EMERGENCY RESPONSE AND THE FUEL & PETROCHEMICAL SUPPLY CHAIN
America’s midstream infrastructure – the integrated system of pipelines, ports and waterways, railroads, roadways and storage facilities – is essential for moving America’s energy supplies and products along the supply chain from producer to manufacturer to the consumer.
By the Numbers

**Pipelines**
205,000 miles of crude oil, NGLs, and refined product pipelines that move raw materials from production areas to refineries and petrochemical plants, and finished products from these plants and facilities to consumer and end uses.

**Inland Waterways**
25,000 miles of inland waterways and 926 coastal and inland ports that facilitate domestic fuel movements and provide access to global import and export markets.

**Railway Track**
140,000 miles of railway tracks and two million freight rail cars. Rail cars move crude oil and NGLs from areas not served by pipelines and where pipeline capacity is inadequate.

**Roads**
4.1 million miles of roadway that support truck shipments of fuels over the "final mile" from regional storage terminals to retail outlets, and from heating oil and propane depots directly to homes and businesses.

**Storage**
1.7 billion barrels of tankage that used to store crude oil, NGLs, and refined products at regional terminals along the supply chain. These storage terminals facilitate transferring products from one transport mode to another and from one owner to another.
Long and complex supply chains can be disrupted from a variety of causes

• Pipeline shutdowns, port shutdowns, road closures
• Power failures
• Natural disasters like hurricanes can affect multiple parts of the supply chain causing power outages that disrupt refinery operations, pipeline deliveries, storage terminal operations, and retail outlet operations; and floods that undermine pipelines and close roads, ports and waterways
Hurricanes Harvey and Irma disrupted the petroleum supply chain along the U.S. Gulf Coast, the East Coast and into the Midwest

- USGC is home to 50% of US refining capacity that supplies gasoline, diesel and other fuels to U.S. Gulf Coast, U.S. East Coast, and the Midwest
- Hurricane Harvey shut down or slowed down 25% of US refining capacity and 37% of Gulf Coast refining capacity – 24 refineries with the capacity to process more than 4.5 million barrels per day of crude oil
AMERICAN FUEL & PETROCHEMICAL MANUFACTURERS

Figure 3. U.S. East Coast (PADD 1) and Gulf Coast (PADD 3) transportation fuels product flows

Source: U.S. Energy Information Administration
AMERICAN FUEL & PETROCHEMICAL MANUFACTURERS

IMPACT OF STORMS ON GROSS CRUDE OIL PROCESSING BY REFINERIES IN U.S. GULF COAST REGION (PADD 3)

- **2017 Harvey/IRMA**: 2017 Harvey/IRMA, capacity of Gulf Coast refineries after storms was reduced to 63%. Fewer refinery outages followed by faster restarts.
- **2008 Gustav/Ike**: 2008 Gustav/Ike, capacity of Gulf Coast refineries after storms was reduced to 49%.
- **2005 Katrina/Rita**: 2005 Katrina/Rita, capacity of Gulf Coast refineries after storms was reduced to 44%.

PRE-STORM LEVELS

29 DAYS 53 DAYS 91 DAYS
Duration of storm related refinery disruptions has been shortened

- Smarter risk management that relies on increasingly sophisticated technology, logistics and communications systems
- Better planning and response efforts from humanitarian relief to drone flights
- Real-time weather modeling before and after storms make landfall to inform decisions about shutting down and restarting facilities
- Improved coordination between refineries, federal agencies and trade associations to streamline emergency response efforts
REFINERY RESTART PROCESS

- **34 DAYS**: Full Damage Assessment
- **13 DAYS**: Ensure Utilities Are Functional
- **13 DAYS**: Start Hydrogen & Cold Crude Circulation
- **2 DAYS**: Start Heating Crude Units
- **12 DAYS**: Start Processing Units to Convert Heavy Petroleum Fractions to Gasoline-Type Products
- **12 DAYS**: Start Processing Units Which Upgrade Gasoline-Type Products
- **12 DAYS**: Start Processing Units Which Upgrade Gasoline-Type Products
- **12 DAYS**: Start All Other Processing Units Producing Nonfuels (Amine, Non-Sulfur Treaters)
- **START OFFSITE DELIVERIES**

Source: U.S. Department of Homeland Security, Hurricane Harvey Infrastructure Outlook

AFPM
American Fuel & Petrochemical Manufacturers
Petrochemical Manufacturing Basics

Natural Gas Processing

- Ethane
- Propane
- Butanes

Ethane Cracker

Naphtha Cracker

Intermediate Feedstocks

- Ethylene
- Propylene
- Butadiene

Refining Process

- Naphtha
- Gas Oil
- Benzene
- Toluene
- Xylene
- Propylene
- Butadiene

Crude Oil
Petroleum Administration for Defense Districts

PADD 5: West Coast, AK, HI
San Francisco
Los Angeles

PADD 4: Rocky Mountain

PADD 3: Gulf Coast

PADD 2: Midwest

PADD 1: East Coast

AFPM
American Fuel & Petrochemical Manufacturers
Pacific Northwest

Product Supply
Pacific Northwest (PADD 5)

- = Bulk Terminal
○ = Refining center
□ = Refinery
= Product Pipeline
= Marine Movement

Company Name
Crude Distillation Capacity
Barrels per calendar day (bbl/cd)

Source: U.S. Energy Information Administration

AFPM
American Fuel & Petrochemical Manufacturers
Northern California & Northern Nevada
Southern California & Southern Nevada

Product Supply – Southern California and Southern Nevada (PADD 5)

- **Bulk Terminal**
- **Refining center**
- **Refinery**
- **Product Pipeline**
- **Key Infrastructure**

**Company Name**

- **Crude Distillation Capacity**
- **Barrels per calendar day (b/c/d)**

**Source:** U.S. Energy Information Administration
New England
Southeast