitrogen investment delivered solid earnings due to strong global demand for urea and UAN, although selling prices for those products have decreased.

"Strong global demand for commodities and improved market conditions for refined fuels led to increased earnings for the quarter, as well as the first half of the fiscal year," says Jay Debertin, president and CEO of CHS Inc. "The strength of our diversified portfolio offset margin pressures experienced within our Ag segment, particularly wholesale and retail agronomy products. Looking ahead, we will continue to invest on behalf of our owners in infrastructure, supply chain capabilities and innovative technology throughout our expansive global network to maximize value for our member cooperatives, farmer-owners and customers."

**Energy:** Pretax earnings of $264.8 million for the second quarter of fiscal year 2023 represent a $254.0 million increase versus the prior year period and reflect:

- Higher refining margins resulting from increased global demand, favorable pricing on heavy Canadian crude oil and improved market conditions for refined fuels.
- Higher propane margins driven by global markets and price volatility.
- Higher prices for renewable energy credits that partially offset higher margins.

**Ag:** Pretax losses of $81.6 million represent a $136.7 million decrease in earnings versus historically strong earnings in the prior year period and reflect:

- Lower margins due to market-driven price decreases across most Ag segment categories, including wholesale and retail agronomy products and renewable fuels.
- A reduction in oilseed processing margins due to the timing of the impact of mark-to-market adjustments.

**Nitrogen Production:** Pretax earnings of $81.7 million represent a $72.5 million decrease versus the prior year period due to lower equity income from CF Nitrogen attributed to a decrease in urea and UAN selling prices.

**Corporate and Other:** Pretax earnings of $48.0 million represent a $37.5 million increase versus the prior year period and reflect increased interest income resulting from higher interest rates, as well as improved equity income from our Ventura Foods joint venture, which experienced more favorable market conditions for edible oils.

## CHS INC. EARNINGS* BY SEGMENT (in thousands $)

| | Three Months Ended February 28 | | Six Months Ended February 28 | |
|---|---|---|---|---|
| | 2023 | 2022 | 2023 | 2022 |
| Energy | $264,822 | $10,832 | $661,416 | $80,021 |
| Ag | (81,566) | 55,181 | 205,733 | 341,606 |
| Nitrogen Production | 81,733 | 154,257 | 178,606 | 250,840 |
| Corporate and Other | 48,033 | 10,557 | 84,737 | 25,023 |
| Income before income taxes | 313,022 | 230,827 | 1,130,492 | 697,490 |
| Income tax expense | 20,974 | 11,931 | 55,528 | 26,651 |
| Net income | 292,048 | 218,896 | 1,074,964 | 670,839 |
| Net (loss) attributable to noncontrolling interests | (273) | (104) | 45 | (122) |
| **Net income attributable to CHS Inc.** | **$292,321** | **$219,000** | **$1,074,919** | **$670,961** |

**Earnings is defined as income (loss) before income taxes.*

## CHS AND MKC TO EXPAND GRAIN MARKETING JV

CHS Inc. and Mid-Kansas Cooperative (MKC) recently announced intentions to expand their current grain marketing joint venture in 2023. The deal will improve the cooperative supply chain in the Southern Plains, expand market access and bolster patronage-eligible options for farmers.

"This initiative expands our collaborative presence and maximizes our complementary asset base in the region to create an efficient, integrated supply chain to connect cooperative- and farmer-owners in the Southern Plains with customers around the world while leveraging the TEMCO terminal in Houston, Texas," says John Griffith, executive vice president, ag business, CHS.

The two companies are currently building a rail-served grain terminal near Sterling, Kan., that is scheduled to be operational in 2024. Both companies will continue to independently own and operate assets throughout the region.

CHS and MKC have worked together for 10 years. "Our track record of successful partnership and shared vision to create value for cooperative-owners and customers makes MKC and CHS the right partners to link farmers with a more defined southern supply chain," says Brad Stedman, president and CEO, MKC.

## CHS OWNERS TO ACT ON PROPOSED BYLAWS AMENDMENTS

Two groups of proposed CHS Bylaws changes will be brought to CHS owners at the 2023 CHS Annual Meeting in December:

**Equity management:** The CHS Board has identified the need to make changes to our equity management program to ensure it remains valuable to owners. Learn more on page 26.

**CHS Board representation:** Amendments would adjust the number of CHS Directors per region to better reflect the CHS ownership base. Learn more at **chsinc.com/amendments**.

## PLAN TO ATTEND CHS OWNERS MEETINGS

**2023 CHS Owners Forums**

Join us at a 2023 CHS owners forum for business and financial updates, plus information on equity management at CHS. Register at **chsinc.inc/owner-events**.

July 20: Bemidji, Minn.
July 24: Bismarck, N.D.
July 27: Indianapolis, Ind.
July 31: Madison, Wis.
Aug. 3: Laurel, Mont.
Aug. 4: Pasco, Wash.
Aug. 8: McPherson, Kan.
Aug. 10: Ames, Iowa
Aug. 11: New Ulm, Minn.
Aug. 11: Virtual forum
Aug. 24: Mitchell, S.D.

**Future Events**

Dec. 5-6
2023 CHS New Leaders Forum
Minneapolis, Minn.

Dec. 7-8
2023 CHS Annual Meeting
Minneapolis, Minn.

**GET MORE:** Sign up to receive CHS press releases by email or RSS feed at chsinc.com/news.


*A CHS Foundation grant is helping high school sophomore Ella Braker, left, reach her goal of someday owning the floral business owned by her mom, Heidi Braker.*

# FLOWERS IN THE FAMILY

Ella Braker has always loved being part of the floral business. "Flowers are fun and bright and always make someone's day a little better," she says.

A sophomore in high school, Braker works evenings and weekends at Rens Floral in Waupun, Wis., which is owned by her mother, Heidi. And she's now doing more than just working there — she's saving money to buy shares of the business, with the goal of owning it when her mom retires someday.

A grant from the CHS Foundation is helping her reach that goal. As an FFA member, she's required to complete a supervised agricultural experience (SAE), a student-led project intended to develop business and personal skills. A $1,000 SAE grant from FFA, funded by the CHS Foundation, will allow her to increase her current 2% ownership share of the business to 4%, which means she pays the expenses and receives the income for her shares.

"It means a lot to have support to build this business," she says.

At age 16, Braker is already bringing valuable skills to Rens Floral, helping her mom track expenses and income online and improving the shop's website and social media presence.

Her plans right now are to go to college, study business and floral design and return to Waupun to learn more about the family business. "Seeing how much my mom loves her job inspires me to do something like that with my life," she says.

*— Amy Sitze*

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## C TOMORROW

### One Plant at a Time

Spot-spraying weeds with autonomous drones has the potential to be a game-changing technology that will help the environment and reduce costs on the farm.

Canadian-based startup Precision AI plans to use advanced drones and custom-built artificial intelligence (AI) technology to precisely apply herbicides at a broadacre scale. Targeted spraying helps improve crop protection results while reducing chemical and water use.

Precision AI won the 2023 Innovation Challenge during the annual World Agri-Tech Innovation Summit. Cooperative Ventures, the venture capital fund launched by CHS and Growmark, sponsored the event.

"Stable, drift-free drone technology that provides aerial diagnostic and precision spray capabilities at 50-plus miles per hour will help CHS owners and customers maintain or increase yields with fewer inputs," says Ben Van Straten, director of sustainability and innovation at CHS. "Achieving this technology at scale is a major win for growers."

Precision AI technology takes crop production decisions from the field to individual plants, while removing reliance on remote internet connectivity.

Winning the Innovation Challenge gives Precision AI access to CHS and Growmark expertise and provides opportunities for trials and further collaboration.

"I am excited to work with CHS and Growmark. I think the strategic fit is fantastic and we can do wonderful things together," says Dan McCann, CEO of Precision AI.

*— Patrick Stumpf*

*Photo: Precision AI*

*Through Cooperative Ventures, CHS is supporting development of targeted application technology using drones.*