



# Commitment to a Sustainable Future

## 2023 Sustainability Report



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# A Message from the President and CEO of AFPM

AFPM's members are committed to sustainably providing the fuels and petrochemicals that the world needs to thrive, and they did not allow the upheaval in global markets resulting from high inflation and Russia's invasion of Ukraine to deter their progress this year. To the contrary, our members and their dedicated workforce only intensified their commitment to sustainability, the environment and their communities.

AFPM members are constantly working to increase the sustainability of their facilities — focusing on water reuse, increasing energy efficiency, incorporating renewable energy to power their facilities, reclaiming and recycling waste, and conserving and restoring the land around them.

They are also playing an oversized role in facilitating the technological advancements needed for a more sustainable world. AFPM member investment in carbon capture, utilization and sequestration (CCUS) has helped make the United States the global leader in new carbon capture projects. AFPM members' innovation in advanced recycling — which enables a wider variety of plastics to be recycled — is helping to increase the amount of recycled plastics in countless consumer products, including shampoo bottles, reusable water bottles and even fast food cups. And the truck drivers that keep our economy moving can fill up their tanks with lower-carbon renewable diesel as a result of U.S. refiners' exponential scaling of their renewable fuel facilities.

U.S. refiners and petrochemical manufacturers also continue to invest in cutting-edge technology, education and collaboration to keep their facilities amongst the safest in the world, relentlessly pursuing a shared goal of zero safety incidents.

And AFPM members remain anchors of their communities, where they have an outsized impact through job creation; volunteerism; generous financial support; and fostering diversity, equity and inclusion both inside their companies and throughout their communities.

Through it all, the fuel and petrochemical industries are holding themselves accountable for their ambitious climate goals, evidencing a commitment to sustainability that goes from boots-on-the-ground operations all the way to governance principles set by executive leadership and backed by tens of billions of dollars in dedicated funding.

Our members continue to pursue policies to efficiently and effectively address the biggest obstacles constraining their ability to help make even more sustainability gains. These include legislative and regulatory support for advanced recycling technologies, CCUS and a nationwide high-octane fuel standard.

I'm proud of the leadership through action that AFPM members continue to display. In the following pages, we highlight some of the many examples of how our members are making progress on their sustainability goals.



A handwritten signature in black ink, which appears to read "Chet M. Thompson". The signature is fluid and cursive.

**Chet M. Thompson**  
President and CEO

American  
Fuel & Petrochemical  
Manufacturers

# Our Commitment to Sustainability

## Our Sustainability Pillars



### Environmental Stewardship

We are committed and responsible stewards of the environment. We are doing more with less — 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

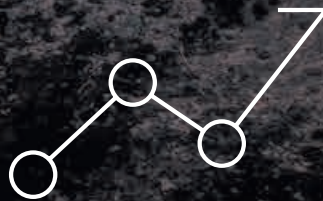
We foster a strong culture of safety throughout our industries and our communities, building on the progress that has led our industries to be amongst the safest of hundreds of industries within the manufacturing sector.

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



### Thriving People and Communities

We help people and communities thrive by providing well-paying jobs for people of all backgrounds, building more inclusive and diversified workforces and communities, preparing the future workforce for jobs in our industries, and giving back to our communities through philanthropy and volunteerism.



### Driving Progress

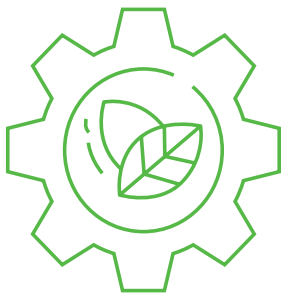
We are addressing society's biggest challenges — including building a lower-carbon future and advancing a more circular economy for plastics — and pushing past the status quo by driving innovation that will make life better, safer and more productive.

The U.S. fuel and petrochemical manufacturing industries are actively working to save energy, reduce emissions, manage water use efficiently, reduce waste and protect and conserve the lands and ecosystems that surround us.

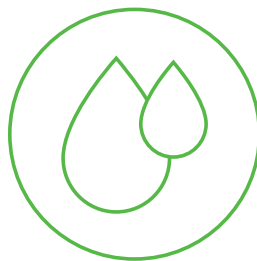
# Environmental Stewardship

## Energy Efficiency and Emissions Reduction

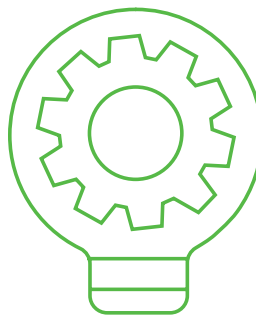
The U.S. fuel and petrochemical industries are employing and planning to deploy a full spectrum of low-emission energy resources — from wind and solar to small modular nuclear technology — and improving processes to maximize energy efficiency and reduce our carbon footprint. Our industries are also reducing emissions in addition to greenhouse gases and deploying technologies to enable early response and mitigation actions, even on small emissions sources, protecting our surrounding communities.



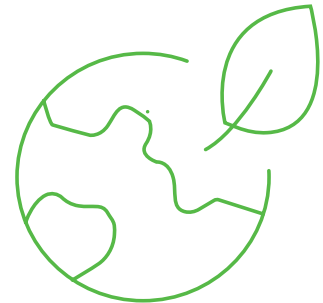
The U.S. fuel and petrochemical industries are investing billions of dollars into saving energy and reducing emissions of their operations and products.



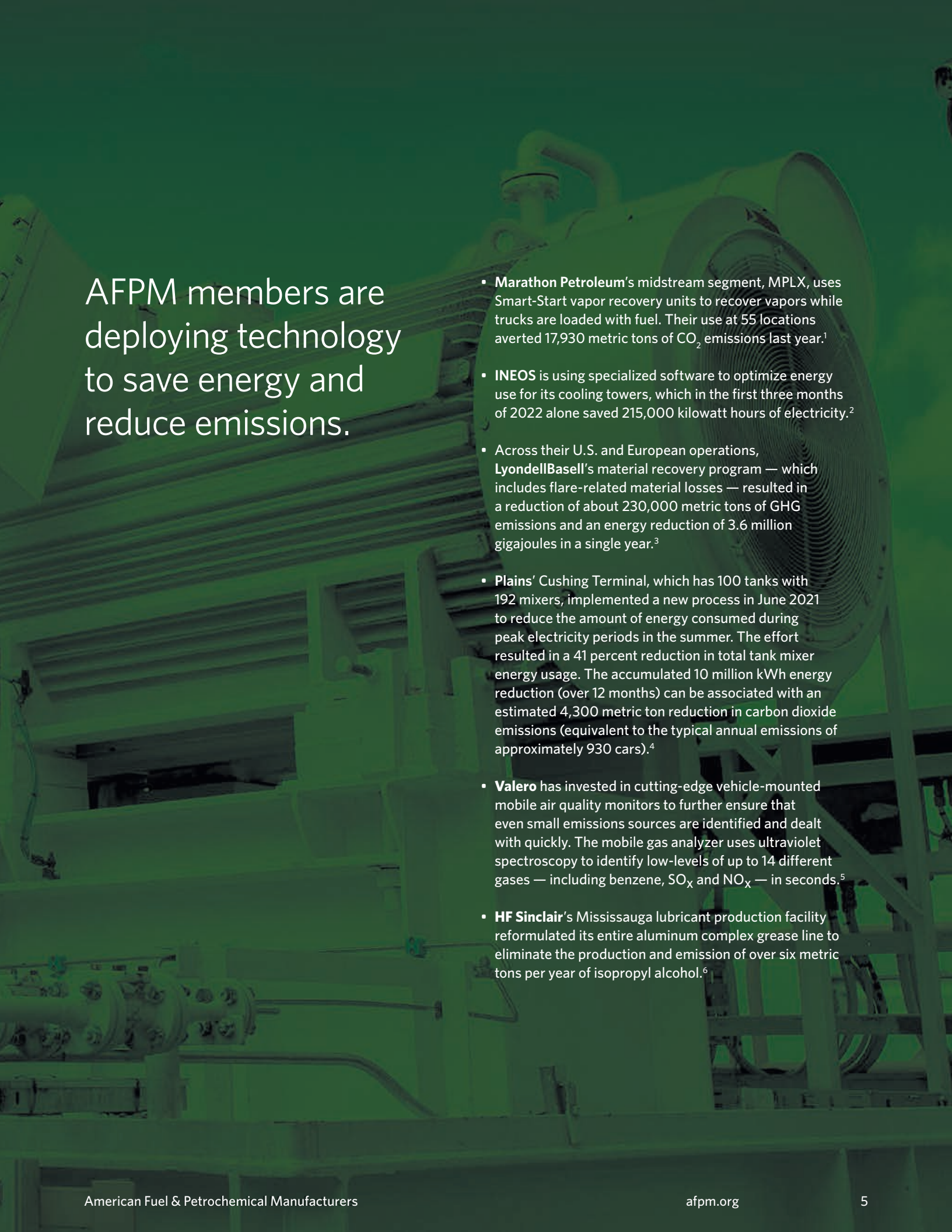
AFPM members are committed to doing more with less — and that includes freshwater use. The fuel and petrochemical industries are developing cutting-edge water treatment and recycling technologies to reduce their reliance on freshwater.



AFPM members look for ways to reuse, recycle and repurpose waste throughout their operations.



AFPM members prioritize the conservation and reclamation of the land and ecosystems around them.



## AFPM members are deploying technology to save energy and reduce emissions.

- **Marathon Petroleum's** midstream segment, MPLX, uses Smart-Start vapor recovery units to recover vapors while trucks are loaded with fuel. Their use at 55 locations averted 17,930 metric tons of CO<sub>2</sub> emissions last year.<sup>1</sup>
- **INEOS** is using specialized software to optimize energy use for its cooling towers, which in the first three months of 2022 alone saved 215,000 kilowatt hours of electricity.<sup>2</sup>
- Across their U.S. and European operations, **LyondellBasell's** material recovery program — which includes flare-related material losses — resulted in a reduction of about 230,000 metric tons of GHG emissions and an energy reduction of 3.6 million gigajoules in a single year.<sup>3</sup>
- **Plains' Cushing Terminal**, which has 100 tanks with 192 mixers, implemented a new process in June 2021 to reduce the amount of energy consumed during peak electricity periods in the summer. The effort resulted in a 41 percent reduction in total tank mixer energy usage. The accumulated 10 million kWh energy reduction (over 12 months) can be associated with an estimated 4,300 metric ton reduction in carbon dioxide emissions (equivalent to the typical annual emissions of approximately 930 cars).<sup>4</sup>
- **Valero** has invested in cutting-edge vehicle-mounted mobile air quality monitors to further ensure that even small emissions sources are identified and dealt with quickly. The mobile gas analyzer uses ultraviolet spectroscopy to identify low-levels of up to 14 different gases — including benzene, SO<sub>x</sub> and NO<sub>x</sub> — in seconds.<sup>5</sup>
- **HF Sinclair's** Mississauga lubricant production facility reformulated its entire aluminum complex grease line to eliminate the production and emission of over six metric tons per year of isopropyl alcohol.<sup>6</sup>

Environmental Stewardship Spotlight

# AFPM Members Shrink Their Energy Footprints

The U.S. fuel and petrochemical industries are investing in both established and cutting-edge renewable energy technologies to help lower the carbon intensity and improve the energy efficiency of our operations.

**Flint Hills Resources**, for instance, is building the largest single-user solar panel project in the nation at its Pine Bend refinery in Rosemount, Minnesota. The 45-megawatt solar installation, which will include over 100,000 individual panels arrayed on 300 acres of land next to the facility, is expected to be completed in the summer of 2023. In conjunction with the recently completed Combined Heat and Power system, the facility will be able to provide almost 70 percent of its power needs onsite under optimal conditions.<sup>7</sup>

Since 2009, **Valero's** wind farm with 50 megawatts of electricity capacity has been powering the majority of the energy needs of its McKee, Texas refinery.<sup>8</sup> And at its Benicia, California refinery Valero is adding a five-megawatt fuel cell to power its asphalt and wastewater facilities. The fuel cell will provide reliable, efficient and low-carbon power while freeing up the grid for community energy use.<sup>9</sup>

**BASF** has entered into virtual power purchase agreements with wind- and solar-power providers for over 250 megawatts to power their facilities from Michigan to Texas. Based on EPA estimates, these agreements will offset over 472,500 metric tons of CO<sub>2</sub> emissions each year.<sup>10</sup> One such power purchase agreement was recently signed with X-ELIO for 48 megawatts of solar power for BASF's Freeport, Texas Verbund facility. The agreement will enable 100 percent of the site's power to be supplied by renewable energy, thereby offsetting over 82,000 metric tons of CO<sub>2</sub> emissions annually.<sup>11</sup>

**Dow**, meanwhile, is working with X-energy to develop and deploy small modular nuclear technology at one of its Gulf Coast sites, allowing Dow to benefit from a carbon-free process to heat and power its facility.<sup>12</sup>

AFPM member companies are also helping to reduce carbon intensity of the energy used in their communities.

**Chevron** is allowing the Marin Clean Energy Solar One project to use 49 acres of refinery land, allowing them to generate 10.5 megawatts of renewable energy each year for local residents.<sup>13</sup>





“A key aspect of environmental stewardship is spending time and connecting employees in the plant to how we define stewardship and how stewardship guides us in the decisions we make every day. The decisions each employee makes every day in their roles can matter. If their focus is too narrow, we could miss out on opportunities.”

— Geoff Glasrud, Vice President and Manufacturing Manager  
Flint Hills Resources

## Operationalizing Climate Change Commitments

AFPM members are delivering on commitments to reduce carbon emissions and fuel a lower-carbon economy by investing billions of dollars in new products and processes that reduce the carbon footprint of the fuel and petrochemical manufacturing industries.

# AFPM members are investing tens of billions of dollars to reduce carbon emissions.

- **ExxonMobil** plans to invest more than \$15 billion over the next six years on initiatives to lower greenhouse gas emissions. A significant share is focused on carbon capture and storage, hydrogen, and biofuels.<sup>14</sup>
- By 2028, **Chevron** targets spending \$8 billion in lower-carbon initiatives — like renewable fuels, carbon capture and hydrogen — as well as an additional \$2 billion on GHG abatement projects.<sup>15</sup>
- In 2021, more than 70 percent of **Valero's** growth capital was deployed to low-carbon projects. To date, Valero has invested more than \$4.65 billion in its low-carbon fuels businesses. At Valero, all low-carbon projects are held at a minimum after-tax IRR threshold, just like other projects.<sup>16</sup>
- As part of its efforts to reduce the carbon intensity and increase the economic value of its products, **Valero** is progressing a carbon sequestration pipeline in the U.S. Midwest, which will connect eight of its ethanol plants and capture nearly three million metric tons of CO<sub>2</sub> per year.<sup>17</sup>
- **Phillips 66** is planning to invest over \$1 billion over the next decade to make their operations more energy efficient.<sup>18</sup>
- **INEOS** is investing over €3 billion in projects to reduce their emissions footprint, as well as a €1.2 billion investment in blue hydrogen with carbon capture technology in Grangemouth, Scotland and another €2 billion for green hydrogen plants throughout Europe.<sup>19</sup>
- **Cenovus** has integrated its five ESG focus areas — climate and GHG emissions, water stewardship, biodiversity, Indigenous reconciliation, and inclusion and diversity — into its capital allocation framework to ensure business decisions incorporate these priorities. The company has included approximately \$1 billion in its five-year business plan for GHG emissions reduction opportunities to help it make progress towards its emissions reduction target.<sup>20</sup>
- Over the next five years, **Cenovus** plans to spend approximately \$1 billion on initiatives that advance its goal of reducing absolute scope 1 and 2 emissions by 35 percent by year-end 2035, from 2019 levels, on a net equity basis. This includes progressing carbon capture projects at the Minnedosa Ethanol Plant, Elmworth gas plant, Lloydminster Upgrader and Christina Lake, as well as methane reduction initiatives across conventional operations, continuing work to increase energy efficiency at Cenovus's conventional and Canadian offshore assets, and advancing additional technology assessments.<sup>21</sup>

## Investing and Scaling Carbon Capture Technologies

International and domestic energy agencies, scientists and politicians across the political spectrum have realized that creating a lower-carbon economy will require massive scaling of carbon capture, utilization and sequestration (CCUS). And the fuel and petrochemical industries are playing a leadership role in making this necessity a reality.

In September 2021, **Calpine, Chevron, Dow, ExxonMobil, INEOS, Linde, LyondellBasell, Marathon Petroleum, NRG Energy, Phillips 66** and **Valero** agreed to begin discussing plans that could lead to capturing and safely storing up to 50 million metric tons of CO<sub>2</sub> per year by 2030 and about 100 million metric tons by 2040.<sup>22</sup>

**Chevron, Talos Energy** and **Carbonvert** are also working on developing the Bayou Bend CCS offshore carbon sequestration hub off the coast of Beaumont and Port Arthur, Texas, which has the potential to sequester 225 to 275 million metric tons of CO<sub>2</sub> from area industrial sources.<sup>23</sup>

**ExxonMobil** is planning a hydrogen production plant and one of the world's largest carbon capture and storage projects at its integrated refining and petrochemical site at Baytown, Texas, with infrastructure capable of transporting and storing as much as 10 million metric tons of CO<sub>2</sub> annually.<sup>24</sup> "This is a significant step for efforts to decarbonize the existing industry," said Ed Graham, vice president of Exxon's Low Carbon Solutions venture. "This is both in the petrochemical and ultimately into cement and steel, which are hard to abate."<sup>25</sup>

CCUS efforts at the scale needed will also require extensive transportation networks, ideally via pipeline. **Enterprise Products** and **Oxy Low Carbon Ventures** are working to meet that need with a CO<sub>2</sub> transportation and sequestration system in the greater Houston to Beaumont/Port Arthur area, which would utilize new and existing pipelines to connect to the sequestration hubs being developed along the Gulf Coast.<sup>26</sup> **Honeywell**, meanwhile, has partnered with EnLink Midstream to combine Honeywell's CCS and hydrogen-purification technologies with EnLink's planned CO<sub>2</sub> pipeline transportation network to help decarbonize the Mississippi River corridor, ranging from Baton Rouge to New Orleans.<sup>27</sup>

AFPM members are also helping to scale Direct Air Capture (DAC), which captures carbon directly from the air. **1PointFive**, a subsidiary of **Occidental's** Low Carbon Ventures, is collaborating with Carbon Engineering to create a DAC plant deployment approach that combines standardized designs, modularized components and mass manufacturing to enable the rapid scaling of this technology.<sup>28</sup>

## Water Management

AFPM members are reducing their reliance on freshwater nationwide through cutting-edge water treatment technologies and innovative recycling strategies such as incorporating municipal wastewater into their operations, saving hundreds of millions of gallons of water every year.

**Albemarle** has created an artificial marsh at its bromide facility in Magnolia, Arkansas that it uses to conserve stormwater runoff. The runoff is then treated and converted for use in their operations, reducing freshwater use by 20 percent.<sup>29</sup>

The Borger Refinery, jointly owned by **Phillips 66** and **Cenovus**, is working on a project to treat and reuse wastewater in its boilers — an effort that will save 3,200 gallons per minute of water.<sup>30</sup>

**HF Sinclair** partners with **CIRCON Environmental** to recycle and repurpose wastewater, resulting in 835,449 gallons of water being safely treated and discharged back into the ecosystem last year.<sup>31</sup>

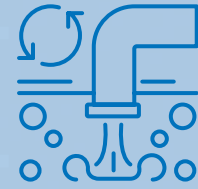
**Chevron's** El Segundo refinery used a digital monitoring dashboard that identifies water optimization opportunities, rigorous water management practices and high-tech water-saving devices like robotic tank inspectors to increase its use of reclaimed water up to 78 percent — an increase of eight percentage points — in the last three years.<sup>32</sup> And through its recycling efforts, the refinery has saved enough water to meet the daily water needs of 80,000 to 90,000 people in the Los Angeles basin.<sup>33</sup>

**Marathon's** Los Angeles refinery uses an anti-scaling dispersant to increase the number of times water can be cycled through its cooling towers, thereby conserving 26.3 million gallons of freshwater each year.<sup>34</sup>

**LyondellBasell** has helped save approximately 1.5 million gallons of water each year since 2004 as the lead sponsor of the Galveston Bay Foundation's Rain Barrel Program in Texas. One rain barrel can conserve approximately 1,050 gallons of water per year.<sup>35</sup>

**Valero's** Wilmington refinery in California has secured treated municipal wastewater for its cooling tower. Once completed, the project is estimated to save up to 420 million gallons of water per year — equivalent to the consumption of 9,000 households.<sup>36</sup>





**Ergon Refining Inc.** in Vicksburg, Mississippi invested \$30 million in a state-of-the-art wastewater treatment facility which allowed them to reduce more than three million pounds of hazardous waste each year.<sup>37</sup>

**Chevron Phillips Chemical's** facility in Borger, Texas created a system that collects condensate produced from one process and uses it to cool a second process, an efficiency innovation that will save 28.22 million gallons of water annually.<sup>38</sup>

In 2021, **Chevron** joined the Global Water Solutions Project of the World Business Council for Sustainable Development (WBCSD). Chevron also participated in the Wastewater Zero initiative to determine how the concept and principles might apply in their refinery operations.<sup>39</sup>

**Chevron** has invested in technologies to reduce its freshwater usage. As a result, the refinery in Richmond, California, has become the largest industrial user of reclaimed water in the San Francisco Bay Area. Together with their partners, Chevron has worked to overcome barriers to reclaimed water use. One such project that contributed to this achievement was the Richmond Advanced Recycled Expansion (RARE), a joint effort with the East Bay Municipal Water District. Through innovation and collaboration, the RARE Water Project facility greatly increased the daily allowable capacity for use of reclaimed water at the refinery, to more than six million gallons.<sup>40</sup>

AFPM member companies are  
**saving millions of gallons**  
of water every year.

## Waste Reclamation and Recycling

AFPM members have introduced numerous initiatives to recover, repurpose and recycle various forms of waste throughout their facilities including oil tank waste, catalysts, metal, glass and paper.



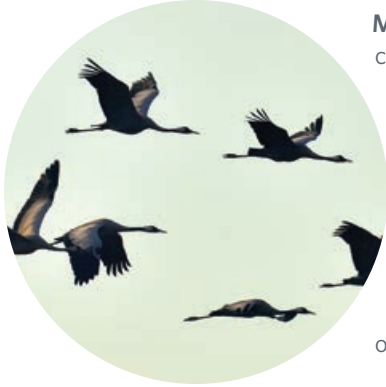
- In one year, **Valero** displaced the equivalent of over 6,500 tons of coal and prevented the release of more than 27,000 tons of CO<sub>2</sub> by having 1.9 million gallons of waste repurposed as fuel for third-party facilities.<sup>41</sup>
- **Phillips 66** has recycled over one million metric tons since 2014, including more than 220,000 pounds of electronic waste, refinery process catalyst, oils, metal, glass and paper.<sup>42</sup>
- **Marathon** works with **CIRCON Environmental** to turn residual material from refinery tanks into waste-derived fuels that are used for cement production. Since 2013, over 103,000 metric tons of waste have been used as fuel — avoiding over 248,000 metric tons of CO<sub>2</sub>-equivalent emissions.<sup>43</sup>
- **PBF's** Delaware City Refinery has partnered with another firm to recover CO<sub>2</sub> produced in refinery operations and send it for use in commercial applications, thereby eliminating millions of pounds of CO<sub>2</sub>.<sup>44</sup>
- **CIRCON Environmental's** 2022 operations repurposed 44,130 tons of hazardous tank residual waste from cleaning operations into 7.4 million gallons of waste-derived fuel for use as a heat source in U.S. cement kilns. This effort alone displaced the need for 24,713 tons of coal, provided a net carbon offset of 105,912 tons and prevented 22,065 tons of residual-waste ash from being landfilled. CIRCON's water treatment operations processed and recycled 165 million gallons of water that was sent back to the ecosystem for safe use. Oil recycling operations processed 234,762 BBLs of oil, which was sold back into the circular economy to bring fresh power and value to our industry.<sup>45</sup>
- For their significant milestones in waste reduction at facilities, **Marathon** and **Valero** were each awarded the inaugural CIRCON Sustainability Leadership Award.<sup>46</sup>

## Conservation and Habitat Restoration

AFPM members support wildlife conservation, land reclamation and biodiversity within the fencelines of their facilities and throughout their local communities through partnerships with national non-profit organizations and local communities dedicated to protecting and fostering local ecosystems.

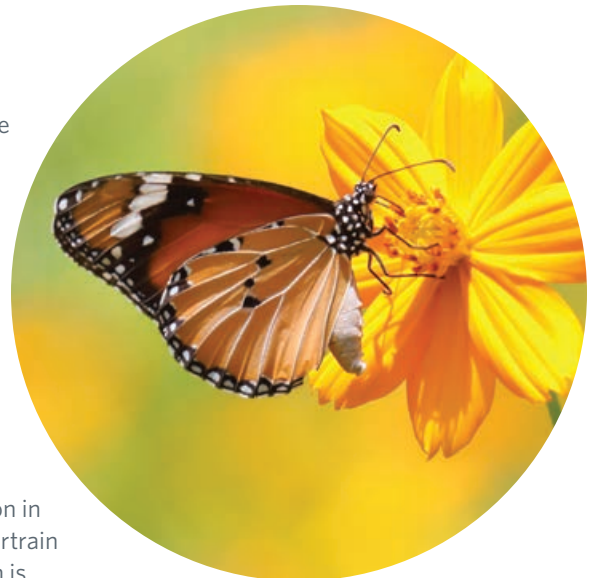


**Chevron** is working with Restore the Earth to restore to 8,800 acres in St. Charles Parish, Louisiana with natural cypress forests and swamps — an effort that is expected to include planting up to 1.7 million native bald cypress seedlings.<sup>50</sup>



**Marathon Pipe Line** is systematizing conservation through its nature-based Integrated Vegetation Management, Integrated Habitat Management, and Urban and Community Forestry programs. These programs emphasize building sustainable landscapes by promoting native vegetation, connecting wildlife habitat corridors, and providing habitat for migratory birds, insects and other wildlife species.<sup>47</sup>

**Phillips 66** has applied for a Nationwide Monarch Butterfly Candidate Conservation Agreement for Energy and Transportation Lands to enroll about 67,842 acres of their rights-of-way across 17 states to protect the threatened butterflies by promoting pollinator-friendly habitats and conservation practices.<sup>48</sup>



**Valero** is supporting wetland restoration in Louisiana via a donation to the Pontchartrain Conservancy. The multi-year program is expected to include restoration planting, student education and environmental monitoring. Approximately 28,000 tree saplings will be planted over 140 acres; the mature trees are expected to capture over 100,000 tons of CO<sub>2</sub> each year.<sup>49</sup>

The **Baker Hughes Foundation** donated \$350,000 to the nonprofit One Tree Planted to support projects to plant 350,000 trees in the Americas, Malaysia, England and Indonesia.<sup>51</sup>



There is nothing more important to AFPM and its members than the safety of our employees, communities and the environment. Our commitments go beyond upholding codes and standards that guide each of our company’s operations — it is embedded in the culture of our industries and instilled in every employee from the day they set foot on the job.

# Health & Safety

## Safety Record

The fuel and petrochemical industries strive to have zero injuries and incidents and constantly work to improve upon our safety records year-over-year. Because of our uncompromising stance on safety, our industries’ illness and injury rates have been consistently among the lowest of all manufacturing sectors over the past 20 years.

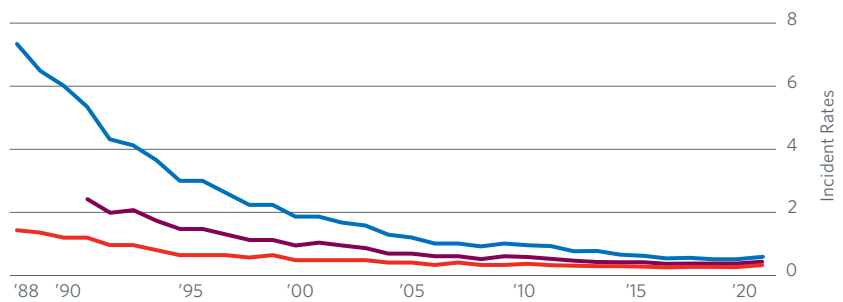
Our industries have led a 30-year decline in rates of injury or illness, underscoring the rigorous safety methods put in place by AFPM and our members.

In the last ten years alone, the rate of process safety events has decreased by roughly 50 percent at refineries and roughly 46 percent at petrochemical facilities.<sup>52</sup>

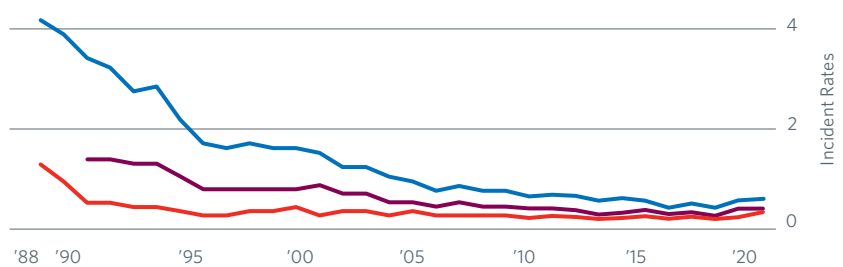
Injury & Illness Incident Rates for Refineries  
Radically Reduced Injuries Past 30 Years

- Total Recordable Incident Rate
- Days Away, Restricted, or Transfer Rate
- Fatality and Days Away Rate

### Refining



### Petrochemical





## AFPM Safety Programs

The fuel and petrochemical industries consistently join forces to promote good safety practices throughout our facilities. Through AFPM's safety programs, we facilitate information and practice sharing, training and other educational opportunities to allow facilities to learn from each other and continuously improve safety across industry.

### ADVANCING PROCESS SAFETY



#### Advancing Process Safety

Advancing Process Safety (APS) is AFPM's flagship safety program developed more than ten years ago to promote collaboration and continuous improvement in process safety at refining and petrochemical facilities across the country. This voluntary program includes data collection, knowledge sharing and other tools and resources to support improved process safety throughout the industry.

- **Walk the Line:** Employee human performance program directed at operators that provides a toolbox of training materials and good 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 and Outreach Group:** Industry data analysis that identifies opportunities for improvement for APS and conducts monthly industry webinars.



#### 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; these tools 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. We are currently expanding these groups to include contractors.



#### Immersive Learning Program

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.

## Emerging Technologies

The fuel and petrochemical industries continually adopt innovative and cutting-edge technologies to improve our operations, particularly as it relates to safety. From using virtual reality to safely train operators in proper emergency response procedures to employing patches that transmit biometric information in real time to ensure that operators are working in safe conditions, our industries continually seek out and deploy the technologies that keep employees safe.



- **ExxonMobil** has embraced virtual reality to train its operators to respond to critical situations that thankfully do not come along often. In Baton Rouge, ExxonMobil worked with eight local IT firms to develop VR training modules for its Polypropylene Growth Project, allowing operators to safely practice critical tasks like emergency response and hazard identification.<sup>53</sup>



- **Chevron** is piloting a wearable skin patch that could provide real-time analysis of motion, sweat loss and electrolyte loss to better identify conditions that can lead to heat stress, let workers know when they need to take a break and even give recommendations on fluid and electrolyte replenishment.<sup>54</sup>



- **Phillips 66's** new Advanced Integrated Mechanical Integrity project is helping refineries to detect corrosion threats even earlier. The program systematically standardizes, validates and digitizes design and process information to improve inspection planning, communication across operating groups, access to information and adding the ability to link corrosion threats to specific equipment while enabling the sharing of findings across the entire site.<sup>55</sup>



- **INEOS** is using a cutting-edge ultrasonic device that locates compressed air and control air leaks over a distance of 50 meters. Its ability to identify the exact location of leaks helps the team reduce safety risks by immediately identifying whether the leak is safely accessible.<sup>56</sup>



- **Marathon** has been using a smart helmet (a camera-affixed hard hat) that enables real-time video communication with offsite users to aid in troubleshooting, collaboration and training. Marathon was also able to use this technology to give EPA officials a virtual tour of their Lansing terminal and demonstrate the loading process in real time when the EPA was not yet authorizing travel due to COVID restrictions.<sup>57</sup>

Our industries continually seek out and deploy the technologies that keep employees safe.

# AFPM Rolls Out Its Immersive Learning Virtual Reality Simulation

**The fuel and petrochemical industries are both exceptionally complex and extremely safe, which creates a quandary: How do you provide employee training for complicated tasks that happen infrequently but need to be handled safely?**

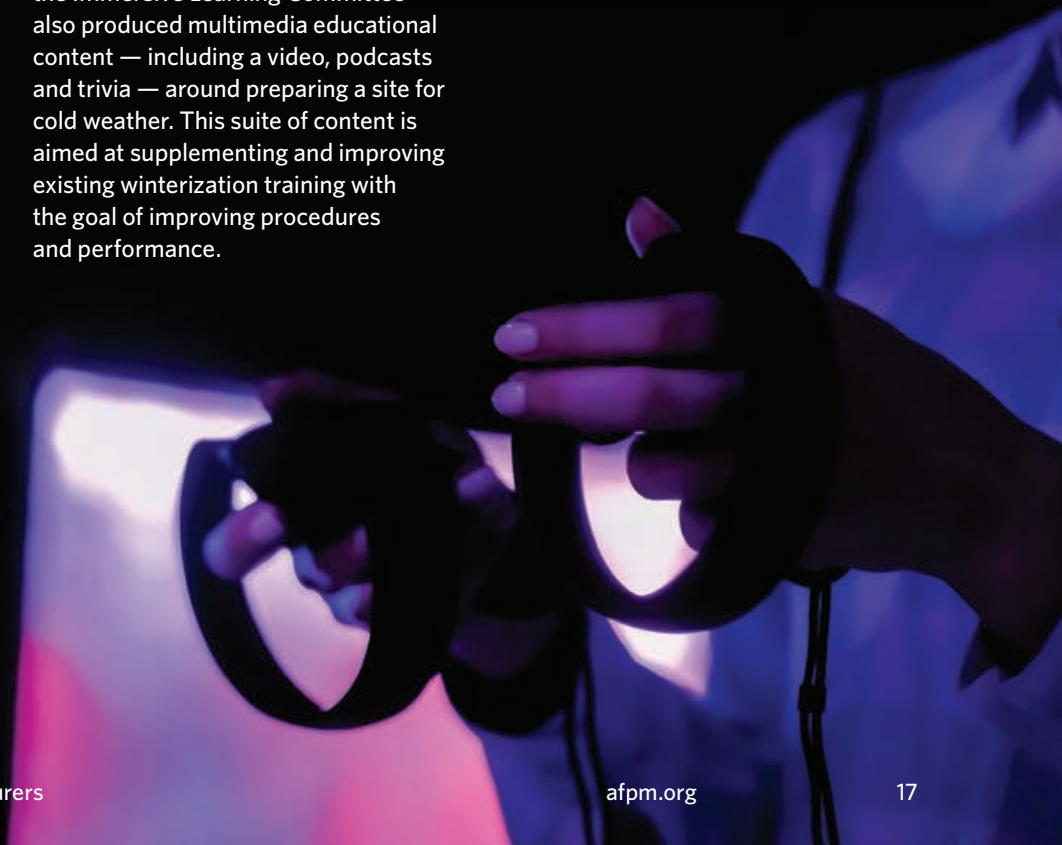
AFPM's Immersive Learning Committee is creating custom-designed multimedia and cutting-edge educational content to tackle this challenge. These resources are designed to raise the education levels and awareness of hazards industry-wide, while facilitating knowledge- and practice-sharing opportunities to continue the communal drive towards zero safety incidents. As an additional benefit, these initiatives offer the opportunity to research and test different immersive learning techniques while refining approaches to obtain maximum knowledge retention and learning.

The first Immersive Learning virtual reality (VR) project involved a simulation of how to start a fired heater — which is a piece of equipment used to heat up the feedstock and product to a specific temperature to facilitate the desired chemical reaction needed to create the final product — from a cold start. This is an infrequent task that nonetheless needs to be done properly to maintain safety, making it the kind of “low-frequency, high-consequence” training that lends itself to VR.

Such simulations give employees the experience of “hands on” training with added benefits: they can fail without any safety hazards and can repeat the training as many times as necessary to understand the steps required, why each step is needed and the consequences of not following the procedures in the right order. The VR learning process also provides real-time data on how trainees are doing and where there are opportunities for improvement, allowing for further optimization of the procedures learning process.

In addition to the fired heater simulation and web-based module, which were rolled out in early 2023, AFPM and the Immersive Learning Committee also produced multimedia educational content — including a video, podcasts and trivia — around preparing a site for cold weather. This suite of content is aimed at supplementing and improving existing winterization training with the goal of improving procedures and performance.

“AFPM and the Immersive Learning Committee are committed to developing educational resources to get the right information to the right people at the right time in order to improve retention and recall, since education is a cornerstone of safety,” said AFPM Vice President of Technical and Safety Programs Lara Swett. “By pooling our collective knowledge to ensure that all AFPM members have access to high-quality industry resources, using innovative and emerging technologies, and sharing insights back with member companies, our industries can continuously learn and improve ... together.”



## Supporting Community Safety

For AFPM members, safety doesn't stop at the facility gates. Our companies work closely with their local communities to increase safety in concrete ways such as volunteering, donating safety equipment and training emergency responders.



MPLX is helping a volunteer fire department improve its safety, efficiency and communication after several wildfires in Western Oklahoma.



CPChem's Pasadena Plastics Complex surprised Kruse Elementary students in Pasadena, Texas with a special campus visit during Fire Prevention Week.



Plains awarded \$25,000 to the Northeast Midland County Volunteer Fire Department towards the expansion of their fire station and training.

- In 2022, **Motiva** inaugurated a First Responder Grant Program, awarding almost \$130,000 to 17 emergency response organizations to fund safety equipment, professional training and safety education programs.<sup>58</sup>
- **Placid Refining** lends its expertise to both the North and West Baton Rouge Parish Emergency Response Task Forces, as well as sponsoring and participating in a "Safety Town" for West Baton Rouge parish first-graders to teach them basic safety information.<sup>59</sup>
- **Marathon's** midstream segment, MPLX, helped out the Butler, Oklahoma Volunteer Fire Department with a \$17,000 grant — and also provided a \$500 donation to each of the 10 fire departments located in the county to help them support their community.<sup>60</sup>
- **Chevron Phillips Chemical** facilities routinely donate to their local community and volunteer fire departments. Recent donations by Texas facilities include SCBA full face respirator masks, battery-operated extraction tools, firefighting supplies and even two firetrucks valued at nearly \$60,000.<sup>61</sup>
- In 2021, **Plains** awarded over \$250,000 to 25 different first responder organizations, including: \$25,000 to the Northeast Midland County Volunteer Fire Department (in partnership with an upstream partner) towards the expansion of their fire station to increase equipment storage and training space, \$25,000 to the National Spill Control School at Texas A&M University-Corpus Christi for the purchase of new hazardous waste operations and emergency response equipment, \$3,600 to Grady County Emergency Management in Oklahoma for the purchase of handheld radios for the Emergency Management Office, \$30,000 to the Wildlife Center of Texas for general operation costs, and \$20,000 to Cheyenne Fire Rescue in Wyoming for a spill response trailer and equipment.<sup>62</sup>



U.S. fuel and petrochemical manufacturers take seriously our role and opportunity to be anchors in our communities. We strengthen our economies through the jobs we create; through workforce training and development initiatives; by fostering diverse, equitable and inclusive communities; and through programs and efforts that support the specific needs in our communities.

# Thriving People & Communities



## Fostering Diverse, Equitable and Inclusive (DE&I) Workplaces and Communities

### DE&I In the Workplace

Within their companies, AFPM members are taking steps to recruit and support talented people from traditionally underrepresented groups and to ensure that all employees are being heard and valued. From developing data-driven organizational assessment tools to engaging with nationally recognized DE&I experts, members are actively spurring organizational change in pursuit of greater diversity, equity and inclusion.

**Phillips 66** developed a data-driven inclusion and diversity organizational assessment, which ensures that they focus their efforts and resources of each business unit on the areas that will have the most impact.<sup>63</sup>

**LyondellBasell** rolled out live DEI training to employees worldwide, providing them with the opportunity to develop skills that will enhance inclusion in the workplace. By the end of 2021, 98 percent of all leaders, professional and administrative employees globally completed required DEI training and a total of 14,000 additional training courses were completed voluntarily.<sup>64</sup>

**Cenovus** rolled out its new purpose and values commitments — which focus on inclusion, belonging and psychological safety — as well as launching its Expect Respect campaign and expanding its employee resource groups, which focus on women, Indigenous employees, LGBTQ+ pride, persons with disabilities and multiculturalism.<sup>65</sup>

**Chevron Phillips Chemical** collaborated with a nationally recognized DE&I consultant to publish a seven-part series to encourage employee discussions about racism and social injustice. They also created a DE&I Blueprint to further mobilize culture initiatives at U.S. facilities to maintain equitable workplaces.<sup>66</sup>

**Chevron Phillips Chemical** supports their employees with six employee resource groups, including: STRIVE (women), PRIDE (LGBTQ+), HOLA (employees of Hispanic origin), BELIEVE (Black employees), InspirAsian (Asian employees) and VETNET (veterans).<sup>67</sup>

**PBF** is a member of the Corporate Partnership Council (CPC) of the Society of Women Engineers (SWE). The CPC focuses on sharing best practices, addressing retention and advancement issues and partnering on diversity initiatives. A group of PBF engineers will be participating in the Society of Women Engineer's annual conference.<sup>68</sup>

## Creating Jobs and Economic Impact

The fuel and petrochemical industries employ and train people with diverse backgrounds and skillsets in millions of well-paying, highly skilled jobs in the United States — with compensation that is two to three times greater than that of the average U.S. worker. In addition, these industries contributed hundreds of billions of dollars to the U.S. economy and pay tens of billions of dollars in taxes.<sup>69</sup> Our employees are proud of the fact that they are contributing to the betterment of society by manufacturing products that improve and save lives; advance healthcare, mobility and technology; and underpin the global economy.



## Industry Awards and Recognitions

AFPM members are increasingly recognized by outside groups for their efforts to promote DE&I throughout their companies.



**Chevron, Marathon, Dow, Eastman and Emerson** have scored 100 on the Human Rights Campaign Foundation's 2022 Corporate Equality Index, the nation's foremost benchmarking survey and report measuring corporate policies and practices related to LGBTQ+ workplace equality. Chevron and Dow have each earned this distinction for 17 years in a row.<sup>70</sup>



**Dow, Eastman and ExxonMobil** have been included in JUST Capital's list of America's 100 most JUST Companies.<sup>71</sup>



**Chevron, Dow** earn top marks in Disability Equality Index.<sup>72</sup>



**Chevron Phillips Chemical:** America's Best Employers (#32, Forbes Awards).<sup>73</sup>



**Emerson:** Ranked #12 by Women Engineer Magazine's list of top employers.<sup>74</sup>



For the fifth consecutive year **LyondellBasell** was named to FORTUNE Magazine's 2022 list of the "World's Most Admired Companies".<sup>75</sup>



**Phillips 66:** Top 50 workplace for Indigenous STEM Professionals awarded by AISES Winds of Change Magazine.<sup>76</sup>



## DE&I In Our Communities

The fuel and petrochemical industries are also working to advance diversity, equity and inclusion outside of our facilities by increasing educational access to underserved groups, funding and partnering with coalitions that seek to dismantle systemic racism through employment, and training and supporting local nonprofits' community development initiatives.

- **Chevron** has developed Environmental Justice Principles to guide engagement with stakeholders and complement efforts to advance racial equity, respect human rights and protect people and the environment.<sup>77</sup>
- **Monroe Energy** is helping to close the digital divide amongst schoolchildren by donating gently used computers, printers and monitors.<sup>78</sup>
- **Emerson Automation Services** has vowed to dedicate \$200 million over the next 10 years to address education inequity needs, focusing on the developmental and educational needs of early childhood through high school children in under-resourced communities.<sup>79</sup>
- **Phillips 66** provided a grant for Crow Tribe education to the Plenty Doors Community Development Corporation in Montana, supporting the nonprofit's efforts to increase food access, cultural sharing and small business resources.<sup>80</sup>
- **PBF's** Toledo Refining Company donated \$100,000 to help make East Toledo more accessible for those with disabilities.<sup>81</sup>
- In the Salt Lake City area, **Marathon** established the Marathon Petroleum Tuition Gap Fund Program at the Uintah Basin Technical College to support students, including those from the Ute Tribe, to help address remaining tuition balances when grants, scholarships or tribe subsidies fall short.<sup>82</sup>
- As a result of a donation from **Cenovus Energy's** Superior Refinery, a local nonprofit will be able to give veterans with disabilities or PTSD the opportunity to connect with fellow veterans during a week of fishing, camping and canoeing — offering veterans a respite from the noise and stress of the outside world in a supportive, healing environment.<sup>83</sup>
- **Dow** has allocated \$13 million to Dow ACTs, a framework for addressing systemic racism and inequality, and has joined a coalition of businesses pledging to upskill, hire and advance one million black individuals in the United States over the next 10 years.<sup>84</sup>
- **Valero** made a financial commitment to develop the River Parishes Community College at the St. Charles, Louisiana Campus in an ongoing effort to reduce poverty, provide workforce training and facilitate upward mobility. The new vocational school provides residents with the opportunity to obtain an associate degree in Process Technology or Instrumentation, opening the path to high-paying careers.<sup>85</sup>



Our industries advance racial equity, respect human rights and protect people and the environment.

## Developing the Future Workforce

Given the complex and high-tech nature of our industries, fuel and petrochemical companies have a vested interest in advancing STEM education to help those interested in building careers in our industries — as well as future generations more broadly — obtain the background they need to successfully compete in tomorrow’s economy. AFPM members also invest significantly in training and educational programs to help students obtain the necessary skills and knowledge to secure the high-paying jobs offered by our industries.

### Investing in STEM Education

Increasing interest and uptake in science, technology, engineering and math (STEM) among today’s youth is critical for ensuring we have a strong pipeline of talent to comprise the future fuel and petrochemical manufacturing workforce. AFPM members are making significant financial contributions to and building their own STEM programs serving as mentors and coaches to encourage and provide more students opportunities to thrive in these important fields of study.

**Phillips 66** contributed \$110,000 to the American Indian Science and Engineering Society to help encourage indigenous students to study STEM.<sup>86</sup>

In 2022, **Motiva Enterprises** awarded \$225,000 in scholarships to 42 high school graduates to aid them in the pursuit of STEM- or business-related associate, undergraduate or vocational degrees. To date, Motiva has awarded more than \$2.7 million in scholarships.<sup>87</sup>

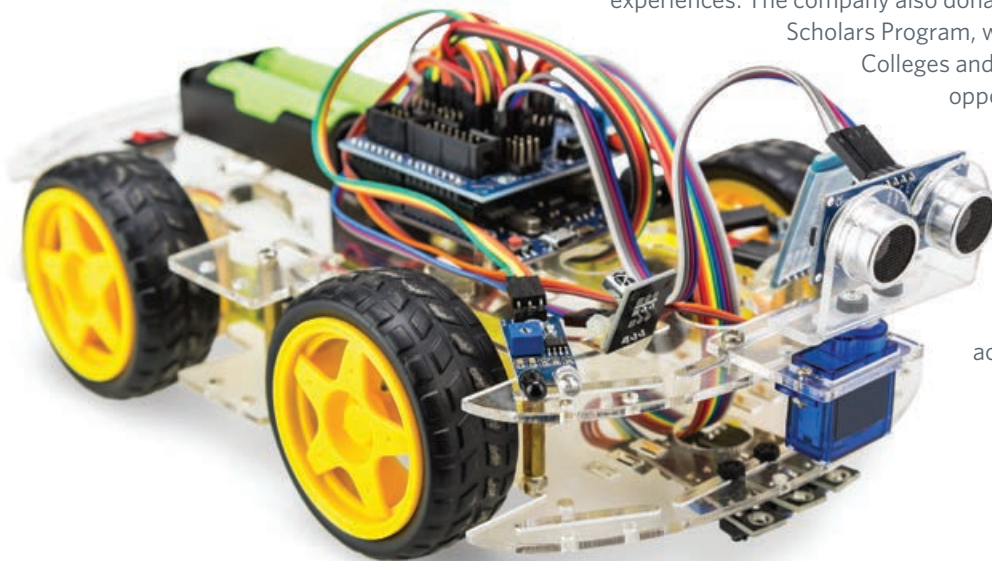
**INEOS Styrolution** is supporting Mission Fulfilled 2030, a nonprofit that works to provide educational opportunities to underfunded and underrepresented youth, with a goal of building 10,000 mentors and coaches of color by 2030 to help accelerate diversity gains in STEM fields.<sup>88</sup>

**Marathon’s** Martinez Renewable Fuels team gave a grant to the USS Hornet Sea, Air and Space Museum to help advance the museum’s Step into Technology STEM High School vocational program, which teaches high school students about the scientific applications of technology from the WWII-era aircraft carrier.<sup>89</sup>

**CITGO’s** Distinguished Scholars program assists students in their efforts to complete two- or four-year university degrees; scholars are recognized not only for academic excellence but also for distinction in categories including Career & Technical Education, STEM, Beating the Odds and Service & Leadership.<sup>90</sup>

**Chevron Phillips Chemical** employees volunteered their expertise and support for under-represented fifth graders at the St. Elmo Brady STEM program in Houston, which aims to empower and inspire students to become the next generation of engineers, scientists and technologist through hands-on STEM experiences. The company also donated \$720,000 to the Future of STEM Scholars Program, which works with 15 Historically Black Colleges and Universities to expand STEM career opportunities.<sup>91</sup>

**Ergon** proudly sponsors the Summer Bridge Program at Mississippi State University via a \$900,000 donation over the next three years. The program supports newly admitted engineering students by developing critical skills for academic success.<sup>92</sup>



### Supporting Skills Training

The fuel and petrochemical manufacturing industries invest significant resources in helping aspiring employees gain the needed skills and proficiencies to be successful in our industries. In addition to offering training opportunities, internships and apprenticeships, AFPM members generously support external academic and occupational training programs to help prepare the young people of our communities for jobs in our industries.

- **Marathon** provided a \$274,000 grant, industry-grade equipment and guidance for a unique training program that connects local high school students with the El Paso Community College to earn advanced welding certifications and an associate degree. Marathon also provided expertise about industry standards, shaped the curricula, and El Paso refinery employees served as mentors.<sup>93</sup>
- **Emerson Automation Solutions** has committed \$500,000 to help establish a Center for Advanced Manufacturing at the Ozarks Technical Community College, which will help educate students about modern manufacturing methods, robotics, mechatronics and automation.<sup>94</sup>
- **Cenovus Superior Refinery** donated \$50,000 to assist in buying a generator for the Northwood Technical College's new mobile welding lab.<sup>95</sup>
- To celebrate the Lima Refinery's 135th anniversary, **Cenovus Energy** has announced a \$250,000 investment in MakerSpace, an organization helping develop skilled professionals — providing space to hone their craft, collaborate with others and advance their careers. This investment will help fund general skilled trades, a process operator certification and other skill development activities at a new development in downtown Lima, Ohio.<sup>96</sup>
- **Hunt Refining** participates in a Co-Op program with Shelton State Community College, providing students with industry work experience for an hourly wage as well as tuition, books and class fees.<sup>97</sup>
- **BASF** expanded its North American Apprenticeship Development Program, providing on-the-job training and the opportunity to earn industry-recognized credentials while earning a full-time wage to almost 100 apprentices in 20 manufacturing facilities around the country.<sup>98</sup>
- In Port Arthur, Texas, **Valero** has partnered with Port Arthur Industry Group since 2000 to provide college scholarships to Port Arthur residents interested in STEM-related careers. In addition, Valero also partners with Lamar State College in Port Arthur to stimulate and support community-based workforce with technical degrees.<sup>99</sup>
- For more than 15 years, **Plains** has partnered with Genesys Works, a Houston-based career readiness nonprofit that provides high school students in underserved communities with skills training, meaningful work experience and impactful relationships. Additionally, in 2019, Plains formalized their technical school internship program for field offices, offering students valuable hands-on experience at select locations. In 2021, Plains offered job opportunities to seven interns specifically enrolled in either field operations or engineering programs.<sup>100</sup>



### Giving Back To Our Communities

Our industries are not just philanthropic pillars of their communities, they are also woven into the fabric of their neighborhoods. Employees are committed to giving back to the communities in which they operate and live, and demonstrate that commitment through financial giving, service and volunteering. From mentoring students to training local first responders to partnering with local nonprofits to protect wildlife, fuel and petrochemical manufacturing employees are actively engaged in their communities.



- In 2021, **ExxonMobil** donated \$34 million to U.S. communities, including the Red Cross, Feeding America and Rebuilding Together. Since 2000, ExxonMobil has contributed over \$1.3 billion to educational programs around the globe.<sup>101</sup>
- Since 2012, **Phillips 66** has donated \$250 million to charities. In 2021 alone, they donated \$27 million, with \$10.5 million going to support education and literacy efforts.<sup>102</sup>
- **Emerson** and its charitable trust contributed nearly \$24 million to more than 1,100 charities, nonprofits and educational institutions, donating over \$300 million in the past decade.<sup>103</sup>
- In a single year, **Valero** and the Valero Energy Foundation generated more than \$62 million for charities, with over \$17 million going to support United Way chapters across the U.S. and \$5.8 million supporting healthcare needs such as the Driscoll Children's Hospital in South Texas, a Mobile Mammography Unit and an Alzheimer's Unit at the University of Texas Health Science Center.<sup>104</sup>
- **Chevron** has committed over \$15 million to address racial inequality in the U.S.<sup>105</sup>
- **LyondellBasell** gave a total of \$10.5 million in grants to 1,300 charities in the communities where they live and work worldwide.<sup>106</sup>
- **Placid Refining Company** employees are active participants in their community, supporting the United Way, St. Jude's Children's Hospital and the "Adopt an Angel" program.<sup>107</sup>
- For over 30 years, employees at **CITGO's** Lemont Refinery have held food drives each fall to benefit local food pantries ahead of the winter season, helping to support the most food insecure populations in their community.<sup>108</sup>
- **CountryMark's** Fueling Freedom campaign raised more than \$63,000 to support local National Guard Family Readiness Groups and United Service Organizations.<sup>109</sup>



Thriving People & Communities Spotlight

# Helping Out After the Storm

AFPM members have a long history of marshalling financial assistance, employee volunteers and their impressive logistics and resources to help storm-struck communities recover from catastrophic events.

Take the industry response to Hurricane Ian, which pummeled Florida in September 2022. **Chevron** quickly pledged \$500,000 to relief and recovery organizations like the American Red Cross and Team Rubicon, and also matched qualified donations by employees and retirees to hurricane relief organizations.<sup>110</sup> **Phillips 66** similarly donated \$250,000 to the American Red Cross to aid recovery efforts.<sup>111</sup> And the San Antonio Zoo was able to send its Zoo Disaster Relief Program recovery crew to Florida to help out after Hurricane Ian, thanks to a generous donation of gas cards from **Valero**.<sup>112</sup>

Such actions are hardly unusual, as industry response to Hurricane Ida showed.


**Valero** immediately deployed its recovery team and within one week had supported hurricane-struck communities with 9,400 meals, 35,000 gallons of fuel for vehicles and generators, 700 gas cans, 200 chainsaws, 200 residential generators and 300 extension cords. They also helped repair 165 homes.<sup>113</sup>

**Valero** also worked with the St. Charles, Louisiana government to help feed emergency responders, residents and school personnel, providing more than 5,400 meals and hundreds of cases of bottled water. To further support first responders and Parish officials, Valero distributed fuel cards.<sup>114</sup>

On top of their on-the-ground support, **Valero** also donated \$500,000 to nonprofits aiding recovery efforts, which included \$250,000 to The American Red Cross for relief needs, including shelter, cleaning supplies and other basic necessities for displaced residents; \$200,000 to Convoy of Hope for hygiene kit distribution; and \$50,000 to Second Harvest Food Bank to provide meals for hurricane-affected families.<sup>115</sup>

**Ergon** similarly continued its tradition of providing hurricane disaster relief as it has since 2005, offering hot meals and support to first responders and communities.<sup>116</sup>

And long after media attention has moved on, AFPM members are still helping communities rebuild. Almost nine months after Hurricane Ida, dozens of **Marathon** volunteers worked to provide free home repairs to residents in LaPlace, Louisiana. Marathon also supported the effort with a \$400,000 grant to pay for building materials that the volunteers used to repair roofs, paint homes and clear debris — a sum that is in addition to the \$2 million Marathon has already donated for Hurricane Ida relief and recovery.<sup>117</sup>

An aerial satellite-style photograph of a large hurricane system over the ocean. The eye of the storm is visible in the upper left, surrounded by dense, swirling white clouds. The surrounding ocean is a deep blue, with some lighter blue areas indicating shallow water or coral reefs. The top portion of the image is overlaid with a bright orange and yellow gradient, which serves as a background for the text.

“We’ve shown what happens when everyone comes together for the betterment of our community. We not only help each other endure challenges like Hurricane Ida, but we develop programs and initiatives that make our community stronger.”<sup>118</sup>

— Michael Henschen, Vice President of Refining  
Marathon Petroleum

AFPM members continue to challenge the status quo by identifying and pursuing innovations to solve the challenges of tomorrow. U.S. fuel and petrochemical manufacturers are bringing lower-carbon intensity fuels to market, creating a more circular economy for plastics and pushing the outer edges of innovation to create breakthroughs that will be the foundation of a lower-carbon future for decades to come.

# Driving Progress

## Creating A Lower-Carbon Future

The increased demand for lower-carbon operations and products will require innovative technological advances — and considerable investments in infrastructure development — that the fuel and petrochemical industries are uniquely positioned to provide. AFPM members are investing millions each year in both adjacent-possible and next-generation technologies, ranging from making hydrogen fuel from landfill methane to turning captured CO<sub>2</sub> into sustainable aviation fuel and using renewable feedstocks to produce lower-carbon polymers.



Petrochemical manufacturers are using renewable feedstocks to produce the building blocks for the plastics that make modern life possible.




AFPM members are investing more in scaling the production of lower carbon intensity fuels like renewable diesel and sustainable aviation fuel than ever before.



Refiners are expanding their expertise to develop and scale hydrogen both in the U.S. and abroad.





## Scaling Lower Carbon Fuels

As demand for lower-carbon fuels increases, U.S. fuel refiners continue to scale and make new investments and breakthroughs in fuels such as renewable diesel, sustainable aviation fuel and lower-carbon hydrogen.

### Renewable Diesel

- **Valero** is the world's largest producer of renewable diesel and has grown in capacity to meet demand. A new plant started up in 2022 increased annual production capacity to 1.2 billion gallons of renewable diesel and 50 million gallons of renewable naphtha.<sup>119</sup>
- **Marathon** and **ADM** have joined forces to build a dedicated soybean processing plant in Spiritwood, North Dakota that is expected to produce approximately 600 million pounds of refined vegetable oil annually. This oil will serve as a feedstock for renewable diesel — enough to create roughly 75 million gallons of renewable diesel each year.<sup>120</sup>
- **ExxonMobil** has invested \$125 million in Global Clean Energy Holdings Inc., the leading global producer of camelina, a fast-growing non-food oilseed crop suitable for using as a renewable diesel feedstock.<sup>121</sup>
- **CVR Energy** successfully converted the hydrocracker at its Wynnewood refinery to produce renewable diesel and the unit has been producing renewable diesel at capacity since October 2022.<sup>122</sup>
- **Chevron** completed the acquisition of **Renewable Energy Group (REG)**, helping Chevron become a leading U.S. renewable fuel company while accelerating Chevron's progress toward its goal of growing renewable fuels capacity to 100 thousand barrels per day by 2030. REG is the country's leading biodiesel producer, operates the United States' first renewable diesel facility and has extensive pre-treatment facilities to process lower-cost waste-based feedstocks.<sup>123</sup>
- **Chevron** is partnering with **CoverCress Inc.** and **Bunge** to bring CoverCress, a new renewable oilseed and animal feed crop, to market. CoverCress is a winter oilseed crop that fits into existing corn and soybean rotations, bringing farmers additional revenue as well as the decreased nitrogen loss and overall soil health that comes from cover crops.<sup>124</sup>
- **Chevron's** El Segundo Refinery is the first refinery in the United States — and one of the first few in the world — to ratably co-process biofeedstock to make gasoline, jet fuel and diesel fuel with renewable content and lower carbon intensity. El Segundo is now co-processing about 2,000 barrels of biofeedstock. Chevron has secured all renewable feedstock at the refinery for the diesel hydrotreater. With its capital-efficient approach to unit conversions, the unit should achieve 100 percent renewable capability in 2022.<sup>125</sup>

Sustainable aviation fuel has the potential to significantly reduce emissions from the aviation sector.

### Sustainable Aviation Fuel (SAF)

- **Par Pacific** and **Hawaiian Airlines** are studying the viability of converting one of Par's processing units at its Kapolei refinery to produce sustainable aviation fuel, using either locally grown oil-yielding crops or imported sustainable feedstocks.<sup>126</sup>
- **Air Products** is partnering with **World Energy** to build a \$2 billion expansion project at World Energy's SAF hub in Paramount, California, expanding its total fuel capacity to 340 million gallons annually.<sup>127</sup>
- **Johnson Matthey** has announced a new technology that has the ability to create sustainable aviation fuel from captured CO<sub>2</sub> and green hydrogen.<sup>128</sup>
- **Chevron** joined the Clean Skies for Tomorrow Coalition, which is working to increase supply of SAF.<sup>129</sup>



## Hydrogen

- In an agreement with Iwatani, **Chevron** has also announced plans to co-develop and construct 30 hydrogen fueling stations across California by 2026 at its branded retail locations. Some of the fueling sites may be supplied by the Richmond refinery.<sup>130</sup>
- **Phillips 66** is working with **H2 Energy Europe** to develop up to 250 hydrogen fueling stations in Germany, Austria and Denmark by 2026, building upon their existing hydrogen fueling program via their Swiss joint venture.<sup>131</sup>
- **INEOS** is constructing a world-scale low-carbon hydrogen plant in Grangemouth, Scotland and is working to create a hub for the production, distribution and export of hydrogen.<sup>132</sup>
- **Air Products** is building a new hydrogen plant and extending its existing hydrogen pipeline in southern California as a part of its sustainable aviation fuel agreement with World Energy.<sup>133</sup>

## Integrating Renewable Chemical Feedstocks

Petrochemical manufacturers are also meeting consumer demand for lower-carbon products by incorporating renewable feedstocks into their products to lower their carbon footprint without compromising quality or performance.

- **LyondellBasell** is using renewable-based raw materials, such as used cooking oil to produce new polymers that have a lower-GHG footprint over the product life cycle. In 2021, the company announced production of polypropylene and polyethylene at a commercial scale with mass balance certificates or measurable C14 content from renewable-based feedstocks. The renewable-based feedstocks can be used in their existing manufacturing processes.<sup>134</sup>
- **Dow** has created paints that contain bio-based binders, with up to 35 percent of the bio-based carbon coming from renewable feedstocks.<sup>135</sup>



## Creating a More Circular Economy for Plastics

Plastic — essential for everything from reducing food waste to light-weighting vehicles to make them more fuel-efficient — has a critical role to play in a more sustainable future. Plastic waste, however, requires urgent action. Through their commitment to address the plastic waste challenge and their significant investment in building a circular plastics ecosystem, AFPM members are working at every stage in the process of closing the loop on plastic waste. They are working to improve waste collection, scaling advanced recycling technologies, collaborating with their customers to increase recycled content in plastics and are developing technologies to measure and track circular plastic feedstocks.

### Improving Waste Collection

The potential of advanced recycling relies on improvements in collecting waste that can be turned into feedstocks. To that end, AFPM members are working together, with partners and with government to improve waste collection systems across the country and the world.

- The City of Houston, **LyondellBasell**, **ExxonMobil**, **Cyclix International** and **FCC Environmental Services** formed the Houston Recycling Collaboration to focus on increasing the city's recycling rate and creating pathways for plastic waste to be used to create recycled plastic materials.<sup>136</sup>
- **LyondellBasell** and **Dow** are founding partners in the Closed Loop Circular Plastics Fund, which invests in technologies, practices and projects to increase the recovery and recycling of plastic waste in North America.<sup>137</sup>
- **Dow** and **WM** are collaborating on a pilot program in Hickory Hills, Illinois to facilitate curbside recycling of hard-to-recycle plastic films — in products such as bread bags, cling film and dry-cleaning bags — in a pilot scheme taking place in the U.S. city of Hickory Hills, Illinois.<sup>138</sup>

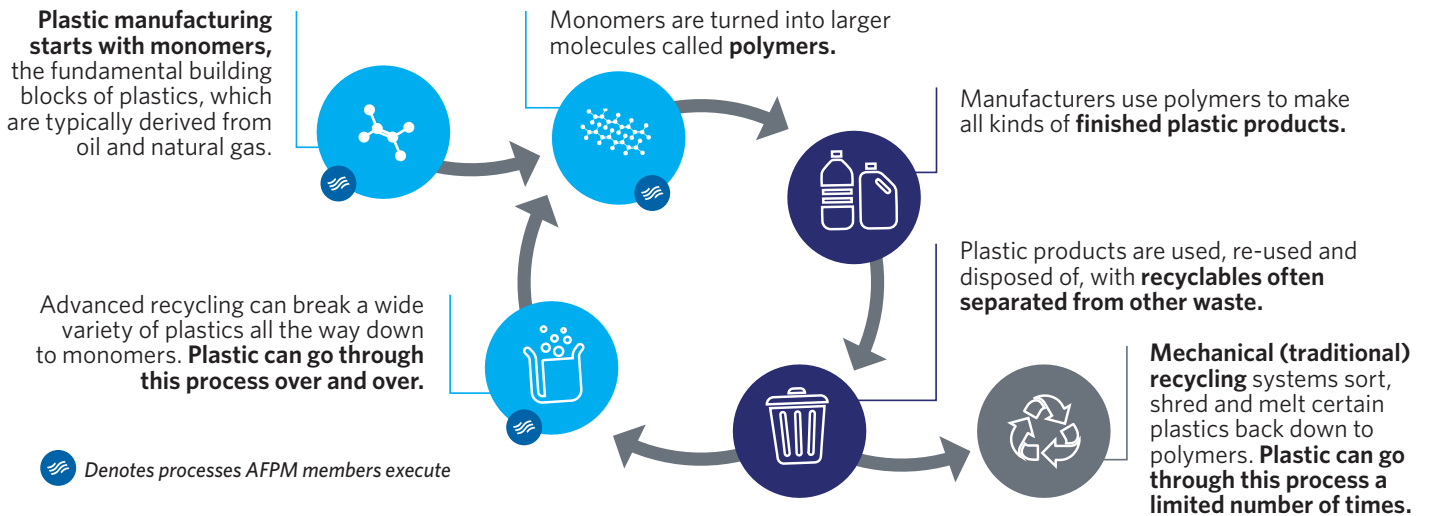


## Growing Advanced Recycling Capabilities

U.S. petrochemical manufacturers are scaling their investments in advanced recycling technologies that are vital to increasing the circularity of plastics. Advanced recycling comprises technologies that break down plastic waste into its original polymer, or “building blocks” and then recreated into new materials.

- INEOS** has developed technology that allows currently unrecyclable PET plastic waste, such as colored bottles or black food trays, to gain a second life through advanced recycling. The technology is currently being piloted at their Naperville, Illinois facility in preparation for scaling globally.<sup>139</sup> INEOS is also investing in new technology to enable the development of more recyclable flexible packaging film, which could help prevent roughly one million metric tons of plastic waste each year.<sup>140</sup>
- ExxonMobil**'s advanced recycling facility in Baytown, Texas processed almost four million pounds of plastic waste last year — the equivalent of recycling about 360 million grocery bags. By year end 2026, ExxonMobil plans to build facilities around the world with the capacity to process one billion pounds of plastic waste each year.<sup>141</sup>
- Chevron Phillips Chemical** has announced the first commercial sales of Marlex® Anew™ Circular Polyethylene and is working to further expand production volumes. In a trial run at the Chevron Pascagoula Refinery alone, the amount of pyrolysis oil processed via advanced recycling methods equates to turning two million one-gallon milk jugs into feedstock.<sup>142</sup>
- Chevron Phillips Chemical** is working with industry partners to analyze the performance of post-use plastic waste in asphalt, using the equivalent of more than 191,000 plastic bags to pave a 67,000-square-foot parking lot at its facility in Port Arthur, Texas.<sup>143</sup>
- SABIC** has created a new ISCC+ Certified bio-based polycarbonate copolymer to help reduce the carbon footprint of the consumer electronics industry.<sup>144</sup>
- Dow** has created a mattress recycling program that diverts mattresses from landfills and incinerators to its industrial-scale chemical recycling facility in France, where Dow uses advanced recycling to turn the foam back into polyol. This polyol can then be used to make new mattresses, insulation and other materials — with the benefit of over 50 percent reduction in CO<sub>2</sub>-equivalent emissions when compared with standard processes.<sup>145</sup>
- End-of-life artificial turf fields from 50 Californian high schools and colleges — including Stanford University — are being diverted from landfills thanks to a partnership between **Exxon, Cyclix** and a leading artificial turf producer. The turf fields will be processed by Cyclix and then sent to Exxon's Baytown, Texas advanced recycling facility.<sup>146</sup>

## ADVANCED RECYCLING



## Customer Collaborations

As demand for more sustainable consumer goods increases, U.S. petrochemical manufacturers are partnering with big brands to incorporate more recycled content into their products.

- **SABIC** collaborated with Mattel to create advanced recycling products that have been incorporated into Mattel’s toys ranging from Matchbox to MEGA BLOKS, including the MEGA BLOKS Green Town — the first mass-retail toy line that has been certified to be carbon neutral.<sup>147</sup>
- **LyondellBasell** worked with Berry Global to support Wendy’s move from a selection of plastic-lined paper cups with limited recyclability to single-substrate, clear plastic drink cups that more consumers will be able to recycle — an important pathway toward circularity.<sup>148</sup>
- **Dow Chemical, Reynolds Consumer Products and ByFusion** collaborated on the Hefty EnergyBag program, which uses a no-emissions process to make items like bus shelters and benches from hard-to-recycle plastic waste gathered in local communities.<sup>149</sup>
- **INEOS Styrolution and BASF** have partnered to create styrene-based polymers made from renewable feedstock such as organic waste or vegetable oils. These “plug-in” styrenics solutions are being used by consumer brands like BRITA for its water filter jugs, offering a reduced CO<sub>2</sub> footprint while maintaining the same qualities as styrenics materials produced from traditional feedstocks.<sup>150</sup>
- **Eastman Chemical** has worked with consumer brands ranging from Proctor & Gamble to Nalgene to scale advanced recycling and increase the amount of recycled plastic present in everyday items.<sup>151</sup>





## Tracking and Measuring Circularity

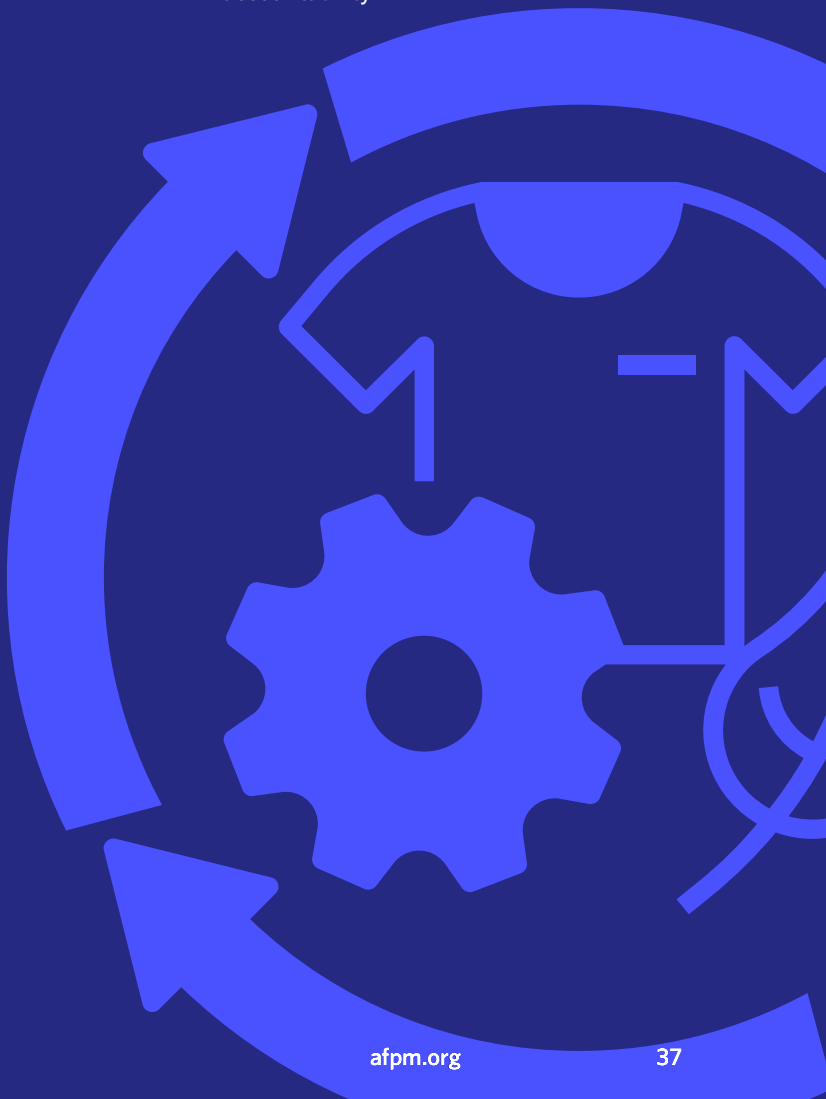
AFPM members are adding more accountability and transparency into the recycled content market by investing, creating and partnering with other groups to create technology to better track and measure the circularity of these products.



- **BASF Venture Capital** has invested in Oceanworks, a digital platform that works to bring traceability and transparency to the flow of recycled plastics. Proper tracking is crucial to ensure that companies are using ocean, ocean-bound and post-consumer plastic in creating their recycled materials.<sup>152</sup>



- **SABIC** has launched a pilot program to demonstrate the feasibility of using blockchain technology to support end-to-end digital traceability of circular feedstocks, tracking them through the petrochemical supply chain and providing transparency, auditability and accountability.<sup>153</sup>



## Driving Innovation

The fuel and petrochemical industries are world-renowned for their ingenuity, innovation and technical expertise and applying those skills to tackle the world's greatest challenges, as we are doing in pursuit of a sustainable future.

AFPM members are tackling the multiplicity of engineering, technological and infrastructure challenges required to pave the way for a more sustainable world, addressing emerging challenges and managing plastic waste while continuing to provide the products and technologies that make modern life possible.

- **Phillips 66, Marathon, ExxonMobil and Aramco** all provided their expertise to the Department of Energy for its six-year initiative to create a national road map for reducing transportation GHG emissions using alternative fuels. The researchers say their plan could improve the fuel economy of cars by 10 to 20 percent and cut truck pollution by as much as 99%.<sup>154</sup>
- **Chevron** is working with Texas A&M AgriLife to develop a “diesel nut,” a strain of peanut that lends itself to renewable fuel production and is better adapted to drier climates.<sup>155</sup>
- **ExxonMobil's** proprietary new technology allows methanol — which can be taken from the gasification of biomass and waste, lower-carbon hydrogen and captured CO<sub>2</sub> — to be converted into sustainable aviation fuel. This process can also be used to produce renewable diesel and lower-carbon chemical feedstocks.<sup>156</sup>
- Researchers from **ExxonMobil** and the University of California, Berkeley discovered a new metal organic framework material that captures and later releases CO<sub>2</sub> like an on/off switch for storage or utilization. It has the potential to capture more than 90 percent of CO<sub>2</sub> and could prove up to six times more effective than conventional approaches.<sup>157</sup>
- **Valero** is supporting Southwest Research Institute to develop a solid filtration membrane to remove CO<sub>2</sub> from the tailpipe of internal combustion engine vehicles, with a goal of creating an affordable solution to reduce CO<sub>2</sub> and life cycle GHG emissions.<sup>158</sup>
- **Dow** is building the world's first net-zero carbon emissions ethylene cracker in Alberta, Canada while simultaneously retrofitting existing assets to achieve net-zero facility emissions. This will include converting cracker off-gas into circular hydrogen to be used as a clean fuel, while carbon emissions are captured, transported and stored offsite.<sup>159</sup>
- **INEOS** has introduced its first styrene butadiene copolymer from 100 percent bio-attributed feedstock, with both the styrene and butadiene components from feedstocks that are not in competition with food production — creating a neutral or even negative carbon footprint for the materials.<sup>160</sup>
- **Phillips 66** received a \$3 million grant from the Department of Energy to advance its reversible Solid Oxide Fuel Cell (SOFC) research. SOFCs generate electricity by oxidizing a fuel, such as natural gas, through electrochemical reactions rather than via combustion. As a result, SOFCs have a 50 percent lower CO<sub>2</sub> footprint compared with conventional power plants, have no combustion emissions, don't produce noise and are an ideal technology for carbon capture.<sup>161</sup>
- **Ergon Armor** developed the Novocoat product line which contain no VOC's.<sup>162</sup>



# Innovators and Problem-solvers

Throughout their 170-year history, the fuel and petrochemical industries have developed a culture of innovation, ingenuity and grit that has helped them see potential where others see unsolvable problems. This has led to the invention of the fuels and products that now underpin modern life.

As these industries continue forging ahead, they will employ thousands of the world's leading engineers, scientists and inventors to find the answers on how to operate more efficiently and turn currently unused materials — including plastic waste, carbon and woody biomass, among many others — into affordable products that meet tomorrow's needs.

**ExxonMobil** alone counts 20,000 scientists and engineers among its employees. This group has received more than 10,000 patents and written more than 1,000 peer-reviewed publications in the past decade, helping to keep Exxon on the cutting-edge of lower-carbon fuels, more efficient processes and next-generation technologies.<sup>163</sup>

**Phillips 66**, meanwhile, has 399 active patents in a wide range of next-generation energy sources, including specialty carbon, premium coke, low-carbon hydrogen, solid oxide fuel cells, carbon capture, organic photovoltaics and biofuels.<sup>164</sup>

**Baker Hughes** was granted more than 2,500 patents in 2021, and it invested another \$492 million into research and development.<sup>165</sup>

**Ergon Asphalt & Emulsions** has contributed \$1,000,000 to the Asphalt Institute Foundation to promote industry innovation and were recently granted patents for use of sterol blends and sterol from animal waste as additives in asphalt binders. Not only that, Ergon Refining and Marketing released Hyvolt NE, a vegetable-based dielectric and cooling medium for use in new and existing power and distribution transformers.<sup>166</sup>

This innovative culture is deeply rooted and allows our industries to remain top-notch global competitors. Over the past 10 years, for instance, **Dow** has won more Edison Awards — which denote breakthrough innovations — than any other organization, cementing its status as an innovation juggernaut.<sup>167</sup>

This rich patent landscape results from talented innovators who are committed to improving the fuel and petrochemical industries. One of **Marathon's** engineers has been innovating for over 50 years — his ideas have led to 28 patents during that time.<sup>168</sup> Marathon was also recently granted three patents as a result of an innovative idea from Marathon's Senior Engineer, Kyle Miller. The technology allows MLPX to mix multiple crude components from separate tanks simultaneously and with precision, resulting in lower costs, lower energy use and a smaller footprint.<sup>169</sup> And two **Phillips 66** scientists — Jane Yao and Keith Lawson — have 100 patents just between the two of them. "We stand on the shoulder of giants," Lawson said. "We're just trying to carry on what the people before us have done."<sup>170</sup>

AFPM members have incorporated various internal governance systems — including new reporting structures, bonus criteria and procurement plans, among others — to hold themselves accountable to their climate goals. They also regularly review ESG issues to identify emerging sustainability areas that are materially relevant so that they can be included in their public reporting.

# Holding Ourselves Accountable



- While each **INEOS** business sets its own sustainability strategy, there is a group-wide Climate and Energy Network that coordinates these strategies and works with each business on carbon, energy and resource matters — sharing best practices, innovations and new business opportunities — and updates all business CEOs twice yearly.<sup>171</sup>
  - **INEOS** also has developed a robust group-wide Safety, Health, Environment and Quality Policy that includes policies on climate change, circular economy, zero pollution, water and biodiversity. In addition to their publicly-available sustainability report, INEOS applies for sustainability ratings from Sustainalytics and EcoVadis and discloses information concerning climate and water performance through the Climate Disclosure Project (CDP).
  - **LyondellBasell** launched its Sustainable Procurement program to assess and improve sustainability performance in its supply chain and established a goal to assess at least 70 percent of their key suppliers against sustainability criteria by 2025.<sup>172</sup>
  - **Valero's** board of directors has created a new Sustainability and Public Policy Committee, which includes the chairs of all of the board committees to enhance the oversight of ESG and climate-related risks and opportunities.<sup>173</sup>
  - The Chevron Incentive Plan was modified to include an energy transition category that measures progress toward activities that lead to achieving **Chevron's** GHG metrics, growing renewable energy and carbon offsets, and investing in low-carbon technologies. This addition directly links virtually all workers' annual bonuses to performance measures aimed at advancing a lower-carbon future.<sup>174</sup>
  - **Marathon** has implemented an ESG metric in its annual cash bonus program that links not only GHG intensity reductions but also DE&I and environmental and safety components to bonuses.<sup>175</sup>
  - While **Albemarle's** Health, Safety & Environment Committee is charged with monitoring progress on sustainability efforts on a quarterly basis, all of the committees report regularly to the Board of Directors on sustainability issues.<sup>176</sup>
  - **Chevron Phillips Chemical** established a Vice President role for sustainability efforts and created an Executive Steering Team to lead company-wide ESG objectives.<sup>177</sup>
  - Additionally, **Chevron Phillips Chemical** released their 2022 Climate Risk Report, which outlines the company's planned approach to managing climate-related risks, its carbon intensity target, technology investments and actions to reduce greenhouse gas emissions intensity.<sup>178</sup>
  - **Cenovus's** compensation philosophy is to pay for performance and to align the interests of employees with the interests of shareholders, while balancing objectives of market competitiveness and retention. The company's safety and environmental performance is directly tied to discretionary employee and executive compensation, which includes individual and corporate performance components. With respect to individual performance, all employees, including the executive leadership team, have annual performance agreements identifying their specific goals and objectives for the upcoming year. These align with Cenovus's business plan and strategy and provide performance focus throughout the year. For members of the executive leadership team, performance agreements are also tied specifically to ESG factors and objectives. Achievement of these goals and objectives influences the individual performance component of discretionary compensation.
- In 2021, Cenovus revised its 2022 scorecard, replacing the Upstream GHG emissions intensity metric with a total, gross operated absolute GHG emissions metric. This supports Cenovus's target to reduce absolute scope 1 and 2 GHG emissions on a net equity basis by 35 percent from 2019 levels by year-end 2035, and long-term ambition to reach net zero emissions by 2050.<sup>179</sup>

AFPM believes that industry must help address society's most pressing challenges — including climate change and reducing plastic waste — while continuing to support the improved quality of life of the billions of people around the world today and the billions more that are expected in the coming decades. 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.



## Climate Change Policies

### Carbon Capture, Utilization and Storage (CCUS)

Carbon capture technology is critical to paving the way to a lower-carbon energy future. AFPM is 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 policymakers on other policies to activate, expand and fully realize the benefits of this innovative technology.



A 95-RON octane standard would unlock an entirely new range of cleaner, fuel-efficient vehicle transportation options for consumers.

### 95-RON Fuel Standard

AFPM members are leading the effort to transition the United States 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.

## Plastic Waste Principles

AFPM's approaches the challenges of global plastic waste by addressing the many aspects of this complex issue. Ultimately, our solutions 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:

- Developing 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.
- Supporting 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.
- Ensuring the regulatory classification for plastic waste is 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.



## Plastic Waste Policies

- AFPM supports state efforts to classify advanced recycling as a manufacturing process, not a waste disposal or incineration process while refuting efforts to demonize plastic products, including Canada's efforts to mislabel plastic as toxic.
- AFPM supports federal legislation that spurs innovation and enables 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.
- AFPM is participating in the development of a Global Treaty on plastic waste that aims to eliminate plastic waste leakage into the environment while recognizing the tremendous benefits of plastics and stimulating the development of a circular economy for plastics.
- AFPM and its' members are participating in the United Nations Intergovernmental Negotiating Committee developing such a treaty by 2024.



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# 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.



## Publications

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

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

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

202.457.0480  
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