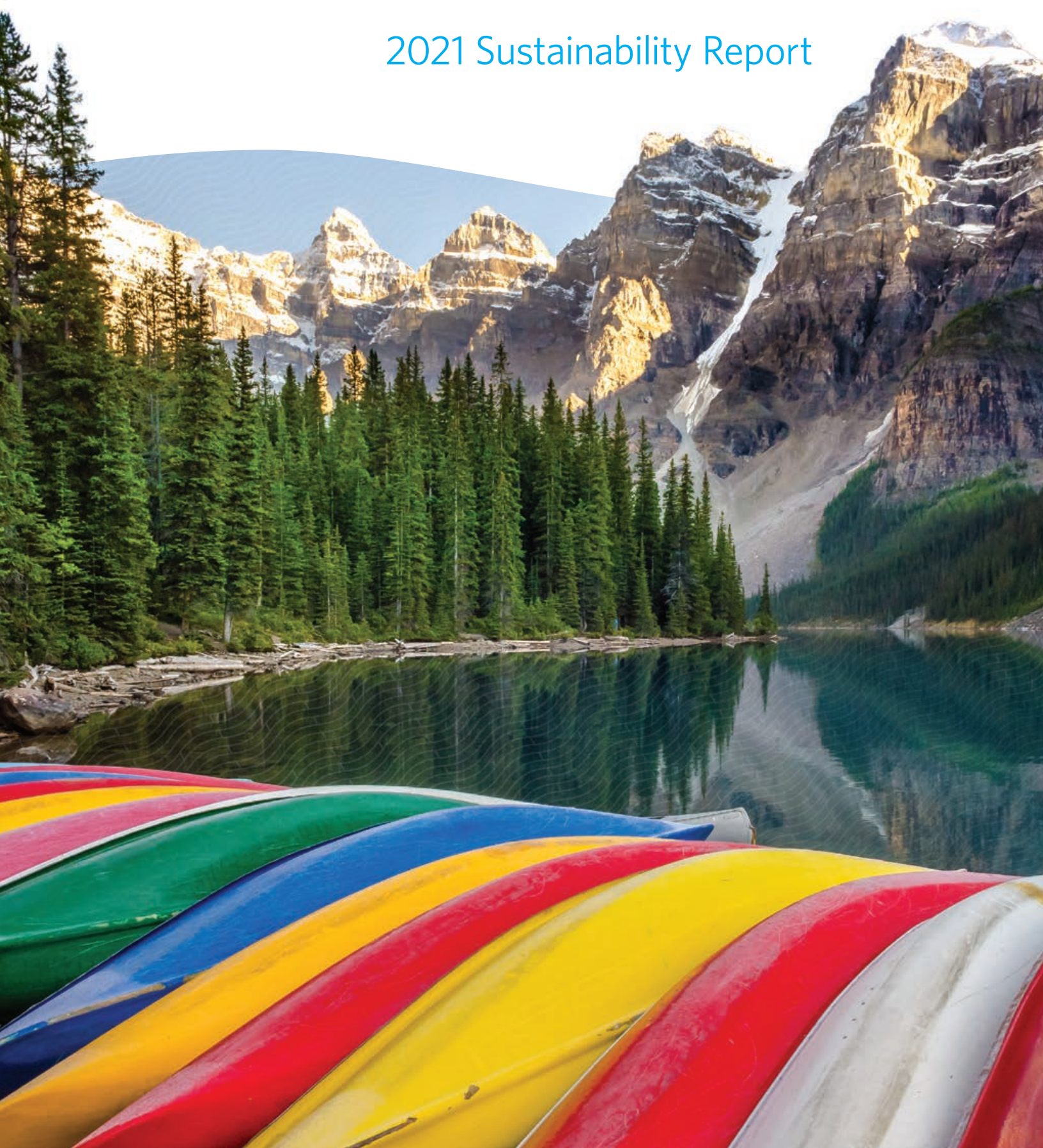




Commitment to a Sustainable Future

2021 Sustainability Report



2 Introduction

4 Environmental Stewardship

- 4 Energy Efficiency and Emissions Reduction
- 6 Carbon Capture Technologies
- 7 Water Management
- 8 Waste Reclamation and Recycling
- 9 Conservation and Reclamation

10 Health & Safety

- 10 Safety Record
- 11 Immersive Learning Programs
- 12 Industry Collaboration
- 15 Advancing Process Safety Sub-Programs
- 15 Occupational Safety Programs
- 17 Spotlight on Pipeline Safety
- 18 Sharing Safety Practices
- 19 Supporting Community Safety

20 Thriving People & Communities

- 20 Jobs and Economic Impact
- 21 Promoting Diversity, Equity and Inclusion
- 22 Investing in STEM Education
- 24 Supporting Skills Training
- 25 Community Engagement
- 26 Community Advisors
- 28 Giving Back

30 Driving Progress

- 30 Renewable Diesel
- 32 Sustainable Aviation Fuel
- 33 Pushing Innovation
- 34 Sustainable Recycling of Plastics
- 36 Path to Plastic Recycling

38 Policies to Drive Progress

- 38 Climate Change Principles
- 38 Carbon Capture, Utilization and Storage
- 39 95-RON Fuel Standard
- 40 Plastic Waste Principles

42 References

43 Information Resources

A Message from the President and CEO of AFPM

America's refiners and petrochemical manufacturers play an irreplaceable role in not only making modern life possible today, but for making our collective future more sustainable.

From the jet fuel that delivered lifesaving COVID-19 vaccines all around the world and the gasoline that brought us closer to loved ones after months apart, to the petrochemicals in the face masks and vaccine syringes that have helped keep us healthy, these industries have quietly and consistently delivered the products the world has needed to be healthy, safe and more connected in these turbulent times.

America's refiners and petrochemical manufacturers have shown up for their people and their communities in more ways than ever. They have adapted processes and protocols to keep their people safe in the midst of COVID-19, remaining among the safest of all manufacturing sectors tracked by the Bureau of Labor Statistics. They continued to implement new technologies and processes to reduce emissions and lessen their impact on the environment. They cultivated more diverse, inclusive and equitable workplaces for people within the workforce today and invested in the education and training of the workforce of tomorrow. And they continued to be anchors of their communities, forging strong, transparent partnerships with their neighbors and giving back through volunteerism and financial support.

AFPM's members are not standing still either. They are evolving to meet the needs of future generations. They are investing in technologies and products that will lead to a lower carbon future — developing lower carbon fuels like renewable diesel and sustainable aviation fuel and driving large scale carbon capture projects, technologies that have, according to the U.N. Intergovernmental Panel on Climate Change, the potential to substantially reduce global

emissions. They are also making breakthroughs in advanced recycling, making new investments, and forging new partnerships to scale these promising technologies. Today, we are seeing the fruits of this labor with more products made of recycled plastic on our shelves than ever before.

Throughout the pages of this report, you will see tangible examples of the refining and petrochemical industries' commitment to sustainably providing the vital products society needs to thrive today and for decades to come. This ingenuity, creativity, dedication and resilience are hallmarks of these industries, and I'm proud to be a part.



A handwritten signature in black ink, which appears to read 'Chet M. Thompson'.

Chet M. Thompson
President and CEO

American
Fuel & Petrochemical
Manufacturers



The U.S. refining and petrochemical industries are committed to providing the products that growing global populations need to thrive, and to do so sustainably.



Environmental Stewardship

Our commitment to sustainability means being responsible stewards of the environment and doing more with less by reducing emissions, conserving energy, using water efficiently, preserving land and reducing waste to protect the climate, air, water and land around us today and for generations to come.



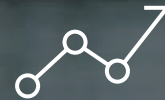
Health and Safety

Our commitment to sustainability means fostering a strong culture of safety throughout our industries and our communities, building on the progress that has led to our industries to be among the safest of hundreds of industries within the manufacturing sector.



Thriving People and Communities

It's about helping people and communities thrive by providing well-paying, family-supporting jobs for people of all backgrounds, building a more inclusive and diversified workforce and investing in education and training to prepare people of all education levels and skill sets for jobs in our industries. It's about being good neighbors — fostering open and transparent communications, supporting and investing in our communities and minimizing the impacts from our facilities to these communities.



Driving Progress

Finally, our commitment to sustainability is about working to address climate change and the management of plastic waste while continuing to provide products that enhance the standards of living for billions of people around the world. And it's about pushing beyond the status quo, driving innovation that will lead to the products and the processes that will help us tackle society's greatest challenges and make life better, safer and more productive.

The U.S. fuel and petrochemical industries are committed to doing more with less and continually investing in ways to operate more efficiently. Our companies are actively working to reduce emissions, manage water and other natural resources more efficiently, reduce waste and conserve the lands and ecosystems that surround us.

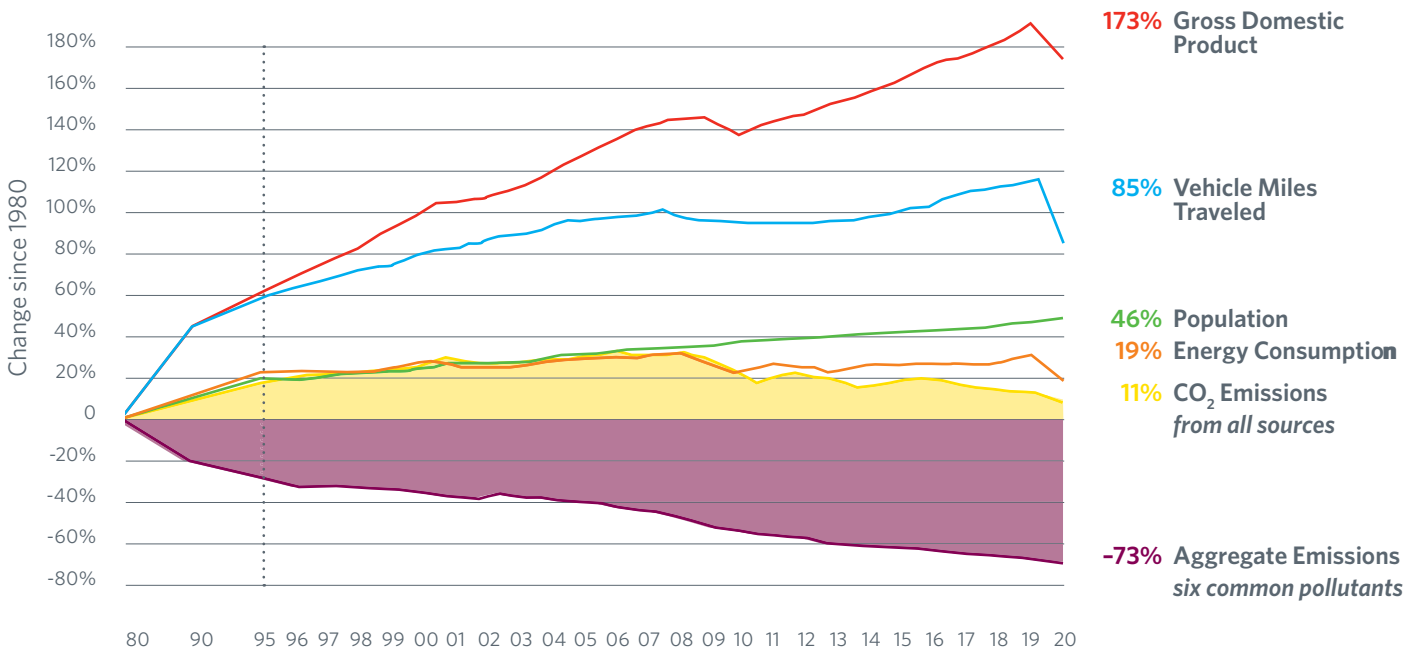
Environmental Stewardship

Energy Efficiency and Emissions Reduction

In the last decade, U.S. refineries have invested more than \$100 billion to improve refinery efficiency, reduce emissions and produce cleaner fuels.¹ As a result, we have dramatically reduced our emissions; in fact, the reported total U.S. carbon intensity of operating refineries decreased by 12 percent during this period.² And despite the historic expansion of the U.S. petrochemical sector, U.S. petrochemical greenhouse gas (GHG) emissions have remained relatively flat.³

Industry is setting its sights even higher with companies making historic commitments to significantly reduce emissions over time. While the roadmaps to these reductions differ across companies, our industries are collaborating with each other, with government, academic institutions and non-governmental organizations (NGOs), among others, to innovate and scale promising technologies that have the potential to drive even more significant emissions reductions.

Comparing Growth and Emissions 1980-2020⁴





\$100 billion

In the last decade, U.S. refineries have invested more than \$100 billion to improve refinery efficiency, reduce emissions and produce cleaner fuels.



Since 1997, **Flint Hills Resources (FHR)** refineries has reduced emissions by 70 percent.⁵ In addition to efforts to reduce emissions inside its facilities, FHR's Pine Bend refinery is a founding sponsor of Project Green Fleet, a collaborative effort with Environmental Initiative to install pollution control equipment in thousands of Minnesota school buses, heavy-duty trucks and other diesel vehicles. Since the effort was kicked-off in 2005, Project Green Fleet has modified more than 3,200 Minnesota school buses and 1,300 diesel trucks with improvements that reduce diesel emissions and help keep Minnesota's air clean.⁶



In 2020, **HollyFrontier's** Woods Cross refinery launched a program aimed at minimizing time from leak detection to repair and reducing the overall total of fugitive emissions.⁷ The program deployed a network of sensors throughout the plant that detect emissions leaks and transmit real-time data, including wind information, to help identify, locate and categorize emissions, enhancing leak detection and repair efforts in the refinery.



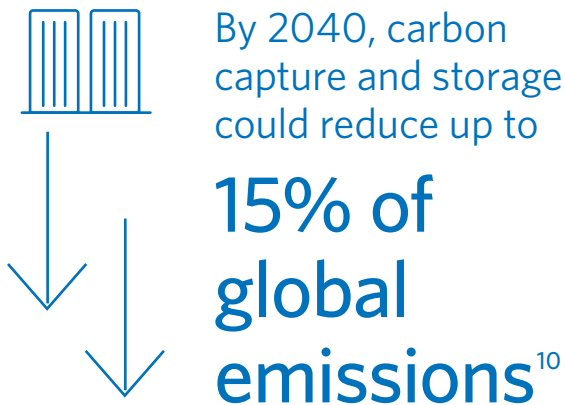
Fueled by natural gas, **Valero's** cogeneration plants reduce reliance on local power grids. In addition, expanders installed in processing units generate power from exhaust gases. Combined, Valero's cogeneration systems and expanders are designed to offset approximately 300 megawatts of electricity annually, enough to power the homes of a city the size of San Francisco.⁸



Companies across the refining and petrochemical industries are investing individually and partnering together, and with NGOs, to advance the deployment of carbon capture technologies to reduce emissions.

Carbon Capture Technologies

Our companies are investing in and advancing breakthrough technologies, including carbon capture, sequestration and utilization. Carbon capture and storage (CCS) could reduce up to 15 percent of global emissions by 2040, and global decarbonization efforts are estimated to double in cost without CCS, according to the U.N. Intergovernmental Panel on Climate Change (IPCC).⁹



- In September 2021, nearly a dozen companies – including AFPM members **Chevron, Dow, ExxonMobil, INEOS, LyondellBasell, Marathon Petroleum, Phillips 66** and **Valero** – announced their interest in supporting the large-scale deployment of CCS technology in Houston. Early projections indicate that infrastructure could be built to safely capture and store about 50 million metric tons of CO₂ annually by 2030 and about 100 million by 2040, which would significantly reduce CO₂ emissions in one of the country’s largest concentrated sources of industrial emissions. The Houston-area facilities these companies operate produce energy and household products critical for modern life. This is on top of existing efforts, including Chevron’s investment of more than \$1 billion in carbon capture, utilization and storage (CCUS) research and development to reduce carbon emissions in Australia, Canada, UK, Norway and the EU.¹¹
- In March 2021, **Valero** and BlackRock Global Energy & Power Infrastructure Fund III announced a partnership with Navigator Energy Services to develop a large scale carbon capture and storage system that would connect eight of Valero’s ethanol plants to a 1,300 mile carbon capture pipeline across five states with the capability to reduce the carbon intensity of ethanol by more than 40 percent and contributing to a substantial reduction of Valero’s GHG emissions.¹²
- **Air Liquide, Air Products** and **Baker Hughes** are part of the **Carbon Capture Coalition**, a nonpartisan collaboration that builds support for carbon capture, transportation, utilization and removal across industries. The coalition includes more than 80 businesses and organizations, including the AFL-CIO, National Farmers Union and National Wildlife Federation.¹³

Water Management

Water — used in the cooling towers and boilers that keep refining and petrochemical plants safe — is critical to the production of fuels and petrochemicals. Our members recognize that water is a precious resource and work to reduce our impact on the local watershed and community, especially in water-stressed areas.

Advanced technologies that efficiently separate oil from water are instrumental in enabling our industries to conserve water use through recycling and reclamation. As a result, today, as much as 70 percent of the water used in both the refining processes and landscaping at certain facilities is now being recycled or reclaimed.¹⁴ Our members continue to pilot new technologies to reduce overall water usage and identify more efficient water sourcing opportunities.



Phillips 66 is piloting the use of closed-circuit reverse osmosis (CCRO) at certain facilities. CCRO is known for its ability to recover significantly more clean water than conventional reverse osmosis, reducing wasted water by up to 75 percent.¹⁵

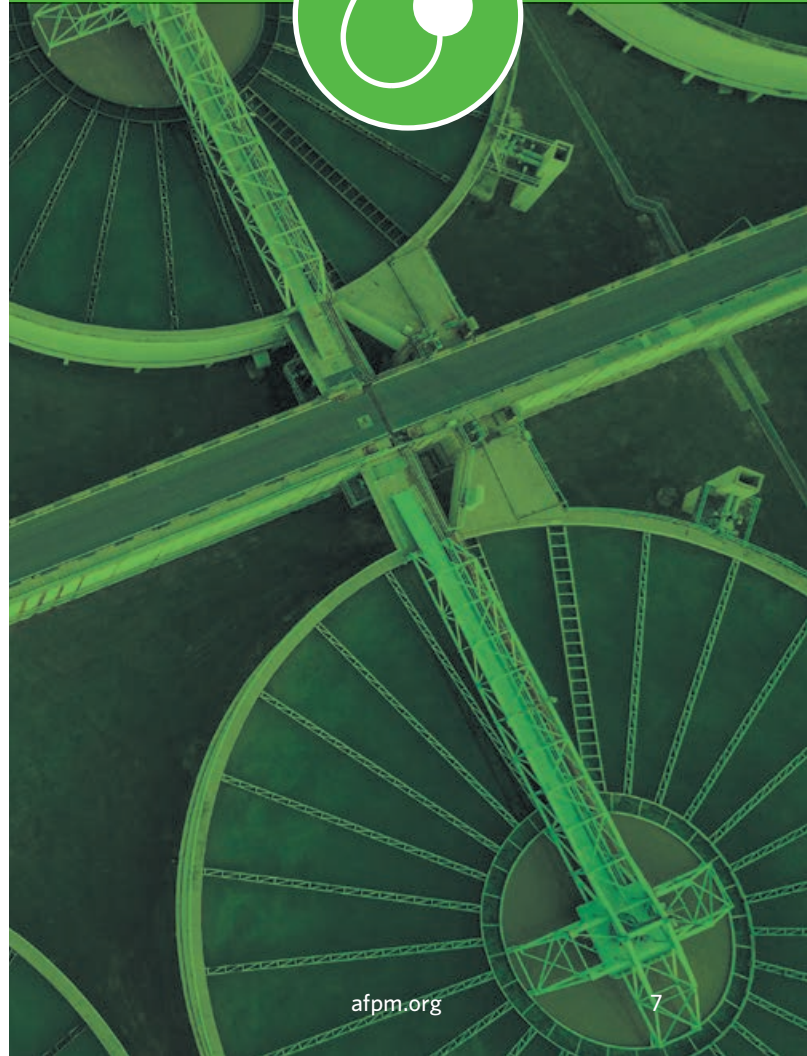


HollyFrontier is integrating technologies that enable water condensate, which was previously uncollectable, to be recaptured and reused, decreasing the overall reliance on fresh water by about 10,000 to 170,000 gallons per day.¹⁶



At its Lake Charles refinery, **CITGO** developed a closed-loop system in which used water that has been stripped of hydrocarbons is reprocessed in waste units and reused elsewhere in the facility. This system resulted in a water savings of more than three billion gallons between 2009 and 2019.¹⁷

Water — used in the cooling towers and boilers that keep refining and petrochemical plants safe — is critical to the production of fuels and petrochemicals.



Waste Reclamation and Recycling

Our members have introduced numerous initiatives to recover and recycle oil tank waste and various precious or rare earth metals. Through the use of new product designs and technologies, our members are reusing and recycling materials into products that take on a new life. Specifically, as rare earth metals have become an increasingly valuable commodity, our members are finding ways to recover them.

- One of **PBF Energy's** most important reuse and recycling programs involves reusing catalysts that are foundational to the refining process, including platinum, nickel, cobalt and molybdenum. At the end of a catalyst's life, its materials are recovered by precious metals reclaimers. These metals can then be reused to produce new catalysts and reduce the need for virgin metals to be extracted from mines.¹⁸

- **BASF** is investing millions of dollars at its Seneca, South Carolina, plant to recycle precious metals from spent catalysts, such as automotive catalytic converters, that can be used in a variety of products for everyday life. These recycled metals have as much as 90 percent lower CO₂ emissions than metal from primary mines.¹⁹
- **CIRCON Environmental's** 2021 operations repurposed 121,719 tons of hazardous tank residual waste from cleaning operations and various nonhazardous wastes into 20,327,073 gallons of waste-derived fuel for use as a heat source in U.S. cement kilns, displacing the need for 68,163 tons of coal, providing a net carbon offset of 292,126 tons and preventing 60,860 tons of residual-waste ash from being landfilled. This year they will introduce an annual Sustainability Leadership Awards Program to celebrate and spotlight achievements of companies in the refining sector that have made sustainability a priority throughout their operations.²⁰



Rare earth metals — like platinum, nickel, cobalt and molybdenum — have become an increasingly valuable commodity and our members are finding ways to recover them.

Conservation and Reclamation

Our members support and sponsor numerous wildlife conservation and biodiversity protection initiatives. Partnering with local communities and non-profit organizations, and through independent company efforts, we work to protect the environment in our communities and host education and engagement programs on conservation.



Dow is working with **The Nature Conservancy (TNC)** and other public and private organizations to build climate-resilient, cost-effective infrastructure solutions in and around coastal areas. To tackle physical climate risks associated with water reliability, Dow and TNC will be working with, in and around our most water-stressed sites — starting with the U.S. Gulf Coast — to identify and implement watershed-level projects aimed at improving both water quality and water quantity in the region.²¹



Eastman partnered with **The Longleaf Alliance (LLA)** to plant 60,000 longleaf pine seedlings at Torreya State Park in Florida. The plantings will help restore an important ecosystem that provides a habitat to endangered species previously devastated by Hurricane Michael in 2018.²³



Cenovus's Caribou Habitat Restoration Project, the largest of its kind in the world, aims to restore up to ~2,500 miles of linear disturbance and plant up to 5 million trees in Canada to restore the habitat of woodland caribou, a threatened species.²⁴



Albemarle received the 2020 Wildlife Habitat Council Pollinators Project Award for its conservation efforts to protect a pollinator garden in Kings Mountain, North Carolina. Albemarle employees helped plant a 2,000 square-foot pollinator garden that provides a habitat for essential pollinators like the monarch butterfly.²²



Nothing is more important to our industries than the safety of workers and communities. As we strive for zero injuries and incidents, our commitment to safety goes beyond upholding codes and standards that guide company operations — it is embedded in our culture and instilled in every employee from the day they set foot on the job. Together, we collaborate to promote and improve safety across our companies, steadily driving down safety incidents year over year.

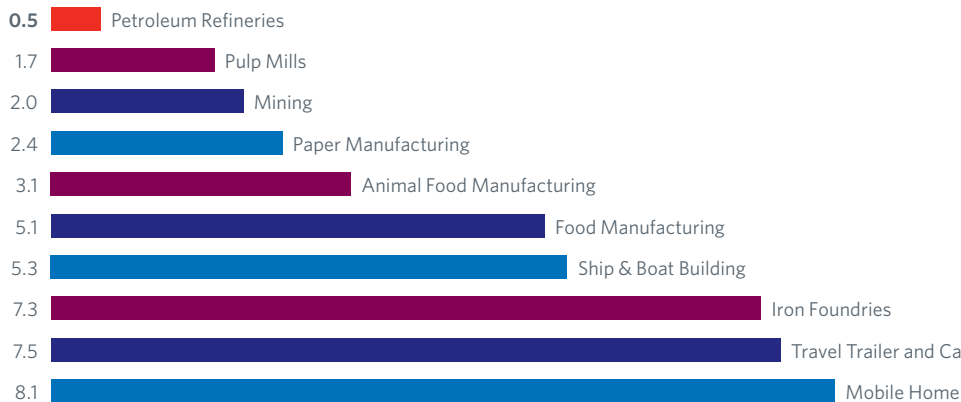
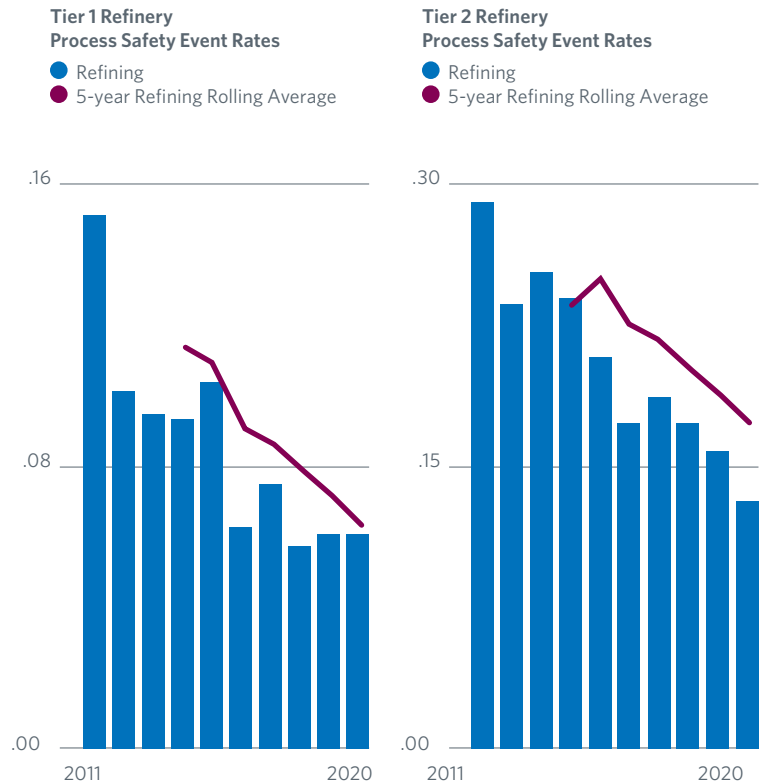
Health & Safety

Safety Record

Our industries have led a 30-year decline in rates of injury or illness, underscoring the rigorous safety methods put in place by AFPM and our members. In the last ten years alone, process safety events have decreased by 60 percent at refineries and by roughly 50 percent at petrochemical facilities.²⁵ We are proud that our members are continuously lauded for their individual efforts on safety, which collectively help us achieve industry-wide results.

Over the past 20 years, the refining and petrochemical industries have consistently had the lowest rates of injury and illness among all of the manufacturing sectors.²⁶ In 2020, refining ranked 5th out of 503 industries behind computer chip manufacturing.

Process Safety Event (PSE) Rates



Incidence Rates of Non-Fatal Injuries or Illnesses Among Manufacturing Sectors

The Refining Industry Ranked 5th out of 503 Manufacturers for the Lowest Rates of Injury and Illnesses (per 100 full-time employees)

Bureau of Labor Statistics; Industry, Injury, and Illness Data 2020, Summary Table 1. The Bureau of Labor Statistics did not collect injury and illness data on the petrochemical manufacturing industry for 2019.



Immersive Learning Programs

The AFPM Training & Immersive Learning Committee provides a forum to share knowledge around the quickly evolving area of immersive learning. This includes highly interactive technologies like virtual and augmented reality to improve performance and safety, while also reducing training time. This group developed the first AFPM virtual reality (VR) simulation, a complex training tool replicating the process for lighting a fired heater from a cold start — a key facility operation for which hands-on, in-the-field training is difficult due to the potential consequences of inaccurate execution.




Health & Safety Spotlight

Industry Collaboration Drives Incident Rates at Refineries and Petrochemical Plants to Record Lows

The refining and petrochemical industries consistently join forces to ensure that their facilities promote the very safest industry standards for employees and community members alike. To support our goal of zero injuries and accidents, AFPM drives and facilitates these joint efforts by providing an array of process, occupational safety and immersive learning programs.

In the last 10 years, process safety events have decreased by 60% at refineries and by roughly 50% at petrochemical facilities.²⁷



In 2010, despite fuel and petrochemical manufacturers making significant improvements in the safety of their individual operations, there was an uptick in serious incidents. Jerry Wascom, **ExxonMobil's** Americas refining director, turned to his counterparts within AFPM and asked how the industries could better protect people.

That conversation led to a paradigm shift in the industries' approach to safety through a groundbreaking new program called Advancing Process Safety (APS). The data-driven program ushered in a new era of collaboration among the nation's refining and petrochemical companies. Today, it is considered a key driver behind a more than 50 percent reduction in incidents since 2011.

"We were very clear about our intentions," Wascom recalls. "This was not a public relations program or an effort to calm the regulators. This was 100 percent about getting better at what we do."

At the age of 18, Wascom started his career on the refinery floor as a laborer and had intimate knowledge of facility operations. He knew this shift in how

the industry approached safety required a collective push. One of his early collaborators was Jim Mahoney, then executive vice president of operations at **Koch Industries**, who immediately saw the value.

"There's nothing more important than protecting people," said Mahoney, who also served as chairman of the AFPM board from 2012 to 2014.

"We decided to come together as an industry and make a commitment to share information to reduce incidents. If we could share information and learn from each other, then we could take our performance as an industry to another level.

In a highly competitive business landscape, where information is often proprietary, Wascom and Mahoney argued that safety should not be. And to ensure that mistakes weren't repeated at a refinery or petrochemical plant in a different company, the industry had to start collaborating.

Today, more than 200 companies have drawn on APS resources and more than 3,500 employees have directly participated in program activities. The vast toolkit of resources that is now available was never envisioned by the

roughly 20 representatives from various fuel and petrochemical companies who first gathered in a conference room in 2010.

The learnings from APS aren't isolated to the fuel and petrochemical industries. AFPM shares information with the independent government agency in charge of investigating industrial incidents to foster smoother, more effective collaboration around the shared goal of keeping people safe. Thomas Zoeller, a former senior policy advisor and acting general counsel at the Chemical Safety Board, described the program as "cutting edge."

"It's an incredible milestone, what they've done in 10 years," said Zoeller. "The folks working on the program should be commended for the dedication that they're bringing to continue to push through and break down those barriers.

As Wascom reflects on 10 years of the APS program and its impact, there's a sense of deep gratitude and satisfaction. "While there's always more work to be done, we've accomplished a great deal and set the stage for ongoing improvement."

The industries' flagship, data-driven **Advancing Process Safety (APS)** program was developed to promote industry-wide collaboration through knowledge sharing about safety incidents and good practices. It is considered a key driver behind a more than 50 percent reduction in incidents at the nation's refineries and petrochemical plants since 2011.²⁸

Today, APS includes an array of sub-programs that help companies continuously improve safety performance by facilitating incident sharing, coordinating site assessments, providing hazard identification tools, offering opportunities to share practices and more. Since its inception in 2010, more than 200 companies have drawn on APS resources and more than 3,500 employees have directly participated in program activities.



Advancing Process Safety Sub-Programs

Walk the Line

Employee human performance program directed at operators that provides a toolbox of training materials and practices to prevent common incidents caused by common operational discipline errors.

The Process Safety Regional Networks

Six regional information sharing networks that allow process safety professionals to improve overall safety performance through collaboration at the site and association level.

The Process Safety Site Assessment Program

Independent third-party assessments that help facilities prevent process safety events through rigorous evaluation of written programs and operations.

Hazard Identification/Practice Sharing Subgroup

Develops Hazard Identification and Practice Share documents for broad industry distribution that address common industry hazards and good industry practices.

The Mechanical Integrity Subgroup

Develops resources to help members improve mechanical integrity programs, a key process safety program element.

The Human Reliability Subgroup

Develops information and tools to improve human performance in operations that aid in reducing the likelihood and consequences of human errors.

Industry Learning & Outreach Group

Industry data analysis that identifies opportunities for improvement for APS and conducts monthly industry webinars.

Together, AFPM members collaborate to promote and improve safety across our companies, steadily driving down safety incidents year over year.



Occupational Safety Programs

AFPM occupational safety programs and training are geared toward preventing injuries in our facilities. Through incident data collection, we are able to identify opportunities for industrywide improvement and build tools to address these issues that are then shared throughout the industries. Our six Occupational Safety Regional Networks facilitate information sharing including lessons learned and good practices to improve the overall safety of the industries. Sharing of good energy isolation practices has been a significant focus of this program.





Spotlight on Pipeline Safety

Pipelines are one of the safest modes for transporting petroleum liquids. From the initial planning stage, pipeline company members work to address safety and security issues. During construction, only the highest quality materials are used, and the pipeline is then inspected and tested. Our industries' inspection methods adhere to — and often exceed — the highest federal and engineering standards. Once pipelines are in service, operators work constantly to keep systems safe by using cutting-edge diagnostic tools. Pipeline companies also conduct preventative maintenance, establish emergency response plans, and practice these emergency responses to ensure rapid action if incidents do occur.

Marathon Pipe Line LLC has developed computer vision models to detect potential integrity threats by harnessing artificial intelligence (AI) and machine learning. This technology can identify hard to detect leaks by leveraging the existing in-station operational cameras that monitor many pipeline facilities.²⁹

Emerson's Geofields pipeline software and Permasense non-intrusive corrosion detection sensors are giving pipeline operators new insights into pipeline degradation, helping to head off lost containment. Emerson is also working to provide operators a Pipeline Digital Twin to aid in training and operational monitoring of pipeline assets. These digital technologies will aid operator safety and reduce environmental risk.³⁰



Employees at the LyondellBasell Industries, Clinton Complex, proudly accept their Distinguished Safety Award, industry's highest honor that is awarded to the top sites with outstanding safety performance, program innovation and safety leadership.

Sharing Safety Practices Across the Manufacturing Sector

Other industries and government partners are taking note of the success of AFPM's safety programs and are seeking to apply good practices more broadly across the manufacturing sector. Over the course of the last year, AFPM has worked with organizations and government partners such as the American Gas Association the American Petroleum Institute, the Center for Chemical Process Safety, the Chemical Safety Board and the Occupational Safety and Health Administration (OSHA) to share good practices derived from these programs.



American Petroleum Institute



Supporting Community Safety

Beyond what we do to advance safety within our facilities, refining and petrochemical manufacturers work with their local communities to increase safety in myriad ways, ranging from donating safety equipment to volunteering and training emergency responders.

For the last 30 years, **CITGO** has hosted annual emergency-response training for volunteers three times per year at Texas A&M Engineering Extension Service (TEEX). Over the course of three days, CITGO instructors give master classes on proper procedures, prop handling and PPE in a wide array of contexts, from ship engine rooms to industrial structures. With attendance upwards of 100,000 emergency responders and workers, attendees gain tangible takeaways to support operations within a command structure, organizing by responsibility and maintaining accountability in emergency procedures. This training is one of the most comprehensive programs focused on emergency response instruction in the world.³¹

To promote safety throughout the Delaware Valley, **Monroe Energy** collaborates with industrial partners in both training and

execution of safety procedures. Members of the Delaware Bay and River Cooperative (DBRC) and Monroe Energy work with neighboring facilities to plan for and respond to oil spills on water from the mouth of the Delaware Bay down through Philadelphia.³²

This year, **Marathon Petroleum** employees from the Catlettsburg refinery participated in a Trench Safety Stand Down exercise and demonstration with local officials from the Ashland Fire Department (AFD), Ashland-Boyd County-Catlettsburg Office of Emergency Management and OSHA at the AFD Training Center in Ashland, Kentucky. The event's purpose was to help raise public awareness of trench safety and allow members of Marathon's Refinery Emergency Response Team and AFD to train in trench rescue.³³



Our members take seriously our role and opportunity to be anchors in our communities. We strengthen our economies through state and local taxes, through the jobs we create, through workforce training and development initiatives — especially those that cultivate diverse talent in our workplaces and communities — and through programs to support education, economic inclusion and healthcare in communities across the U.S.

Thriving People & Communities

Jobs and Economic Impact

The refining and petrochemical manufacturing industries support nearly 3 million highly skilled, well-paying jobs in the United States, with compensation that is two to three times greater than that of the average U.S. worker and high levels of satisfaction reported.³⁴ As part of a sector that manufactures products that save and improve lives, our employees take pride in the work that they do and the impact they have on healthcare, mobility, technology and our global economy in general.

Annually, petroleum refiners contributed more than **\$477 billion** to the U.S. economy and petrochemical facilities contributed **more than \$106 billion**. As part of this, last year, the industries together paid more than **\$62 billion** in state and local taxes and **\$61 billion** in federal taxes.³⁵

Beyond the opportunities that we directly create, our industries have a far-reaching economic impact.



For every job in the refining industry, we support more than 30 additional jobs across the economy.³⁶



And for every job in the petrochemical manufacturing industry, 20 additional jobs are created — from positions in retail to those in the engineering and accounting professions.³⁷

\$225,000

Average refining industry worker total compensation³⁸

\$149,000

Average petrochemical industry worker total compensation³⁹

Promoting Diversity, Equity and Inclusion

Our industries employ individuals of many skillsets — from welders to engineers to cyber security specialists — and from diverse cultures, races and backgrounds. Having a diverse workforce and promoting equity and inclusion within our companies ultimately drives creativity and innovation, and is critical to the future success of our industries. Our companies have instituted a number of efforts to recruit talent from traditionally underrepresented groups, and to support these individuals in growing their careers with us.

- Many companies, including **Chevron Phillips Chemical** and **HollyFrontier**, are collaborating with historically black colleges and universities (HBCUs) through the Future of STEM Scholars Initiative (FOSSI) to provide internship opportunities, mentoring and scholarships to students who are studying in science, technology, engineering and mathematics (STEM) fields.⁴⁰
- **Phillips 66's PRIDE66** employee resource group educates and provides resources to become better allies for the LGBTQ+ community through their Out & Equal LGBTQ+ Terminology and Ally Development series. And, in 2020, the company celebrated National Coming Out Day for the first time to recognize the importance of embracing people for who they truly are and to create more advocates for equality.⁴¹
- In 2020, **Emerson** launched Diverse Slates, a recruitment program to help bolster the diversity of its talent pipeline at all levels and increase representation of women and minority candidates. In support of this program, Emerson committed to a goal of doubling representation of women globally and U.S. minorities at the leadership level by 2030.⁴²
- To provide workforce development support for students from underrepresented communities, the **Baker Hughes Foundation** partnered with the 100K Mentors Challenge and Life Project 4 Youth, non-profits that provide virtual mentorship and professional networking programs. These programs provided resources for those struggling to find employment and career building opportunities during the pandemic.⁴³
- In 2020, **Motiva** welcomed three new female members to its Executive Leadership Team, making it one of the most gender-diverse leadership teams in the industry with 50 percent female representation.⁴⁴
- In 2021, **Chevron** established a Supplier Diversity Governance Board tasked with representing all U.S.-based businesses and implementing Chevron's supplier diversity strategy to increase the utilization and development of small, local and diverse suppliers. Actions include updating Chevron's procurement policies on the Amazon buying platform to increase purchases with small and diverse sellers and partnering with major suppliers to adopt their commitment to supply chain inclusion. Chevron's commitment to a diverse and inclusive supply chain is founded in the belief that inclusive practices in the procurement of goods and services creates a business advantage for the company, supports local economies, and creates prosperity in regions where they operate.⁴⁵

Investing in STEM Education

Refining and petrochemical operations are highly complex — relying on virtual reality, augmented reality and other high-tech knowledge and skills. Given the role that technology plays in driving environmental sustainability, the need for STEM talent in our industries will only increase. Our investments in STEM education from K-12 through the university level are working to address this need.

- **Flint Hills Resources** works to interest young minds in STEM fields, and in the last year made the move to take its STEM partnerships online to keep students engaged during the suspended school year. The company's social media page is now filled with STEM experiments led by their engineers that students can complete at home.⁴⁶
- Launched in 2016, the **CITGO** Science, Technology, Engineering and Math (STEM) Talent Pipeline partners with schools and organizations near its facilities to drive and cultivate interest and prepare students for careers in STEM. CITGO Innovation Academies are at the core of this program, offering hands-on activities and engaging STEM learning experiences tailored for each campus. CITGO STEM ambassadors engage with students at events, career fairs and through mentorship opportunities.⁴⁷
- **The Dow Chemical Company** Foundation has partnered with the University of Michigan School of Education Center for Education Design, Evaluation and Research, and Delta College to form the Dow Innovation Teacher Fellowship.⁴⁸ The goal of the fellowship — which currently works with educators from Arenac, Bay, Gratiot, Isabella, Midland and Saginaw counties — is to prepare K-12 teachers to educate their students about innovation and sustainability. Through the program, 15 to 20 teachers are selected annually to participate in professional development and curriculum design, connect with community partners on sustainability issues and design a unit around a specific sustainability issue.⁴⁹
- **Chevron** partners with the Utah Office of Energy Development to provide the Energy Workshop Scholarship, awarded annually to Utah awards students pursuing STEM university degrees or technical education programs. The scholarship has given approx. \$120,000 since 2016. Because of their outstanding support in developing future leaders, Chevron has been awarded the Rural Champion for Education award at the Governor's One Utah Summit.⁵⁰
- **Emerson** is working with the Texas A&M University Zachary School of Engineering, providing educational labs for advanced automation technologies and downstream process practices. In these labs, students gain hands-on education plus guidance from industry experts to enhance their practical understanding of process manufacturing.⁵¹





Supporting Skills Training

Cultivating a talent pipeline for tomorrow is a critical focus. Our companies offer a number of training opportunities, internships and apprenticeships — plus support for external academic and occupational training programs — to prepare individuals of all backgrounds for jobs in our industries.



Motiva has awarded \$1 million in scholarship funds since 2018. Recipients receive financial aid as they pursue a STEM or business-related undergraduate, associate or vocational degree. Other scholarship funds are awarded through partnerships with the Port Arthur Industrial Group (PAIG), the Women in Energy Foundation (WEN), the United Negro College Fund (UNCF) and more.⁵²



Airgas recently expanded its high school welding education initiative to encompass 23 new schools and six returning schools. Participating schools receive a customized mix of hands-on professional development training equipment to support underserved communities and close the skills gap in the welding industry.⁵⁴



PBF Energy partners with community colleges and technical schools located near its sites to develop associate degree and apprenticeship programs.⁵³



Emerson is actively working with leading trade schools around the nation including Lamar Technical College and San Jacinto Community College to deepen workers understanding of digital transformation technologies changing the nature of work in downstream operations. Donated technologies, expert instruction and curriculum development are ways in which Emerson is helping to upskill industry workers toward a digital future.⁵⁵



Chevron's El Segundo refinery in Southern California has convened a community advisory panel made up of residents from El Segundo and Manhattan Beach since 2002.




Community Engagement

Transparency with our communities is a principle that underpins each of our member companies' operating philosophies. To the outside world, operations at a refining or petrochemical facility may seem daunting — which is why openness is so important. In each community where we operate, we strive to create an open dialogue and build relationships on understanding, trust and respect. Our interactions and communication with local residents, community leaders and community organizations take many forms — from relationships that have been built over time to more formal Community Advisory Panels (CAPs).

We strive to create an open dialogue and build relationships on understanding, trust and respect.

Thriving People & Communities Spotlight

Community Advisors Have Emerged as Change Agents For Industrial Neighbors



Oil refineries and chemical plants across the country have relied on Community Advisory Panels (CAPs) for decades to inform residents about facility updates. But in recent years, fueled by discussions ranging from employment opportunities and the local economy to traffic patterns and infrastructure, emissions and extreme weather events, these meetings are also influencing how our facilities do business.

“In our industries, many individuals have dedicated their entire careers to safety and protecting their colleagues, neighbors in the community and the environment,” said Chet Thompson, president and CEO of the American Fuel & Petrochemical Manufacturers. “CAP meetings are opportunities for straight talk between community members and some of these technical professionals. They’re forums for raising concerns, sharing information and finding solutions.”

Phillips 66, like other companies in the petrochemical and fuel industries, has prioritized building multigenerational, diverse CAPs and recruiting new members to better understand the perspectives and priorities of community members representing various dimensions of diversity.

“We work hard to make sure our CAPs reflect our fence-line neighbors, community business owners and other local stakeholders,” said Maria Dunn, chief governance officer for public policy issues, sustainability strategy, and environmental, social and governance engagement at Phillips 66, which operates 10 refineries, in the United States. Each has a CAP.



“It’s through open lines of dialogue that we improve and make progress together.”

— Chet Thompson, President and CEO,
American Fuel & Petrochemical Manufacturers

“Leaders at our facilities review local demographic data and recruit CAP volunteers, either directly or by working with local organizations, who reflect their communities,” said Dunn. “We need to regularly ask ourselves, ‘Are we reflecting our communities?’ And if we’re not fully, let’s get a plan in place to adapt.”

“It’s through open lines of dialogue that we improve and make progress together,” said Thompson.

CAPs can serve valuable, and multiple purposes in communities. For **Dow Chemical**, the CAP near the company’s headquarters in Midland, Michigan, has evolved over the years from being a committee that met monthly to learn about the company’s safety performance to a partnership-building opportunity between each member of the CAP and the company. As a result of this partnership, Dow was able to quickly mobilize to help the community in the aftermath of a 500-year flood in May 2020 — ultimately delivering the right resources to residents in need.⁵⁶

Our companies and our employees believe deeply in the importance of giving back to the communities.



Giving Back

Whether it's mentoring in local schools, aiding local firefighting efforts or protecting wildlife habitats, our companies and our employees believe deeply in the importance of giving back to the communities in which we operate — through volunteer hours and financial support. Often, partnerships are key to these efforts. These include partnerships with local leaders and first responders, as well as national NGOs such as Purple Heart Homes and community organizations like local National Guard Family Readiness Groups.⁵⁷

This past year, **CountryMark** has hosted Fueling Freedom events, donating 50 cents for every gallon of fuel pumped to local National Guard Soldier and Family Readiness Groups. Hundreds of CountryMark volunteers and community members participated and recently raised more than \$53,000 to support local National Guard Family Readiness Groups across Indiana, Illinois and Michigan. The donations support local service members and their families by funding after-school programs, summer events for the community and care packages for deployed local soldiers.⁵⁸

In the wake of hurricanes and other extreme weather events, our industries serve as community anchors for rebuilding. For instance, after severe winter weather hit Texas and Louisiana in February 2021, **CITGO** committed \$225,000 to assist St. Bernard Project (SBP), the Independence Heights Redevelopment Council and Rebuilding Together Houston. CITGO also worked to support communities impacted by Hurricane Ida by donating to the United Way of Southwest Louisiana (UWSWLA) as part of the public-private "\$50K Ida Challenge." TeamCITGO volunteered at UWSWLA's supply drive and helped distribute supplies and meals to community members affected by the storm.⁵⁹



Monroe Energy participates in its community's outreach program, Adopt-A-Child Toy Drive, which provides holiday gifts to local children.

In partnership with Special Olympics Hawaii, **Par Petroleum** helps the non-profit organization provide Olympic-type sports training and competition for more than 3,400 children and adults with intellectual disabilities. Par Petroleum raised more than \$100,000 last year, and Par employees and their families volunteer for events including the opening ceremonies of the State Summer Games and the Fueling Dreams campaign, which has raised more than \$880,000 for Special Olympics Hawaii over the past 30 years.⁶⁰

Motiva has entered a four-year partnership to focus on the removal and prevention of marine debris with the Gulf of Mexico Alliance (GOMA), a regional organization focused on enhancing the environmental and economic health of the Gulf Coast region through increased collaboration. As the newest members of GOMA's Gulf Star Program, Motiva will contribute \$25,000 annually for the next four years in support of marine debris remediation and education. In 2021, Motiva will be focusing on marine debris removal, prevention and education activities with schools in the Tampa Bay area, where we operate one of our distribution terminals.⁶¹

For more than a century, **Chevron** has provided humanitarian aid to their communities when struck by natural disasters. In 2021, the company contributed \$3 million in support of U.S. Gulf Coast communities affected by Hurricane Ida. The funds supported both immediate relief and rebuilding efforts following the hurricane. In addition, the company matched qualifying donations to hurricane relief efforts made by employees and retirees, as well as providing financial contributions to organizations where employees volunteered.⁶²

Beyond producing the fuels and petrochemicals that power the economy today, our companies are focused on how we can transform lives tomorrow. From low-carbon fuels that will drive clean transportation to solutions for advanced recycling for plastics, we are driving progress for a healthier future — for humanity and for our planet.

Our members are investing millions of dollars in research and development (R&D) to enhance the products we deliver and to advance technology to improve the sustainability of other industries — from aviation to consumer-packaged goods.

Driving Progress

Renewable Diesel

Lower carbon transportation will require a mix of liquid fuels and technologies in addition to advancements in other renewable energy sources and innovations in product design, such as improved battery technologies. As problem-solvers committed to a more sustainable future, America's refiners are stepping up to increase production of lower carbon fuels, while continuing to meet global demand for a range of petroleum products.

One promising solution that refiners are investing in is renewable diesel. Produced from feedstocks such as vegetable oil and used cooking oil from restaurants, renewable diesel can reduce lifecycle GHG emissions by as much as 70-80 percent, making the fuel a key part of the solution to mitigate GHG emissions from heavy transportation. Consumers benefit because renewable diesel is chemically similar to petroleum diesel and fully compatible with existing infrastructure, meaning costly retrofits to vehicles and fueling stations aren't required. Today, refiners are investing billions of dollars to enable production of renewable diesel, with the anticipated production target of more than five billion gallons by 2024.⁶³

Consumers benefit because renewable diesel is chemically similar to petroleum diesel and fully compatible with existing infrastructure, meaning costly retrofits to vehicles and fueling stations aren't required.



- 
- A person wearing a white lab coat and gloves is pouring a clear liquid from a glass beaker into a graduated cylinder. The background is a solid blue color. The text is overlaid on the right side of the image.
- **Valero's** current renewable diesel production capacity is 700 million gallons per year at a plant adjacent to Valero's St. Charles refinery in Louisiana. Also, construction is underway of another plant adjacent to Valero's refinery in Port Arthur, Texas, which is expected to start operations in the first quarter of 2023. This will result in a combined annual capacity of 1.2 billion gallons of renewable diesel. Valero has invested \$3 billion to date in low-carbon fuels and expects to invest \$2 billion more through 2023.⁶⁴
 - To meet the goal of producing 200 million gallons of renewable fuel annually, **HollyFrontier** is investing more than \$800 million for a renewable diesel unit and pre-treatment unit co-located at its Navajo Refinery in New Mexico and to convert its Cheyenne, Wyoming, refinery to renewable fuel production.⁶⁵
 - Through a project called Rodeo Renewed, **Phillips 66** plans to convert its San Francisco refinery over to the production of renewable fuels. Once completed, the Rodeo refinery will be one of the world's largest renewable fuel production facilities, with a planned initial production capacity of 800 million gallons per year of renewable diesel, renewable gasoline and sustainable aviation fuel (SAF).⁶⁶
 - **ExxonMobil** is investing in scaling renewable diesel with a five-year deal to purchase 5 million barrels of American-produced renewable diesel annually from Global Clean Energy's Bakersfield biorefinery starting in 2022. In addition to purchasing renewable diesel, ExxonMobil's majority-owned affiliate Imperial Oil Ltd., is slated to produce renewable diesel at a Canadian facility.⁶⁷
 - **CVR Energy Inc.** announced plans to convert its Wynnewood and Coffeyville refineries to renewable diesel production. The company expects the Coffeyville facility to produce approximately 150 million gallons per year of renewable diesel with the capability for up to 25 million gallons per year of SAF.⁶⁸
 - **Chevron** expects to grow its renewable diesel volumes three times by 2025 relative to year-end 2020 volumes; and with the company's complex refining system, Chevron believes it'll have the capacity to produce 100,000 barrels per day of renewable diesel and sustainable aviation fuel by 2030. As of third quarter 2021, the company had increased renewable diesel sales by 30 percent relative to estimated fourth quarter 2020 sales volumes, and 60 percent of their U.S. terminals are now capable of renewable or biodiesel distribution. And the company expects all its U.S. diesel sales to have renewable or biodiesel content by the end of the decade.⁶⁹

Given the increased reliance on truck transportation for e-commerce, and therefore the anticipated demand for diesel, such investments from refiners are a meaningful part of a comprehensive cleaner energy solution. Importantly, producing renewable diesel can be part of refiners' strategies to reduce facility-level emissions. Though reductions will vary depending on specific feedstocks used and individual refinery configurations, one facility transitioning to renewable diesel production cites the opportunity to halve its facility-level carbon emissions and cut sulfur emissions by 80 percent.⁷⁰

Sustainable Aviation Fuel (SAF)

Sustainable aviation fuel (SAF) is another forward-leaning solution championed by refiners. Today, an increasing number of airlines and industry groups are announcing zero-carbon goals and SAF agreements with refiners and biofuel producers. Created from renewable and waste sources, SAF requires no reconfiguration of aircraft engines or technology because it's interchangeable with traditional jet fuel, though current regulations cap SAF blending at 50 percent.⁷¹ SAF has the potential to reduce lifecycle GHG emissions up to 80 percent, compared with conventional jet fuel.⁷²

- **Chevron** is now co-processing about 2 million barrels per day of biofeedstock at their El Segundo refinery and recently, a test-batch of sustainable aviation fuel (SAF) was produced at Chevron's El Segundo Refinery in California in September 2021 and was sold to Delta Air Lines at Los Angeles International Airport (LAX). Parallel to this project, Google Cloud plans to build a framework to analyze emissions data from Delta Air Lines and Chevron related to the SAF test-batch, supporting the long-term goal of achieving greater transparency and improved reporting around SAF emissions. The company expects to convert the same diesel hydrotreater to 100 percent renewable capability, increasing capacity to 10MBD of renewable diesel. Chevron has also signed a letter of intent with Gevo to jointly invest in building and operating one or more new facilities that would process inedible corn to produce sustainable aviation fuel, which can lower the lifecycle carbon intensity of fuels used in the aviation industry.⁷³
- In partnership with United Airlines, GE Aviation, Boeing and CFM International, **Marathon Petroleum** SAF fueled the first flight powered by 100 percent drop-in SAF, which provided an estimated 75 percent reduction in CO₂ emissions.⁷⁴
- **Marathon Petroleum's** subsidiary, Virent, contributed to an aviation industry first, as United Airlines flew an aircraft full of passengers using 100 percent SAF in one engine and petroleum-based jet fuel in the other. Virent used its BioForm process to produce synthesized aromatic kerosene (SAK) — a critical component that made the 100 percent SAF possible. Virent is targeting greater than 50 percent reduction in greenhouse gas emissions for SAK from a commercial project, with the potential to achieve net zero emissions using options such as renewable electricity, renewable natural gas and carbon capture and sequestration. Passengers on the historic demonstration flight included media, elected officials, and executives from the companies that collaborated on the effort: United Airlines, Boeing, CFM International, Virent, Marathon Petroleum and World Energy.⁷⁵



AFPM is supportive of all efforts by its members to invest in R&D that leads to a lower carbon energy future. A recent analysis by Harvard Business School found that our industries invest roughly three times more than other firms on technology to address climate change. Between 2008 and 2017, AFPM member companies were among the top 50 of “green patent producers.”⁷⁶

Pushing Innovation

A common theme throughout our industries' history has been a relentless focus on delivering new solutions to the world's most pressing problems. This has fueled continuous investment in R&D, new and better ways of working, and ultimately breakthrough products.



Phillips 66 is partnering with Georgia Tech to advance the development of high-performance reversible solid oxide fuel cells (RSOFC). The project will “demonstrate the commercial feasibility of a low-cost and highly efficient RSOFC system for hydrogen and electricity generation.” Phillips 66 is a leader in solid oxide fuel cell technology, holding nine U.S. patents in its SOFC intellectual property portfolio, with 21 additional patents pending.⁷⁷



Marathon Petroleum, through its subsidiary Virent, has invested more than \$200 million in advanced biofuels research and development. Currently, Virent has 120 pending patent applications worldwide to create alternative fuel sources using renewable resources, like agriculture waste and plant sugars from corn, sugar cane and beet. Virent is also researching the potential for net-zero fuel and chemical products through wind, solar, blue/green hydrogen and regenerative agriculture activations.⁷⁸



In 2021, **Air Liquide** established the world's largest membrane-based low-carbon hydrogen production unit in Canada. Powered by 99 percent renewable energy, this unit has a daily production capacity of over 8.2 metric tons of low-carbon hydrogen — enough to fuel more than 2,000 cars, 16,000 forklifts, 275 buses or 230 large trucks.⁷⁹



On March 16, 2021, **Chevron** was awarded a U.S. patent to produce biofuels using the company's FCC unit. This patent is the work of a cross-functional team that leverages existing capabilities, technologies, and human energy to develop processes to upgrade bio-feedstock to produce biofuels at scale, helping us take a big step forward in our energy transition journey.⁸⁰

Sustainable Recycling of Plastics

Addressing the challenge of plastic waste in the environment is a central focus for our industries. For the last several years, petrochemical manufacturers have been working to unlock the challenge of reusing single-use plastic products — items such as grocery bags, food packaging, bottles, cups and other containers.

Our industries are investing in and scaling cutting-edge recycling technologies. Today we are at an inflection point where these efforts are paying off in the form of tangible products on store shelves. Recycling, both mechanical and advanced, is making it possible, giving single-use items a second life.



Alongside Tennessee Gov. Bill Lee, **Eastman** announced a commitment to build one of the world's largest plastic-to-plastic recycling plants in Tennessee. The plant will use methanolysis, which breaks down plastic to be purified and used to make new plastic products. The plant, expected to be finished by the end of 2022, will be able to process 100,000 metric tons of previously unrecyclable plastic per year, diverting waste from landfills and contributing to Eastman's circular economy strategy.⁸¹

Eastman announced, per year,
the plant will be able to process

100,000
metric tons

of previously unrecyclable plastic

ExxonMobil plans to build its first, large-scale plastic waste advanced recycling facility in Baytown, Texas, and is expected to start operations by year-end 2022 with an initial planned capacity to recycle 30,000 metric tons of plastic waste per year.

ExxonMobil plans to build approximately 500,000 metric tons of advanced recycling capacity globally by year-end 2026. To help address the need for increased collection and sorting of plastic waste, ExxonMobil formed Cyclyx International LLC, a joint venture with Agilyx Corporation, focused on developing innovative solutions for aggregating and pre-processing large volumes of plastic waste that can be converted into feedstocks for valuable products. Cyclyx will help supply ExxonMobil's advanced recycling projects and aims to do the same for other customers.⁸²

Chevron Phillips Chemical has developed a free, publicly available toolkit (Sustainably Smart) to break down how petrochemical manufacturers are continually making their products more sustainable and pushing to keep plastic out of the ocean.⁸³



In 2021, **INEOS Olefins & Polymers UAS** received ISCC PLUS Certification (ISCC) for its manufacturing sites in Texas and California. This certification supports recent successful, commercial-scale trials of Advanced Recycling technology and lays the groundwork for INEOS' commercial offering of next generation polymer products including High Density Polyethylene and Polypropylene derived from recycled plastics.⁸⁴



Partnership and collaboration are critical for addressing the global challenge of plastic waste. Our members have invested in cross-industry initiatives to tackle plastic waste and work across industries to co-create products made from recycled plastic.

Eastman has partnered with **Stanley Black & Decker** to manufacture a new line of power tools with Eastman's Tritan™ Renew copolyester that is produced through advanced circular recycling. With a planned launch in early 2022, the new Black & Decker reviva™ line will include 50 percent certified recycled content in the enclosures.⁸⁵

Emerson is providing PureCycle Technologies a 'born digital' platform for their planned development of 50 new polypropylene recycling facilities. Polypropylene is currently only recycled at a rate of 1 percent annually due to traditional cost and potential degradation. PureCycle chemically washes the recovered materials to remove odor, color and contaminants to return the waste material into near-virgin polypropylene.⁸⁶

LyondellBasell, in partnership with **Unilever**, is working to develop post-consumer recycled packaging materials for Unilever's newly introduced Dove Roll-on and Rexona deodorant products. By using materials made from recycled plastic waste, LyondellBasell will be able to divert an estimated 940 metric tons of previously used fossil-based resins in 2021.⁸⁷ This partnership contributes to LyondellBasell's goal of producing 2 million metric tons of recycled and renewable-based polymers annually by 2030.

SABIC is partnering with **Microsoft** to create the Microsoft Ocean Plastic Mouse, with an exterior made from 20 percent recycled ocean plastic.⁸⁸ SABIC created a resin made from plastic that was recovered from ocean-feeding waterways and areas within a 50-kilometer radius of the ocean. For every one kiloton of product made from 20 percent recycled material, an equivalent of 24 million water bottles are removed from ocean areas.



Driving Progress Spotlight

The Path to Revolutionizing Plastic Recycling

In 2019, **Chevron Phillips Chemical (CPCChem)**'s Sustainability Technology Manager Ron Abbott was given a seemingly insurmountable challenge: by 2020, make CPCChem the first company in the United States to announce commercial production of a circular polymer made by converting plastic waste into the chemical building blocks for new plastic. A cross-functional team was launched, and they started chipping away at the goal.

Fast forward to October of 2020 — CPCChem's team announced successful commercial scale production of Marlex® Anew™ Circular Polyethylene.⁸⁹ The material is physically identical to polyethylene resins normally produced from ethane, the natural gas liquid feedstock (the raw materials used for plastic production), but it is produced from a liquid feedstock created by breaking down and recycling waste plastic. This process both diverts difficult-to-recycle plastics from landfills and reduces the amount of conventional feedstock required.

"The long-term goal is to get plastic waste out of landfills and back into circulation. We must convert our economy to a circular economy where we reclaim these valuable resources we are currently landfilling," Abbott said. As such, the company has already set a new goal: produce one billion pounds annually of Marlex® Anew™ Circular Polyethylene from recycled

"Plastics enable incredible things in our lives — it is impossible to imagine a modern hospital, grocery store, school or workplace without them."

— Chet Thompson, President and CEO, AFPM

plastic by 2030. CPCChem's achievement reflects a turning point for advanced plastic recycling in the United States, and a broader trend where a number of petrochemical manufacturers, from Eastman to ExxonMobil to INEOS, are helping to scale advanced recycling.

"A big part of the solution is going to come from the petrochemical industry because they have the scale, the knowledge and the reach to really change how things are done with consumer packaging going forward,"



“This is the environmental challenge of our generation. We have to fix this together. I think we’re well on our way.”

— Ron Abbott, Sustainability Technology Manager, Chevron Phillips Chemical

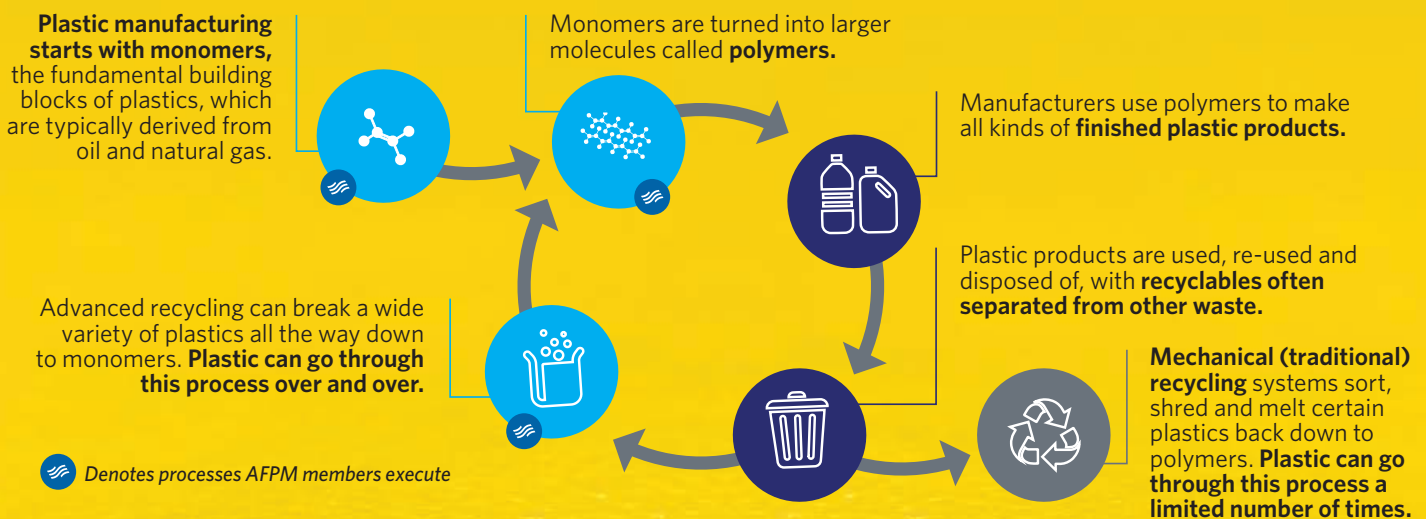
said Professor Mike Hickner, a chemical engineering professor at Penn State University, who studies polymers. “The fact of the matter is that we are only making more plastic materials overall,” he said. “We are never going to use fewer materials than we use today. The population and demand are continuing to grow.”

Through advanced recycling, a wider range of used plastic products can be broken down at the chemical level and converted to feedstocks for new polymers, which can then be transformed into thousands of consumer products. Since the polymer is transformed back to basic building blocks, this process can be repeated multiple times without jeopardizing the strength and quality of the final polymer. This enables manufacturers to expand the boundaries of how, and where, recycled plastics are used.

“Plastics enable incredible things in our lives — it is impossible to imagine a modern hospital, grocery store, school or workplace without them,” said Chet Thompson, president and CEO of AFPM. “Our commitment to sustainability includes working to advance data-driven public policies that recognize plastics’ benefits, while also addressing mismanaged plastic waste and encouraging advanced recycling projects. This technology is completely redefining what is possible through recycling, and it is a critical part of the cross-value chain approach to keeping plastic waste out of the environment.”

Abbott agrees. “This is the environmental challenge of our generation,” said Abbott. “We have to fix this together. I think we’re well on our way.”

ADVANCED RECYCLING



AFPM works to advance public policies that address our most pressing challenges. Whether it's advocating for a nation wide high-octane fuel standard that would drastically reduce emissions, or pursuing strategies to address plastic waste in the environment, AFPM supports policies that enable our members to supply the fuel and petrochemicals that growing global populations and economies need to thrive, and to do so in a sustainable way.

Policies to Drive Progress

Climate Change Principles

AFPM is committed to engaging in the discussion and development of sound climate change policies that are:

- Balanced and measured to improve quality of life, ensuring the long-term economic, energy, and environmental needs of humanity are met;
- Protective of U.S. competitiveness and prevent the shifting of production, jobs, and emissions from the United States to other countries;
- Harmonized, preemptive, and economy-wide;
- Simple and transparent; and
- Achievable and flexible to adjust as necessary.

AFPM and our members are further committed to:


- Delivering affordable, reliable fuel and petrochemicals products that lift the standards of living for people all over the world;
- Improving the efficiency and sustainability of our operations;
- Offering fuels and petrochemicals that make engines and other products more efficient; and
- Continuing research, innovation, and application of new technologies and products.

Carbon Capture, Utilization and Storage (CCUS)

Carbon capture is a critical technology to pave the way to a lower carbon energy future. We are supportive of tax credits for carbon capture technologies — specifically the 45Q tax credit for carbon capture technologies — because these technologies are an essential pathway for reducing the carbon intensity of energy and industrial systems. We are working with Congress on other policies to activate, expand and fully realize the benefits of this innovative technology.



We are supportive of tax credits for carbon capture technologies — specifically the 45Q tax credit.



95-RON Fuel Standard

AFPM members are leading the effort to transition the U.S. to high-octane gasoline through a nationwide high-octane, 95-RON fuel standard that would meet the most stringent air quality standards in every state. Alongside refiners' efforts to decarbonize heavy transportation through renewable diesel, a 95-RON octane standard would unlock an entirely new range of cleaner, fuel-efficient vehicle transportation options for consumers — options that include affordable, family-accommodating vehicles.

What we're proposing

A 95-RON octane standard throughout the U.S. that would require automakers to produce more fuel-efficient vehicles designed to run on higher-octane gasoline.

How it would work

A deadline would be set after which point all gasoline-powered vehicles sold in the U.S. would be manufactured to run on 95-RON high octane fuel, a fuel/vehicle design combination that will deliver better vehicle mileage and lower carbon emissions. As these new cars are introduced to the road, 95-RON fuel would be added to pumps alongside existing fuel options.

The advantage of octane

A higher octane fuel, when used in higher compression engines designed to utilize it, can increase fuel economy. In fact, a joint analysis conducted by AFPM and United States Council for Automotive Research (USCAR) found that a 95-RON octane standard would increase fuel efficiency by three to four percent for new vehicles. That additional percentage of fuel efficiency is a critical missing piece in the effort to improve fleetwide fuel. In addition, since ethanol is an economic source of octane a 95-RON standard benefits America's farmers and renewable fuel producers, as well as fuel refiners, retailers and consumers.

Plastic Waste Principles

AFPM's approach to addressing the challenges of global plastic waste considers many aspects of this complex issue. Ultimately, our solutions will always acknowledge the tremendous long-term value of plastic products, while considering data-driven innovations that promote advanced recycling solutions and remove regulatory barriers to widescale adoption of such technologies.

Specifically, we advocate for:



Development of a national framework to eliminate plastic waste in the environment and grow the circular economy for plastics;



Working collaboratively across the plastics value chain and with governments to encourage the responsible disposal of plastic products and the recycling, reuse and recovery of plastic waste on a global scale. This includes increased funding of state and local waste collection programs to better source and collect plastic waste;



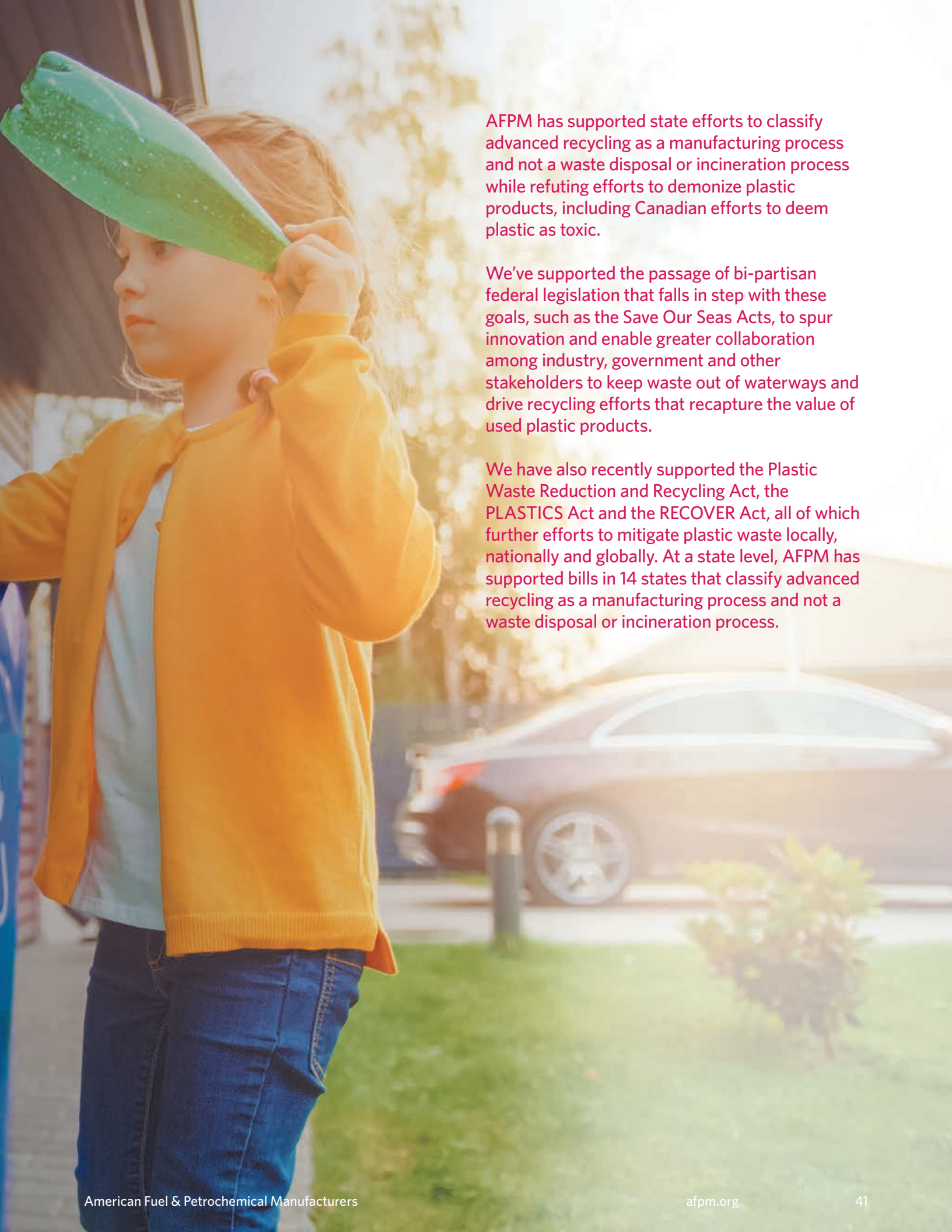
AFPM supports the innovation and development of plastic waste repurposing technologies that have the potential to recover plastic waste and transform it into usable materials. This includes removing regulatory barriers for new facilities that will allow for the continued expansion of advanced recycling capabilities;



Appropriate regulatory classification for plastic waste as a manufacturing feedstock, which simplifies the process and reduces regulatory hurdles for companies processing plastic; and



Proper accounting and tracking of recycled content, allowing companies to set clear goals and to consistently track their recycling efforts.



AFPM has supported state efforts to classify advanced recycling as a manufacturing process and not a waste disposal or incineration process while refuting efforts to demonize plastic products, including Canadian efforts to deem plastic as toxic.

We've supported the passage of bi-partisan federal legislation that falls in step with these goals, such as the Save Our Seas Acts, to spur innovation and enable greater collaboration among industry, government and other stakeholders to keep waste out of waterways and drive recycling efforts that recapture the value of used plastic products.

We have also recently supported the Plastic Waste Reduction and Recycling Act, the PLASTICS Act and the RECOVER Act, all of which further efforts to mitigate plastic waste locally, nationally and globally. At a state level, AFPM has supported bills in 14 states that classify advanced recycling as a manufacturing process and not a waste disposal or incineration process.

References

- 1 Industrial Information Research
- 2 John Beath Environmental
- 3 U.S. Environmental Protection Agency
- 4 AFP-012 Industry Performance Graphics
- 5 Flint Hills Resources
- 6 Project Green Fleet
- 7 HollyFrontier
- 8 Valero
- 9 International Energy Agency
- 10 International Energy Agency
- 11 ExxonMobil
- 12 Valero
- 13 Carbon Capture Coalition
- 14 Chevron
- 15 Phillips 66
- 16 HollyFrontier
- 17 CITGO
- 18 PBF Energy
- 19 BASF
- 20 CIRCON Environmental
- 21 Dow
- 22 Albemarle
- 23 Eastman
- 24 Cenovus
- 25 AFPM
- 26 U.S. Bureau of Labor Statistics
- 27 AFPM
- 28 AFPM
- 29 Marathon Petroleum
- 30 Emerson
- 31 CITGO
- 32 Monroe Energy; Delaware Bay and River Cooperative
- 33 Marathon Petroleum
- 34 AFPM
- 35 IMPLAN
- 36 AFPM
- 37 AFPM
- 38 AFPM
- 39 AFPM
- 40 Chevron Phillips Chemical; HollyFrontier
- 41 Phillips 66
- 42 Emerson
- 43 Baker Hughes
- 44 Motiva
- 45 Chevron
- 46 Flint Hills Resources
- 47 CITGO
- 48 Dow Innovation Teacher Fellowship
- 49 Dow Innovation Teacher Fellowship
- 50 Chevron
- 51 Emerson
- 52 Motiva
- 53 PBF Energy
- 54 Airgas
- 55 Emerson
- 56 Dow
- 57 BASF; CountryMark
- 58 CountryMark
- 59 CITGO; CITGO
- 60 Par Petroleum; Maui Now
- 61 Motiva
- 62 Chevron
- 63 Baker & O'Brien
- 64 Valero
- 65 HollyFrontier
- 66 Phillips 66
- 67 ExxonMobil
- 68 Biodiesel Magazine
- 69 Chevron
- 70 Phillips 66
- 71 CNN
- 72 International Air Transport Association
- 73 Chevron; Chevron
- 74 United Airlines
- 75 Marathon Petroleum
- 76 Harvard Business School
- 77 Phillips 66
- 78 Marathon Petroleum
- 79 Air Liquide
- 80 Chevron
- 81 Eastman
- 82 ExxonMobil
- 83 Chevron Phillips Chemical
- 84 INEOS
- 85 Stanley Black & Decker
- 86 Emerson
- 87 LyondellBasell
- 88 SABIC
- 89 Chevron

To access the links to these sources, visit www.afpm.org/data-reports

Information Resources

Communications

Through a combination of traditional and social media outlets, AFPM reaches the press, policymakers and the public to educate them on the facts about our industries' work and value, and to inform member company employees about important issues impacting the industries.



**WE
MAKE
PROGRESS**



Publications

AFPM publications inform our members about industry statistics, technical innovations, environment and safety developments, security and many other relevant issues.

AFPM's online store allows you to search technical papers and reports by keyword, author and/or meeting and directly download to your computer. Learn more at afpm.org/publications.

Newsletters and General Publications

- Annual Report
- Daily Alert
- Energy in Motion – The AFPM Transportation & Infrastructure Newsletter
- Fuel Line
- Green Room Report
- Security Watch
- Sustainability Report
- Tech Update

Statistics

- Annual Survey of Occupational Injuries & Illnesses
- Process Safety Event Report
- AFPM U.S. Refining & Storage Capacity Report

Petrochemical Statistics Program Subscriptions

- AFPM Petrochemical Surveys, Production & Inventory Statistics – quarterly
- AFPM Selected Petrochemical Statistics U.S. Trade Data – monthly

Technical Papers

- Annual Meeting Papers
- Cybersecurity Conference Papers
- Environmental Conference Papers
- International Base Oils & Waxes Conferences Papers
- National Occupational & Process Safety Conference Exhibition Papers
- Operational Planning Control and Automation Technologies Conference Papers (2019 and previous)
- Reliability & Maintenance Conference Papers (2019 and previous)

Transcripts

Operations & Process Technology Summit, formerly Q&A (2019 and previous)

* Publications are distributed to members only.







1800 M Street, NW
Suite 900 North
Washington, DC
20036

202.457.0480
afpm.org

© 2022 American
Fuel & Petrochemical
Manufacturers