

House Committee on Energy and Commerce, Subcommittee on Energy

Hearing entitled “The 2017 Hurricane Season: A Review of Emergency Response and Energy Infrastructure Recovery Efforts”

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The American Fuel & Petrochemical Manufacturers (“AFPM”) appreciates the opportunity to provide testimony on the effectiveness of public and private sector response efforts to Hurricanes Harvey and Irma. AFPM is proud to represent more than 95 percent of the nation’s refining and petrochemical manufacturing capacity. Our members make the gasoline, diesel, jet fuel, and petrochemicals that make modern life possible. Hurricanes Harvey and Irma demonstrated not only the resiliency of our nation’s energy sector, but also the dedication of the nation’s first responders and the incredible people that work in the refining and petrochemical industries.

The U.S. Gulf Coast, and Houston in particular, is the heartbeat of the global energy and petrochemical sectors. Texas is home to 30 refineries with more than 5.4 million barrels per day (“bpd”) of refining capacity. Louisiana is home to another 19 refineries and 3.3 million bpd of capacity. Combined, these two states are home to more than half of U.S. refining capacity. There are 30 olefins (ethylene and propylene) production complexes in the U.S.; 19 are in Texas and eight are in Louisiana. Texas alone has the capacity to produce roughly 125 million pounds per day of ethylene, which is viewed as a leading indicator of growth in the manufacturing sector. Altogether, the refining and petrochemical industries contribute \$229 billion to the economies of Texas and Louisiana and support nearly one million jobs. Our employees not only worked around the clock to prepare for and respond to one of the largest hurricanes in U.S. history, but did so while dealing with displaced family and friends, not to mention the personal loss of homes, cars, clothing, and everything else we take for granted.

AFPM is proud to report that our industries were well prepared and weathered Hurricane Harvey fairly well.

Hurricane Harvey forced 24 refineries representing 25 percent of U.S. refining capacity to shut down or run at reduced rates. But just two weeks later, refiners were almost fully operational and those still down or in the process of restarting were working to resume operations as quickly and safely as possible.

Safety is the core tenet of the fuel and petrochemical industries. Actions taken for hurricanes like Harvey and Irma are in the interest of safety – protecting employees, communities and the environment. The industries’ swift and effective response is indicative of a workforce that prides itself on continuously improving upon its safety record, implementing best practices, investing in training and preparedness, and using the best-available technology to safeguard its people. The industries are confident these precautions helped mitigate damage and improve safety around these storms.

It took a team to mitigate Harvey’s impact. The industries did not do this alone – we got tremendous help from our dedicated workforce, first responders and federal, state, and local authorities. A lesson

learned from Hurricanes Katrina and Rita was that these critical partners needed to improve working together. The government especially came through for the industries with better, accessible information. These partners deserve credit for the improvements since previous incidents.

Finally, despite the havoc wrought by Harvey on the supply side, the refining industry was prepared for Irma. For Harvey, there was a loss of production capabilities. The job was to keep and restore production as much, and as quickly as possible. There are no refineries in Florida, so Irma was more about a disruption in distribution and delivery of fuels. The refining industry's job was to get fuel to the people who needed it. To do this, the industry put as much product as it could into the market in advance of Irma and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed. Our industries and our people have been resilient in the face of extraordinary circumstances.

I. Impact of Hurricanes Harvey and Irma on Transportation Fuel Supply and Distribution

Nothing is more important to AFPM's members than the safety of their employees, communities, and first responders. As a result, refineries will reduce or shut down operations if companies do not believe running can be done safely. Hurricane Harvey alone dumped 60 inches of rain and more than a trillion gallons of water across the U.S. Gulf Coast. The magnitude of the storm resulted in the closure or slowdown of an unprecedented 24 refineries along the U.S. Gulf Coast from Corpus Christi, Texas, to Lakes Charles, Louisiana (see Appendix A for a full list of impacted refineries). This affected 50 percent of the refining capacity in the region and 25 percent of total U.S. refining capacity. For context, Hurricanes Katrina and Rita resulted in the shutdown or reduced output of 20 percent of U.S. refining capacity in 2005. The impact on the U.S. petrochemical industry was even more pronounced—at its height the hurricane impacted nearly 60 percent of U.S. upstream chemical manufacturing capacity. Petrochemicals like ethylene, propylene, and xylene form the foundation for many of the chemicals and plastics found in everything from food packaging to medical equipment and mobile devices. These supply chains were disrupted for many weeks following the storm.

Despite the temporary disruption in the refining sector, the market was well-supplied. In fact, heading into Hurricane Harvey, U.S. inventories of gasoline (230 million gallons) were well above the five-year historical average. As supplies were disrupted, the East Coast drew down this inventory. East Coast total gasoline inventories in the week ending September 1, 2017, fell by 2.2 million barrels, or 3.5 percent, compared with the previous week. Almost all of this drawdown occurred in the Lower Atlantic region, which stretches from Virginia to Florida. This weekly drop in inventories was smaller than the drop that occurred following a previous outage of the Colonial Pipeline in September 2016, when Lower Atlantic gasoline inventories fell by nearly six million barrels.

The global fuel supply chain is extraordinarily complex. At the most basic level, it starts with upstream oil exploration and production, both on-shore and off-shore. Crude oil is gathered and shipped via pipeline, rail, and maritime to U.S. refineries for processing into gasoline, diesel, jet fuel, heating oil, and many other products. Refined products are moved through the bulk transfer system to terminals, where they are blended with biofuel, moved onto trucks, and delivered to retail. Disruption along any portion of this supply chain can have ripple effects up and down the supply chain system. This can be as simple as retail stations losing power and the ability to pump fuel out of the underground storage tanks. It may include flooded roads that prevent the "last-mile" delivery of fuel to stations. It may be lack of access to pipeline, terminals, or any other major asset in the bulk transfer system.

To better illustrate the complexity of these fuel movement, we have included maps published by the U.S. Energy Information Administration (“EIA”) in Appendix B that illustrate the flow of crude oil and petroleum products throughout the U.S. The primary challenge in recovery was overcoming the logistical barriers in getting product to consumers, as virtually every aspect of the bulk distribution system – pipelines, ports, and terminals – was also impacted, creating ripple effects along the full supply chain.

Many crude oil and petroleum product pipelines were affected by Harvey. The most significant outage was the Colonial Pipeline, which connects to 29 refineries and 267 distribution terminals and carries up to 2.5 million barrels per day of gasoline, diesel, and jet fuel from Houston through the Southeast U.S., and as far north as New York Harbor. Likewise, pipeline outages within Texas disrupted product flows to parts of the state, including Dallas. As a result, trucks typically used for the “last mile” of the supply chain were resourced as far away as Kansas City to pick up fuel, a 1,500-mile roundtrip. Despite the market being well-supplied, consumers engaged in panic-buying. In fact, demand in parts of Texas doubled over a short period of time, putting a strain on available supplies. In Florida, demand increased five-fold as millions of people evacuated in front of Hurricane Irma. The panic increased demand complicated relief efforts and contributed to supply issues in some areas.

The U.S. Gulf Coast is home to a dozen ports in three sectors (Corpus Christi, Houston and Galveston, and Port Arthur and Lake Charles). These ports are heavily trafficked with ships delivering crude oil to U.S. refiners and with product shipments to other parts of the U.S. and abroad. Hurricane Harvey temporarily closed or severely impacted the operating status of the majority of ports in the Gulf Coast region, from Corpus Christi to Lake Charles, and every port in between. Flooding, submerged obstacles, currents, security concerns, and other factors complicated efforts to get crude oil to refineries and product out of refineries to consumers via marine vessel. According to the American Chemistry Council, port closures affected 39 percent of waterborne chemicals trade.

Crude and refined product storage and distribution terminals are essential links in the petroleum supply chain. These facilities ship and receive crude oil and refined products from pipelines, marine vessel, rail and truck. As of March 2017, 49 percent of total U.S. working crude oil storage capacity and more than 40 percent of working storage capacity for both motor gasoline and diesel fuel were located in the Gulf Coast region. Many of the crude oil and refined product terminals along the U.S. Gulf Coast in the path of Harvey were preemptively shuttered before Hurricane Harvey made landfall, and remained closed through landfall, flooding, and cleanup. In addition, Hurricane Harvey drastically disrupted the railroads that support these terminals as well as refineries and petrochemical plants in the region. Specifically, Union Pacific Corporation and BNSF Railway, the two leading U.S. railroads, and regional railroad Kansas City Southern all suspended operations in the area affected by the storm. Rail shipments out of Houston were delayed through mid-September, though steadily improving. It wasn’t until September 19 that Union Pacific, for example, was able to announce Gulf Coast operations had been fully restored. After conducting inspections and repairs to damaged rail infrastructure, the railroads began limited service in the region approximately a week after the storm. It’s not possible to determine the precise impact of Harvey on rail traffic, but it has been clearly negative, so far. We estimate that the area immediately affected by Harvey accounted for approximately 764,700 originated carloads in 2014 (the most recent year for which data are available).

Despite the significant challenges presented by Hurricane Harvey, within 29 days, all but a couple facilities were back up and running. This is a testament to the professionalism, preparation, determination, and resiliency of the refining and petrochemical industries. Thanks to investments the industries have made and a well-coordinated federal, state, and local response, facilities were able to recover more quickly than after previous events. However, this process is not without challenges. Restarting a refinery requires more than simply flipping a switch—it is a complicated process that can take several weeks. The relatively quick resumption in output is significant given that restarting plants is much more complicated than flipping on a light switch. Restarts take time. Like shutdowns, restarts must be done slowly and deliberately to protect the health and safety of employees, as well as communities and environment.

Restarts after storms include securing safe access to the site, and checking the integrity of equipment, storage tanks, process units, and instrumentation. They also include inspecting facilities for any storm damage, making any necessary repairs, and verifying that there are sufficient feedstocks, such as oil and natural gas, available for processing from ports and pipelines. Inbound supplies must be able to arrive at the refinery and outbound products must have a clear route to market, so transportation infrastructure is also examined before opening.

As soon as all facilities are determined to be safe, crews move to energize electrical systems and cautiously ramp up activity in process units to begin turning raw materials into products such as diesel, gasoline, and jet fuel.

When a refinery is restarted, operators proceed slowly and carefully because piping systems may have unprocessed hydrocarbons inside of them that are left over from the shutdown. Operators also work to identify any anomalies or changes in the system as units are brought back online. Making sure each unit is operating normally keeps the overall system safe.

While Hurricane Harvey primarily impacted the ability for the U.S. to produce fuels, the primary challenge with Hurricane Irma was getting fuel to consumers in a safe and timely manner.

Transportation fuel markets in Florida rely entirely on supply from outside the region, primarily product supplied by marine tanker and barge, but also, to a lesser degree, by truck. Marine terminals, which are primarily concentrated at deep-water ports along Florida's Gulf of Mexico and Atlantic coastlines, receive bulk products on tankers and ocean-going barges from Gulf Coast refining centers and foreign supply sources. From the marine terminals, products are further distributed to markets along the coastline by intrastate barge and truck movements, and via pipeline to Orlando. Markets in the Florida Panhandle are also supplied from distribution terminals in Mobile, Alabama, as well as terminals in Bainbridge, Georgia, that receive fuels from the Colonial Pipeline. These deliveries into Florida from the Southeast region are made by truck.

The rapid spike in demand in advance of Irma made it difficult for gas stations and distributors to keep stations supplied as consumers filled up their cars and stocked up on fuel in preparation for uncertain conditions. During and immediately following the storm, impacts of Irma on infrastructure including ports, roads, and power, created challenges to moving fuel from terminals to retail outlets. To prepare, the industry put as much product as it could into the market in advance of the storm and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed.

II. Industry and Government Preparation and Response

The state and federal governments and the refining and petrochemical industries were well-prepared for Hurricanes Harvey and Irma, having learned and applied lessons from previous storms. This preparation increased safety and minimized downtime and consumer impacts. In fact, following Hurricanes Katrina and Rita it took 91 days for the industry to return to 89 percent of pre-hurricane inputs. After Harvey and Irma, the industries returned to 88 percent of inputs only 29 days after landfall.

In the wake of Hurricanes Katrina and Rita in 2005, the industries took steps to mitigate the impact of natural disasters. For example, many Gulf Coast refineries built and elevated refinery control rooms to avoid flooding and hardened them to withstand Category 5 storm wind speed. Refineries and chemical plants installed redundant power supplies and elevated generators and electrical systems to avoid flooding. Companies had also worked with local and state governments to develop alternative supply plans and establish clear lines of communication.

More recently, in the wake of Superstorm Sandy in 2012, Secretary of Energy Ernest Moniz asked the National Petroleum Council (“NPC”) to study vulnerabilities in the oil and gas infrastructure and effective ways for industry and government to communicate to address energy supply disruptions. By the time of the NPC study, the petroleum refining industry, especially along the U.S. Gulf Coast and post Katrina/Rita, had already taken significant steps to improve resiliency, response, and coordination - and during the NPC study AFPM members and other petroleum industry participants were focused on how to improve communications with both the federal and state government(s) to streamline and support restoration and operations during and after an event. The NPC released its report in December 2014 and made seven recommendations. As a general matter, the federal, state, and industry coordination was significantly improved compared to prior storms. AFPM offers a brief assessment on each of the NPC recommendations.

	Recommendation	AFPM Assessment
1	Harmonize DOE’s energy response team structure with the National Incident Management System (NIMS) Incident Command System (ICS).	AFPM is not in a position to fully evaluate the degree to which DOE’s emergency response team structure was harmonized with the NIMS ICS.
2	Leverage the Energy Information Administration’s subject matter expertise within DOE’s energy response team to improve supply chain situation assessments.	AFPM is not in a position to fully evaluate how EIA’s expertise was utilized. However, both DOE and DHS situation reports were very helpful, although the DOE reports were less granular than in previous disasters.
3	Establish company liaisons and direct communication with DOE’s energy response team to improve situation assessments.	Industries supplied liaisons with the DOE Infrastructure Security and Energy Restoration Department (ISER) and DOE was very responsive to industry requests.
4	Streamline and enhance processes for obtaining temporary regulatory relief to speed up recovery.	The process and approval for temporary regulatory relief measures were significantly improved from previous disasters. Further discussion of waivers follows below.

5	States should increase engagement with the oil and natural gas industry in their energy assurance plans, and industry members should assist states in such efforts.	States have been doing this through DOE exercises and the National Association of State Energy Official (“NASEO”) exercises. AFPM has been involved in multiple DOE and NASEO exercises over the last couple of years to help DOE and state officials understand the oil and gas (“ONG”) supply chain. Recently NASEO has developed a draft State Emergency Fuel Plan that has been shared with industry stakeholders for review and comment—which is a great step toward states better understanding the fuel situation in their state and surrounding states. In the past each state had its own independent plans with varied degrees of detail. Over the last couple of years, industries have increased their participation in DOE and NASEO exercises such as the annual DOE Clear Path exercises, the NASEO Liberty Eclipse exercise, and presented at NASEO meetings.
6	Both DOE and states should establish routine education and training programs for key government emergency response positions.	AFPM is not in a position to evaluate DOE and state responsiveness to this recommendation.
7	Both DOE and states should improve their comprehensive drill and exercise programs and include industry participation. Reciprocal invitations extended by companies to DOE and states are recommended.	DOE and states have made important strides on this recommendation. The quality of the exercises has improved, and the early engagement with industries to help develop the exercises has improved, as well. AFPM and other ONG members have participated in these exercises. Likewise, the ONG Sector Coordinating Council recently has been inviting DOE to industry exercises.

To prepare for these events, AFPM members will typically have a cross-functional emergency management team that includes operations, safety, security, human relations, purchasing, contracting, and government relations. These teams develop comprehensive crisis management plans that include personnel responsibilities and plans for material support. The frontline of hurricane response are the ride-out crews that actually stay at the refineries during the duration of the storm to address emergencies and facilitate access to the site later. ExxonMobil alone had 780 ride-out crews at Baytown and Beaumont. This involves substantial logistical planning that includes accommodations, supplies, equipment, and communications capabilities. Companies plan for their vehicle, fuel, and power needs that may arise.

In addition to the logistical issues associated with running a facility, refineries and petrochemical facilities must also remain vigilant regarding site security to ensure these national security assets are

protected during the chaos of a major storm. This includes everything from ensuring entrances are guarded to providing essential employees with letters designating them as critical so they are able to travel during curfews.

The response to Hurricanes Harvey and Irma was significantly improved compared to previous storms, particularly for regulatory relief and access. AFPM's members were particularly pleased with the communication and coordination between federal authorities and industries. The Department of Energy, Department of Transportation, Department of Homeland Security, and Federal Emergency Management Agency held daily joint calls with trade associations and companies representing critical infrastructure. These calls served to provide updates on issues like site access, port closures, curfews, and the status of infrastructure, but also allowed industries to make officials aware of problems or questions. FEMA did an outstanding job taking access/reentry requests and state and local governments were very proactive communicating the local reentry procedures early, which helped avoid confusion later.

Federal and state authorities took many actions to support an efficient and effective recovery effort, including expeditiously processing waiver requests.

- **Fuels.** On August 30th, the Environmental Protection Agency (“EPA”) granted a multi-state waiver for requirements of low-Reid Vapor Pressure (“RVP”) conventional gasoline and reformulated gasoline (“RFG”). The next day, EPA expanded the waiver to include 38 states and Washington, D.C. These waivers are critical to allow refiners to make and sell winter-grade fuel that includes components like butane that can be used to increase the volume of fuel supply. For most states, the low-RVP waiver expired on September 15th with the usual switch to winter gasoline. In addition to the multi-state waivers by EPA, states waived state requirements for RFG and RVP specifications. For instance, Texas has a federally-enforceable Low Volatility State Implementation Plan (SIP) that was in place until October 1st.
- **FERC Tariffs.** The fuel waivers granted by EPA are less effective if the fuel cannot be shipped through the pipeline infrastructure to reach consumers, even if it meets specifications. An issue arose when the Colonial Pipeline system refused to accept higher RVP gasoline (11.5#, also called A3 into Colonial) because it did not have a tariff on file with the Federal Energy Regulatory Commission (“FERC”). Prior to Harvey and the RVP turn (Sept 15th), refiners had still been selling remaining inventories of lower RVP gasoline (9# or also called A2 into Colonial). Although all of the individual states along Colonial, and New York Harbor had granted RVP waivers, Colonial still required that all nominated volumes meet that specific pipeline product specification, even though that product would be downgraded when it co-mingled with all the inventory in the line. As a result of the delay, Colonial could not pump from Houston (West of Lake Charles) into its mainlines and reach its full one million bpd pump rate, resulting in a temporary disruption of supplies into Colonial and up through the Southeast/Northeast. At Colonial's request, FERC approved an emergency waiver tariff on September 5th. Although this was resolved quickly, the issue resulted in a couple days of confusion and frustration for several refiners trying to move product into the market.
- **Jones Act.** The Jones Act requires cargo that is shipped between U.S. ports move on U.S.-flagged ships that are built, crewed, and owned by U.S. citizens. As a result of its strict

requirements, shipping goods on a Jones Act vessel often costs as much as three times more than moving the same cargo a similar distance between a U.S. port and foreign location using a non-Jones Act vessel. On September 8th the Department of Homeland Security waived the Jones Act for refined petroleum products shipped from New York, Pennsylvania, Texas, and Louisiana to South Carolina, Georgia, Florida, and Puerto Rico, ahead of Hurricane Irma. On September 11th the waiver was expanded to include shipments from all states in PADD 1B (Central Atlantic) and PADD 3 (Gulf Coast) to all states in PADD 1C (Lower Atlantic).

- **Hours of Service Relief.** Twelve states, including Puerto Rico and the U.S. Virgin Islands, declared states of emergency due to Harvey and Irma. In response, the Federal Motor Carrier Safety Administration issued an emergency declaration and waived Federal Motor Carrier Safety Regulations, including Hours of Service Regulations. These waivers allowed the trucking industry and AFPM member companies to more effectively support recovery and resupply efforts.
- **Emergency Response Support.** During response efforts fuels and other materials that may be regulated by the Pipeline and Hazardous Materials Safety Administration (“PHMSA”) are essential elements to a quick recovery. To foster a more efficient response, PHMSA issued an Emergency Waiver of the Hazardous Materials Regulations to persons conducting operations in support of disaster and recovery efforts in Texas and Louisiana. This waiver supported the movement of essential fuels and recovery products to impacted areas and aided in the recovery. For example, generators would typically be characterized as “dangerous goods” or “hazardous materials,” triggering certain requirements for labeling and shipping documents. This waiver streamlined the ability of officials to quickly move these goods into affected areas.
- **Pipeline Operator and Inspection Relief.** Following the event to ensure safe operation of pipeline infrastructure, pipeline operators must conduct inspections and in some cases repair to damaged infrastructure. To assist in these effort PHMSA issued an emergency stay of enforcement for operators affected by hurricanes. This stay provided companies with a larger pool of skilled workers to aid in recovery. This relief aided in the recovery efforts and ensured essential mid-stream energy infrastructure resume operation quickly.
- **Strategic Petroleum Reserve.** The U.S. Strategic Petroleum Reserve (“SPR”) is the largest government-owned stockpile of emergency crude oil in the world. Established in the aftermath of the 1973-74 oil embargo, the SPR provides the President with a powerful response option should a disruption in commercial oil supplies threaten the U.S. economy. It is also the critical component for the United States to meet its International Energy Agency obligation to maintain emergency oil stocks. The SPR has a design storage capacity of 713.5 million barrels and as of late October held 670 million barrels.

Crude can be made available from the SPR either as a drawdown and sale based on a Finding of a Severe Energy Supply Disruption or as a time exchange whereby the recipient receives crude from the SPR in exchange for a delivery of crude oil at an agreed future time. Following Hurricane Katrina, on September 2, 2005, President George W. Bush issued a Finding of a Severe Energy Supply Interruption that authorized and directed the Secretary of Energy to drawdown

and sell crude oil from the SPR. Following Hurricane Isaac in 2012 one million barrels of crude oil from the SPR were made available, and following Hurricanes Gustav and Ike in 2008, more than five million barrels were made available to refiners.

Hurricane Harvey closed ports, disrupting marine delivery of crude oil to U.S. Gulf Coast refineries, and shut-in Gulf of Mexico oil production. The severe flooding from Harvey also disrupted the operation of pipelines that supply U.S. onshore and Canadian crude oil production, and shut in some U.S. onshore production. As a result, crude oil from the SPR was made available to refineries for delivery by pipeline. Through September 28, a total of five million barrels of oil from the SPR had been delivered to Gulf Coast refineries, helping to continue their processing operations and prevent further supply disruptions.

III. The Industry's Dedicated Employees are the Heart and Soul of their Communities

The devastation along the Gulf Coast brought daily images of heartbreak as lives were upended and many of those stories were about our employees. Yet, we also saw overwhelming support from the community—businesses to individuals, alike.

The real story is about the employees themselves. There are too many stories to tell them all, but a few really stand out as great examples of the dedication of the U.S. fuel and petrochemical manufacturing industries' employees even as they had water pouring through their own homes. For instance, Dan Misko, an ExxonMobil employee in Beaumont, Texas, and a team of about 60 people — a combination of ExxonMobil personnel, city employees, and contractors — worked with the city day and night to come up with a temporary solution to help restore its water service. The water dropped by Hurricane Harvey caused the Neches River to swell to more than 20 feet around the utility's pumping station, knocking out pumps at the city's water plant. The plant processes more than 21 million gallons of water a day to serve a community of more than 100,000 people. Misko and team transported excess plastic pipes from the refinery to the water plant, and crews were deployed around the clock for the next 72 hours to build eight, 600-foot-long pipelines. Eight temporary pumps were installed to help restore water service in Beaumont.

Jason Meyer, Rusty Till, and Pedro Alvarez, all employees of the Chevron-Phillips Chemical Company, took their boats and together rescued nearly two hundred people over the course of several days and helped ferry supplies and medical equipment.

Industry-wide, as the flood waters receded, coworkers helped each other with housing, cleaning, and repairs.

In addition to providing tens-of-millions of dollars in supplies and aid to local recovery efforts, AFPM's member companies sprung into action to provide relief for their employees and to help directly with recovery efforts. For instance, many companies offered displaced employees hotel rooms and longer-term housing, helped arrange for rental vehicles for those who lost cars, provided interest free loans, and helped underwrite the cost of out-of-network prescriptions and medical care. We had at least one member company paying for its maintenance crews to help clean up and repair employees' homes.

IV. Recommendations and Conclusion

The federal, state, local, and industry response was significantly improved compared to previous incidents, but there is always something to learn and improve upon. First and foremost, government must continue to find ways to coordinate efficiently among various agencies and jurisdictions while keeping lines of communication open with industry stakeholders. One particularly useful tool has been the DOE Clearpath exercise, a multi-stakeholder exercise that actually simulated a hurricane strike on the Gulf Coast this year. Such exercises help industry and government officials to know each other and develop lines of communication before disasters strike. Regular exercises also help educate federal and state officials about the fuel supply chain, which is extraordinarily complex, helping to improve decision making. One specific example of how this can be improved is that there was inaccurate and/or incomplete information about flooded highways and major roadways in Southeast Texas, which impacted companies' ability to plan safe routes for emergency supplies to flow to impacted sites.

Companies have assets today that can help facilitate better information, but in some cases were unclear on whether/how they might be used. The best example is the use of commercial drones to help facilitate information needed for reentry procedures. AFPM urges the Federal Aviation Administration to establish guidelines on commercial drone use to facilitate emergency response operations—particularly relating to utility and energy infrastructure restoration efforts—following a natural disaster. This guidance would help to speed up emergency response and energy facility reentry efforts following extreme weather events (as was recently seen with Hurricane Harvey), which would, in turn, ensure the safety of facility workers and the surrounding public.

In addition to big-picture communications, there will undoubtedly be other lessons learned as governments and industry review the preparation, response, and recovery efforts. For instance, the high-water rescue assets provided by local government quickly became overwhelmed. The local U.S. Coast Guard responded quickly, but also had inadequate local resources at its disposal. In fact, at least one company quickly built a private high-water rescue capability, which was instrumental in several rescues of employees and families. Without the volunteer rescue assets, the loss of life may have significantly increased.

Furthermore, it is critical to review public communications about available fuel supplies. As with previous emergencies, retail fuel supplies were exhausted before landfall. This is not a new problem, but is a repeat problem for all significant storms. Within 24-48 hours prior to landfall, families were refueling all vehicles, as well as additional fuel for generators. This results in the initial non-availability of premium and diesel fuels followed by the lack of availability of regular grade gasoline at most stations. It is critical that the public be informed about the challenges with recovery, but are not induced to engage in "panic-buying."

Finally, AFPM urges industry and government to take a comprehensive look at infrastructure development to work collaboratively to modernize areas of need. This may include everything from seawalls to drainage systems. For the refining and petrochemical industries, each company is already reviewing their own processes and procedures to make the next response even more effective.

AFPM and its members look forward to identifying and discussing lessons learned with federal, state, and local policymakers to improve upon our response efforts for future storms.

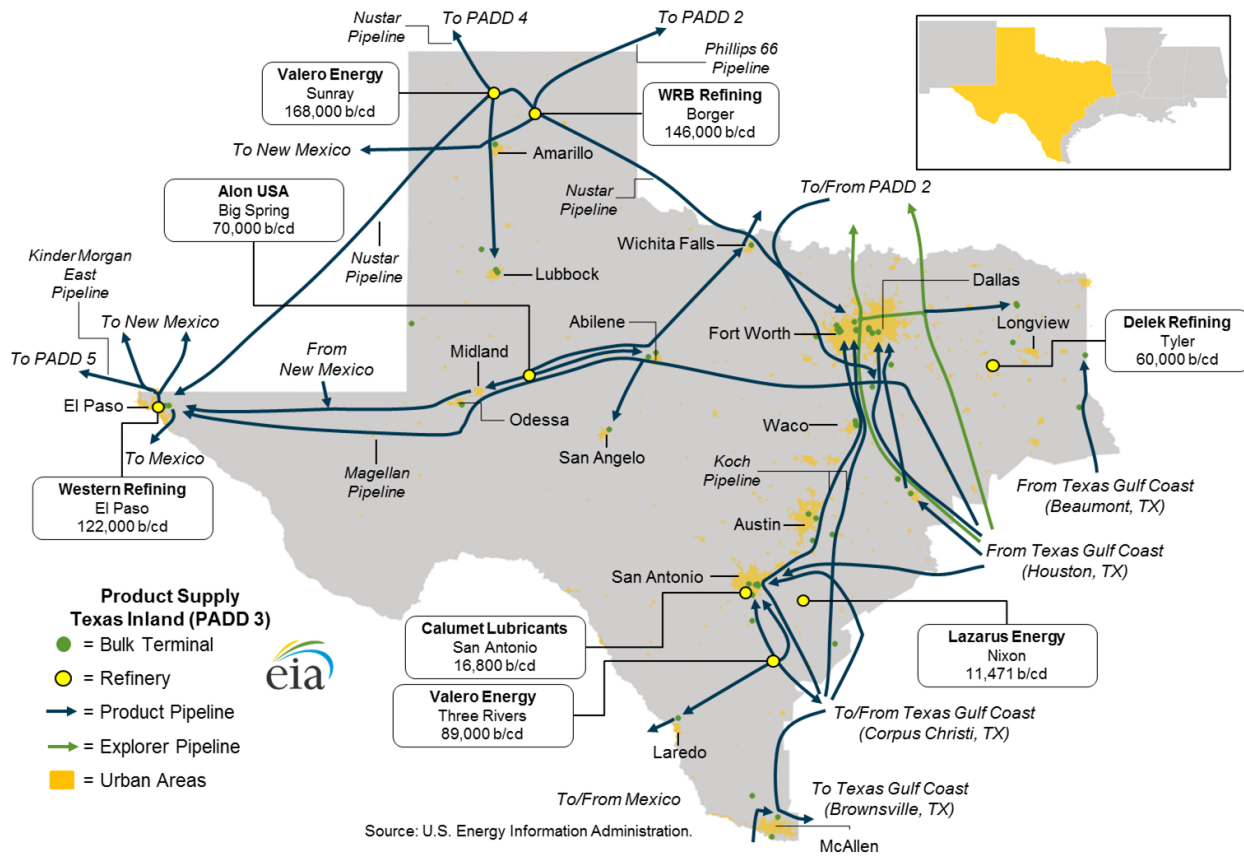
Appendix A—Refineries Impact by Hurricane Harvey

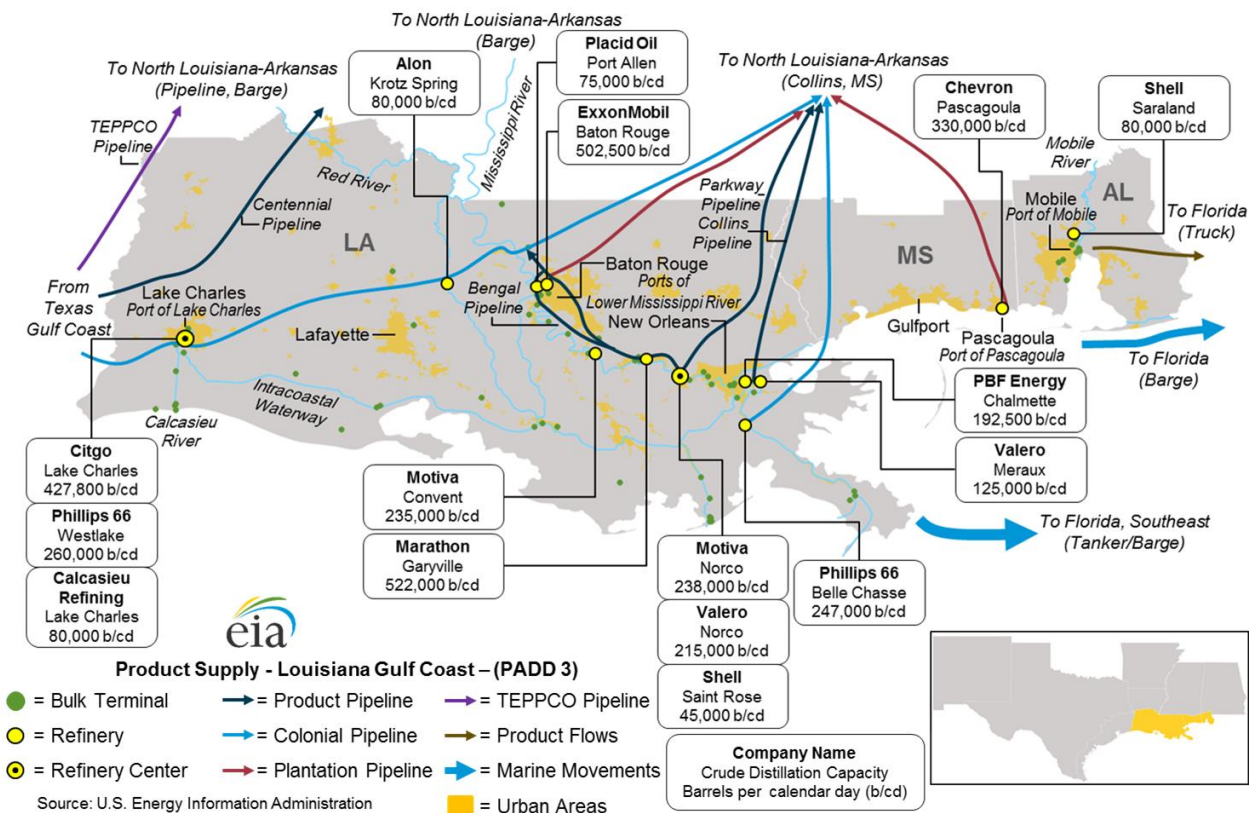
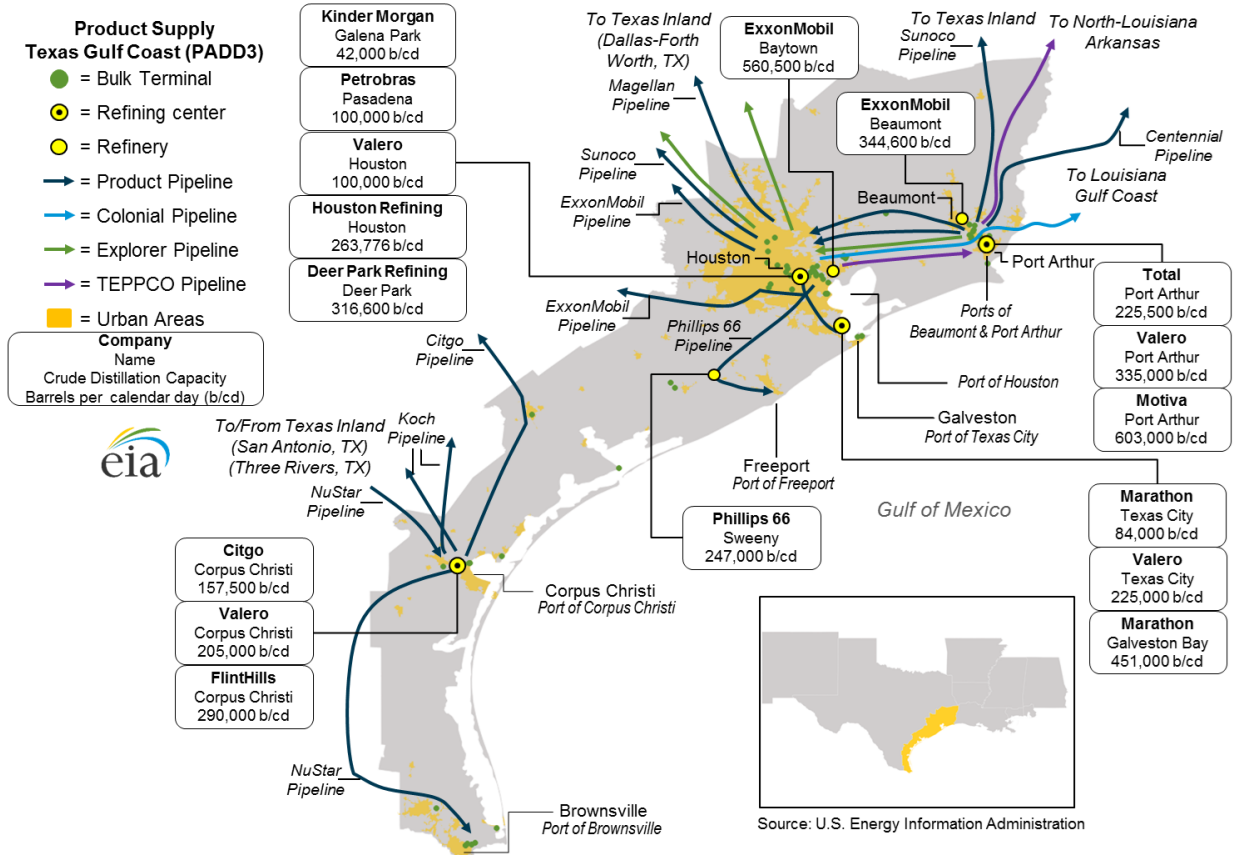
Refineries Impacted by Harvey

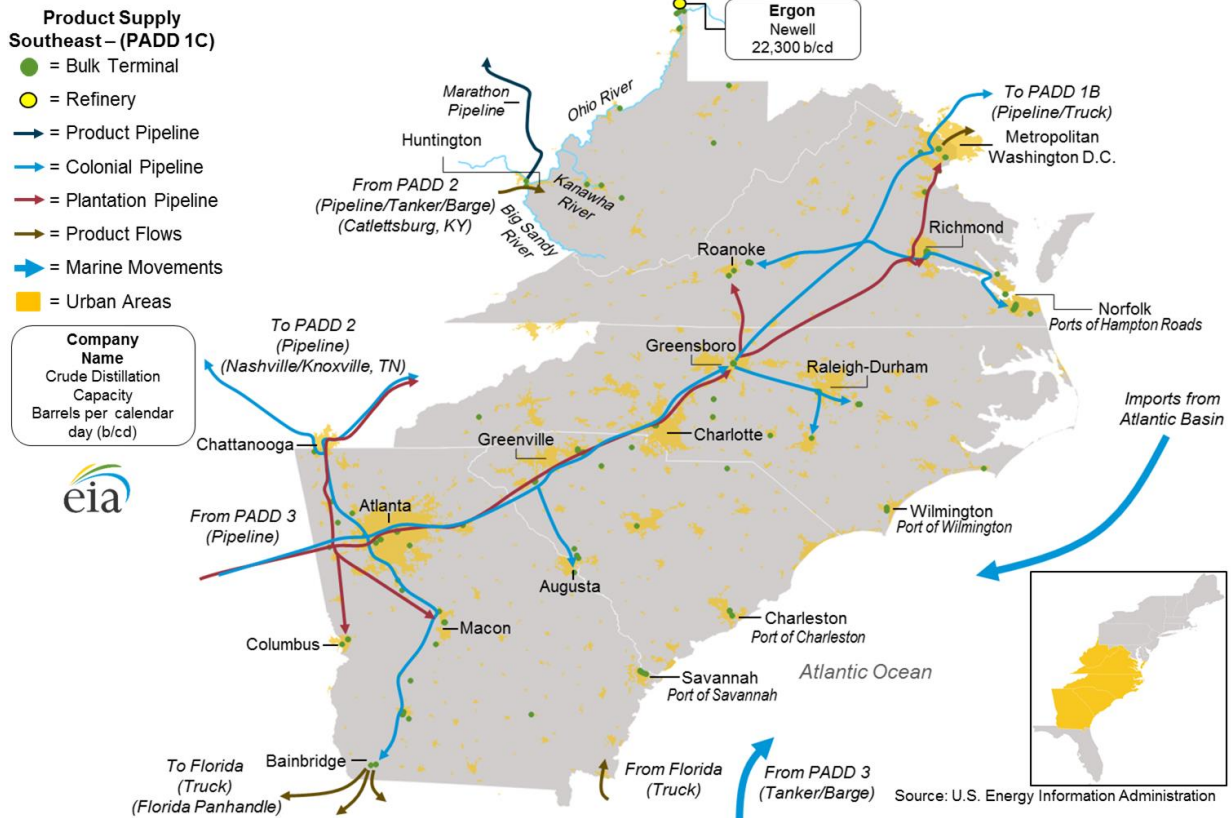
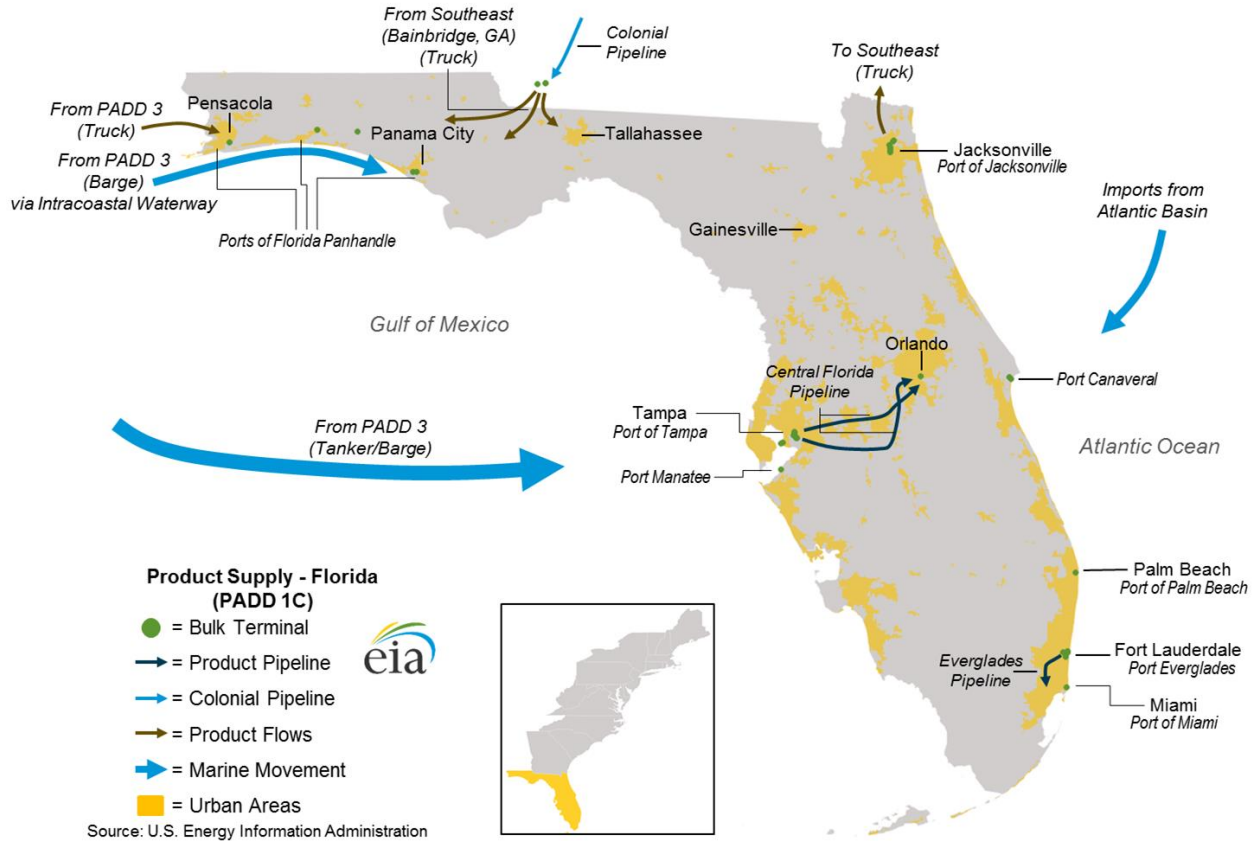
<i>Refinery</i>	Crude Distillation Capacity Thousand Barrels per Day Total		
<i>Motiva Port Arthur</i>	Beaumont	Port Arthur	603.0
<i>Total Port Arthur</i>	Beaumont	Port Arthur	225.5
<i>Valero Port Arthur</i>	Beaumont	Port Arthur	335.0
<i>XOM Beaumont</i>	Beaumont	Port Arthur	<u>362.3</u>
<i>Total Beaumont/Port Arthur</i>	TOTAL		1,525.8
<i>Buckeye Texas Processing</i>	Corpus Christi		46.3
<i>Citgo Corpus Christi</i>	Corpus Christi		157.5
<i>Flint Hills Corpus Christi</i>	Corpus Christi		296.5
<i>Magellan Condensate Splitter</i>	Corpus Christi		42.5
<i>Valero Corpus Christi</i>	Corpus Christi		293.0
<i>Valero Three Rivers Corpus Christi</i>	Corpus Christi		<u>89.0</u>
	TOTAL		924.7
<i>Kinder Morgan Splitter Galena Park</i>	Houston		84.0
<i>Lyondell Basell Houston Refining</i>	Houston		263.8
<i>Marathon Galveston Bay</i>	Houston		459.0
<i>Marathon Texas City</i>	Houston		86.0

<i>P66 Sweeny</i>	Houston	247.0
<i>Pasadena Refining</i>	Houston	112.2
<i>Petromax Refining</i>	Houston	25.0
<i>Houston</i>		
<i>Shell Deer Park</i>	Houston	325.7
<i>Valero Houston</i>	Houston	191.0
<i>Valero Texas City</i>	Houston	225.0
<i>XOM Baytown</i>	Houston	<u>560.5</u>
<i>Houston</i>	TOTAL	2,579.2
<i>Citgo Lake Charles</i>	Louisiana Gulf Cost	425.0
<i>P66 Westlake</i>	Louisiana Gulf Cost	260.0
<i>Calcasieu Lake Charles</i>	Louisiana Gulf Cost	104.0
<i>Louisiana Gulf Coast</i>	TOTAL	789.0

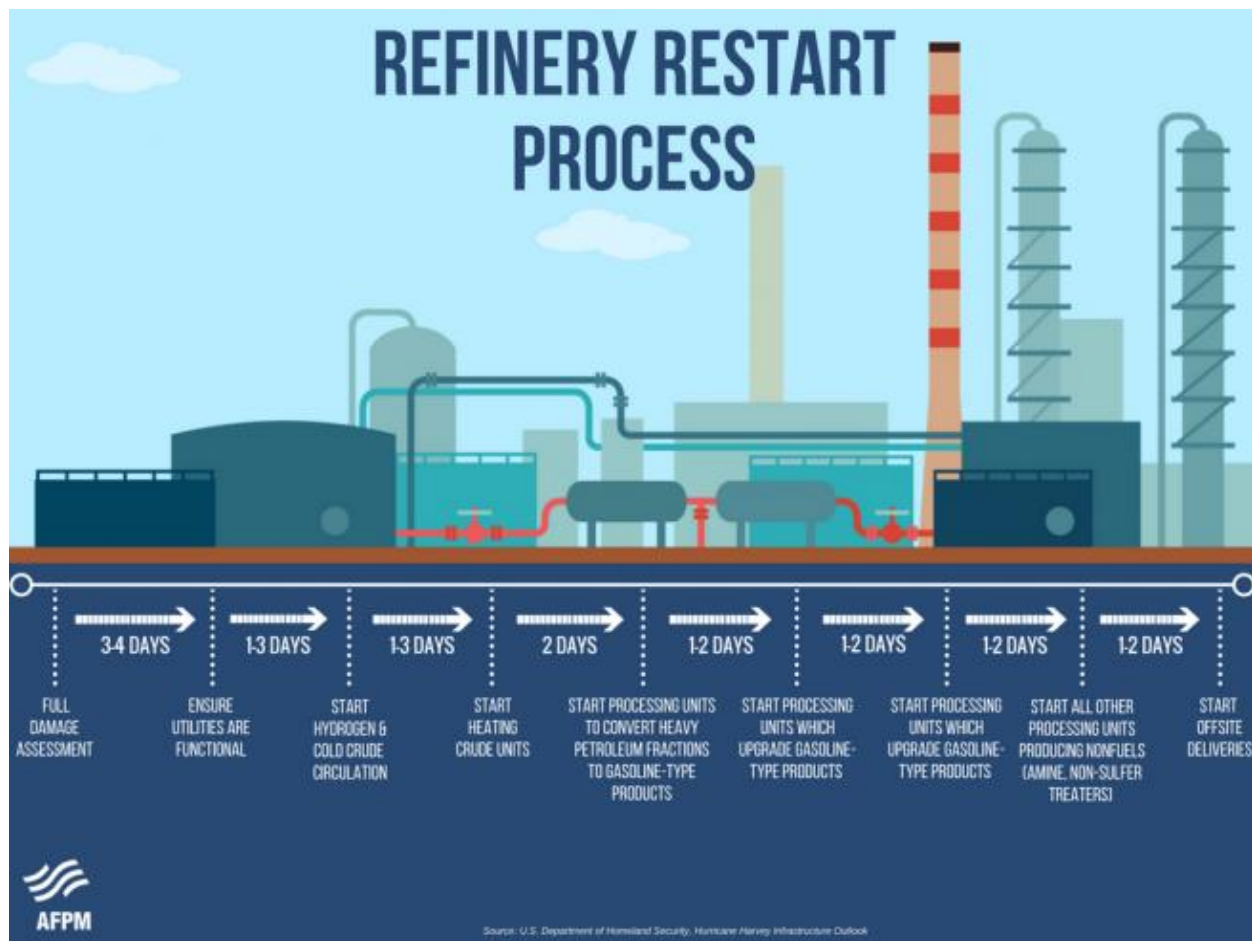
Appendix B—Energy Information Administration Supply Chain Maps







Appendix C—The Refining Restart Process



Testimony Summary for Chet Thompson, AFPM President and CEO

Hurricane Harvey was arguably the most significant storm impacting the U.S. refining and petrochemicals industry, but our preparation and dedicated workforce helped the industries weather the challenge.

The amount of water dumped by Hurricane Harvey impacted 24 refineries with a quarter of U.S. refining capacity. The hurricane also affected 60 percent of Gulf Coast upstream petrochemical capacity (including ethylene and propylene), representing 58 percent of total U.S. chemical capacity. In addition to refining and petrochemical facility outages, the Hurricane also had a significant impact on the supply chain. This included access to crude oil because of port closures and pipeline outages, but also logistical challenges with getting refined product from our facilities to consumers.

Despite the logistical challenges, just two weeks after Harvey made landfall, 20 of these refiners had restarted or were in the process of restarting. Roughly two weeks after Harvey subsided, 28 percent of Gulf Coast upstream chemical capacity had restarted. In fact, following Hurricanes Katrina and Rita it took 91 days for the industry to return to 89 percent of pre-hurricane inputs. After Harvey and Irma, the industry returned to 88 percent of inputs only 29 days after landfall.

That our industries by and large withstood the storm and that is not by accident. Industry and governments both learned from previous experience that we needed to improve working together. The government especially came through for the industries with better, accessible information. These partners deserve credit for these improvements since previous incidents.

Despite the challenge presented by Harvey, the fuel industry was prepared for Irma. There are no refineries in Florida, so Irma was more about a disruption in distribution and delivery of fuels. The refining industry's job is to get fuel to the people who need it. To do this the industry put as much product as it could into the market in advance of the storm and staged products on both coasts to get fuel to Floridians as soon as it was safe and infrastructure allowed.

The federal and state response was significantly improved compared to previous storms

Our industries didn't do this alone — our companies are gratified by the communication and coordination exhibited between operators, first responders and federal, state and local authorities exhibited throughout unprecedented scale and reach of these weather events. In addition to the improved communication and coordination between the public and private sectors, both federal and state authorities were much quicker with fuel waivers and other actions needed for an efficient and effective recovery effort.

Finally, as always, our companies will work with federal and state authorities to identify lessons-learned and prepare for the next disaster

The federal, state, local, and industry response was significantly improved compared to previous incidents, but there is always something to learn and improve upon. The most important issue is communication, and governments must continue to find ways to coordinate efficiently among various agencies and jurisdictions while keeping lines of communication open with industry stakeholders. For the refining and petrochemical industries, each company is already reviewing their own processes and procedures to make the next response even more effective.