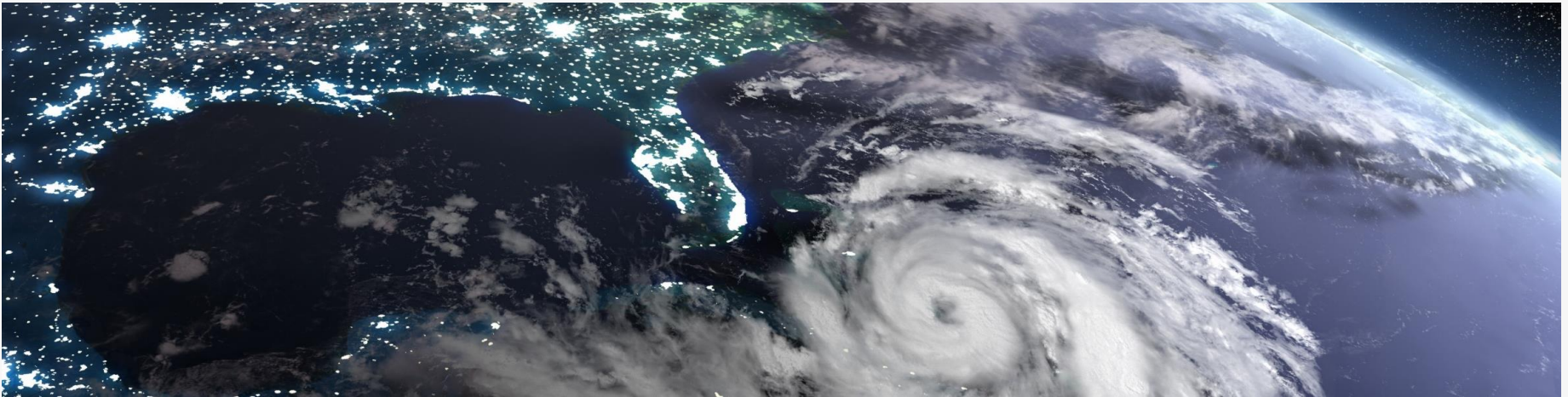


Special Report

Hurricane 2022: Facing Supply Chain Adversities with Resilience



Contents

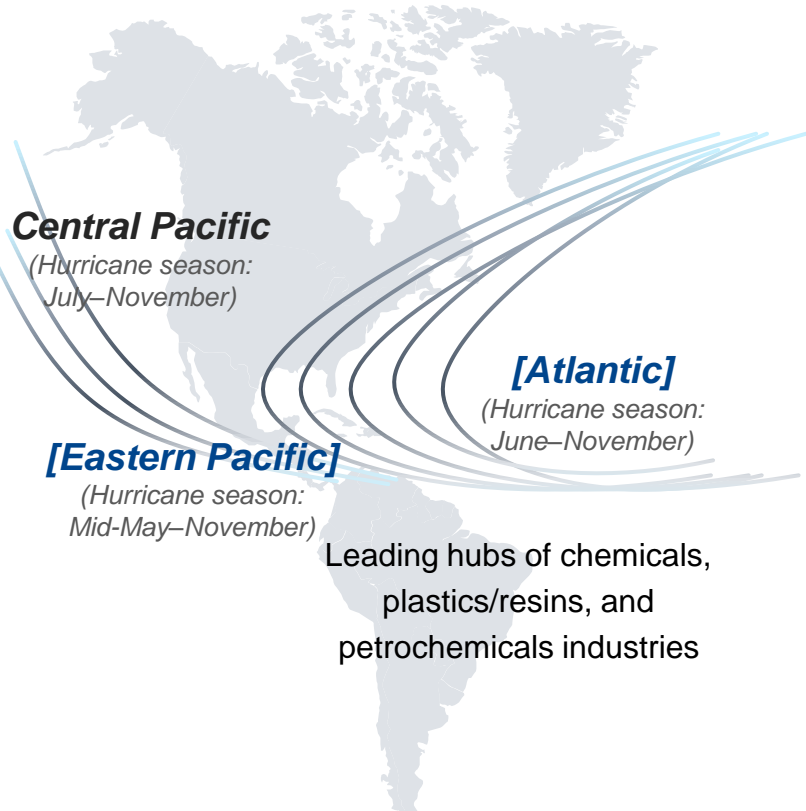
Hurricanes at US Coasts Key Regions Prone to High Risk	02
Incessant Rise in Supply Chain Disruption Due to Substantial Rise in Hurricanes	03
2022 Hurricane Season Likely to be “No Exception”	04
Impact on Key Supply Chains Industries, Production, Capacities, Logistics, and Infrastructure	05
Increased Cost of Sourcing Owing to Production/Infrastructural Damages	09
Best Practices Implementation of Effective Risk Mitigation	10
Aranca Solutions Portfolio Monitoring of Supply Chain Dynamics/Risks	11

Hurricanes at US Coasts: Key Regions Prone to High Risks

Over 300 hurricanes cause >\$1 trillion in damage, majorly impacting chemicals, petrochem industries

Hurricane Pathways and Impacts

Hurricane Belts



Leading hubs of chemicals, plastics/resins, and petrochemicals industries

[xx] Indicates major hurricane belts

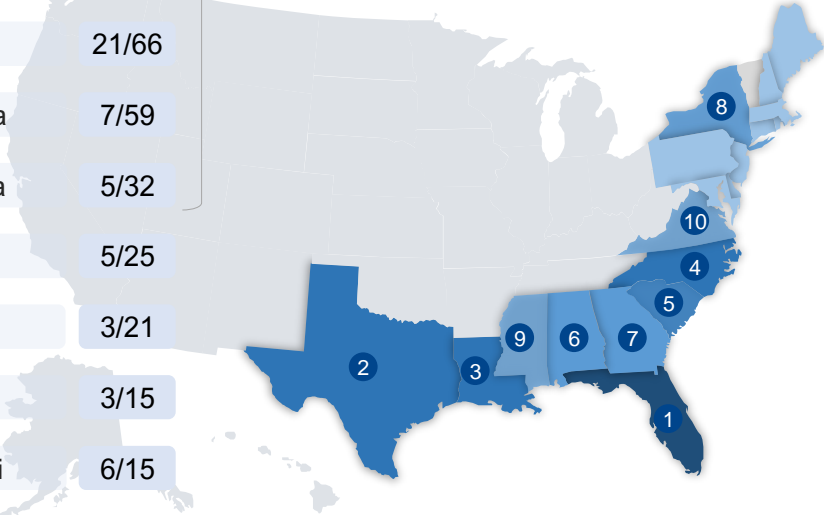
— Indicates wind intensity

309 Total Hurricanes, 1851–2021

32% Major Hurricanes' Share

1	Florida	37/121
2	Texas	19/67
3	Louisiana	21/66
4	N. Carolina	7/59
5	S. Carolina	5/32
6	Alabama	5/25
7	Georgia	3/21
8	New York	3/15
9	Mississippi	6/15
10	Virginia	0/13

Most of the major hurricanes cause landfall across the five states, which are hubs for the chemicals, petrochemicals, and plastics/resins industries, among others.



Industries whose supply chains are heavily dependent on the top five states would be more susceptible to hurricane hazards.

Industries that have presence across the Atlantic belt or have supply chain dependencies are majorly prone to high risk.

Note: Hurricanes with a wind speed of >111 mph causing extensive to catastrophic damage are classified as major hurricanes.

xx/xx Indicates major/total hurricanes

Incessant Rise in Supply Chain Disruption: Due to Substantial Rise in Hurricanes

Continual increase in storms/hurricanes leads to significant supply chain disruption in recent times

Key Hurricanes and Consecutive Damages

Hurricanes Development | US Damages, USD billion

Continual Rise Across					
	2018	2019	2020	2021	2022 Onward
All Storms/Hurricanes	15	18	31	21	Occurrence of hurricanes > ++
Major Hurricanes (Wind speed: >111 mph)	2	3	7	4	Incidence of major hurricane > +++
Names	Florence, Michael	Dorian, Humberto, Lorenzo	Laura, Teddy, Delta, Eta, Epsilon, Zeta, Iota	Grace, Ida, Larry, Sam	Names defined until 2027
Timeline	August 31 to October 11	August 24 to October 2	August 20 to November 18	August 13 to October 5	August to October/November
Impact (USD billion)	Michael – 25 Florence – 24	Dorian – 1.6	Laura – 19	Ida – 75	Expected impact > ++
Total Damage (USD billion)	49.4	7.6	42.0	79.6	Potential damage > ++




Due to substantial damages on account of the increasing number of hurricanes, industries are forced to assess the potential impact.

2022 Hurricane Season: Likely to be “No Exception”

Supply chain disruption expected to worsen throughout 2022 hurricane season

Hurricane Prediction for 2022

Estimated Storms/Hurricanes and Season Probability

Predictions, 2022	Atlantic			Eastern Pacific			Central Pacific
Named Storms	14–21			10–17			2–4
Hurricanes	6–10			4–8			None
Major Hurricanes (Wind speed: >111 mph)	3–6			0–3			None
Probability	Higher than average 			Moderately average 			Below average 
Definitions	<ul style="list-style-type: none">AlexBonnieColinDanielleEarlFionaGaston	<ul style="list-style-type: none">HermineIanJuliaKarlLisaMartinNicole	<ul style="list-style-type: none">OwenPaulaRichardSharyTobiasVirginieWalter	<ul style="list-style-type: none">AgathaBlasCeliaDarbyEstelleFranGeorgetteHoward	<ul style="list-style-type: none">IvetteJavierKayLesterMadelineNewtonOrlenePaine	<ul style="list-style-type: none">RoslynSeymourTinaVirgilWinifredXavierYolandaZeke	Some of the selected names: Aka Iopa Lana Niala
Season Status	Commenced on June 1 Alex – Tropical Storm (39–72 mph)			Commenced on May 15 Agatha – Category 2 Hurricane (96–110 mph)			Yet to commence
















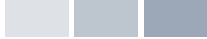


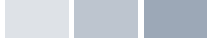



The ongoing La Niña phenomenon, warmer-than-average sea surface temperatures, weaker tropical Atlantic trade winds, and heavy West African monsoon are expected to drive hurricane activity and supply chain disruption in 2022.

Impact on Key Supply Chains: Industries Facing Major Whirlwinds (1/4)

FMCG, industrials, packaging, and healthcare largely impacted by hurricanes

Value Chain Dependencies and Hurricane Impact

End-use Industry Impact

Value Chain Dependencies – Buying Categories			Hurricane Impact	Industries Impacted	
	Chemicals	Basic chemicals (organic and inorganic), specialty chemicals	Low 	<ul style="list-style-type: none"> ● FMCG ● Industrials ● Mobility ● Packaging 	
	Plastics/Resins	PET, PE, PP, PVC, etc.			
	Petrochemicals	Crude oil, naphtha, natural gas, electricity, industrial gases			
	Rubber	Natural and synthetic rubber			
	Pharmaceutical Ingredients	APIs, excipients, biologics, and contract manufacturing		<ul style="list-style-type: none"> ● Electrical/ Electronics ● Healthcare 	
	Food	Agro commodities, vegetable fats and oils			
	Metals and Minerals	Ferrous (iron ore, steel) and non-ferrous (copper, zinc, aluminum, etc.)			
	Others	Glass, composites, and other indirect materials			



Supply chains having presence across the Atlantic and Eastern Pacific are primarily hit by major hurricanes.

Impact on Key Supply Chains: Decline in Production (2/4)

Plant shutdown/lower operating rates lead to significant decline in production during hurricane season

Production Impact on Key Industries Due to Hurricanes

Production Disruption and Timeframe

Key Supply Chains	Key Commodities Impacted	Timeframe of Hurricanes				Timeline of Production Impact			Overall Impact on Production
 Chemicals	<ul style="list-style-type: none">Acrylic acidMethanolEthylene oxideChlor-alkali					Jan	Feb	Mar	
 Plastics/Resins	<ul style="list-style-type: none">PETPEPPPVC, etc.	Q1	Jan	Feb	Mar	Apr	May	June	
		Q2	Apr	May	June	July	Aug	Sept	
		Q3	July	Aug	Sept	Oct	Nov	Dec	
 Petrochemicals	<ul style="list-style-type: none">Crude oilNatural gas	Q4	Oct	Nov	Dec	Jan	Feb	Mar	











Supply of chemicals, plastics/resins, and petrochemicals is affected due to production disruption caused by hurricanes.

Impact on Key Supply Chains: Key Capacities Prone to Disruption (3/4)

Firms such as LyondellBasell, INEOS, ExxonMobil prone to production shutdowns/turnarounds

Key Capacities Susceptible to Hurricane Hazards

Illustrative Examples

Key Supply Chains	Illustrative Companies	Key Commodities	Key Locations	Overall Capacity Prone to Impact (MT)
 Chemicals	lyondellbasell	Ethylene	Channelview, LaPorte	2,020,000
			Ingleside	545,000
			Cedar Bayou	800,000
	ExxonMobil	Butyl and synthetics	Houston	175,000
 Plastics/Resins	lyondellbasell	HDPE	Victoria	260,000
			Pasadena, Cedar Bayou	1,255,000
	INEOS	Polypropylene	Chocolate Bayou, La Porte	800,000
 Petrochemicals	 Marathon Petroleum	Crude oil Natural gas Gasoline Other specialty products	Garyville	608,000
	 Phillips 66		Alliance	269,000
	 Shell Shell Plc		Norco	250,000
	 Valero Energy		Meraux, St. Charles	348,000

Leading players across hurricane-prone regions face shutdowns/turnarounds throughout the hurricane season.

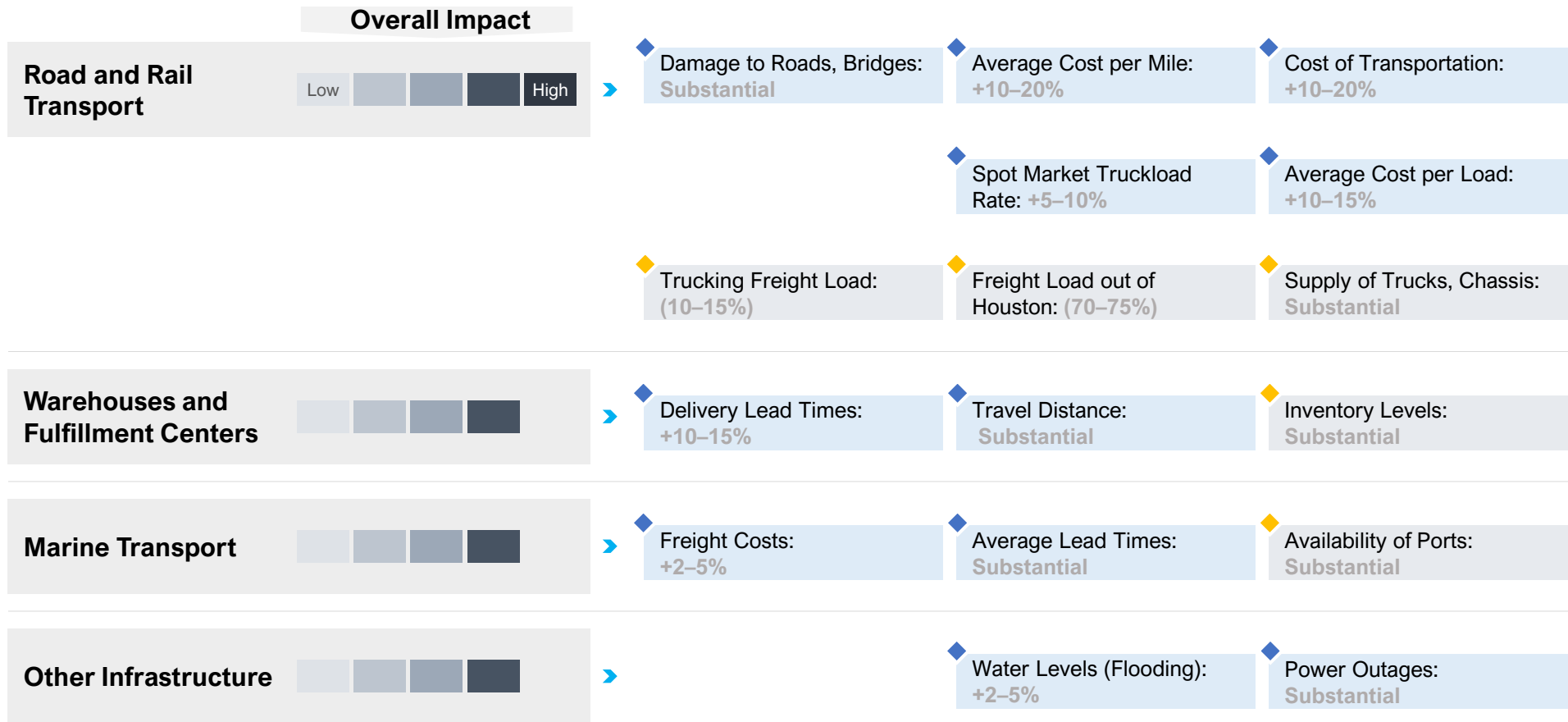
Impact on Key Supply Chains: Impact on Logistics and Infrastructure (4/4)

Adverse impact on logistics, and infrastructure further adds to the rise in overall commodity prices

Logistics and Infrastructural Impact

Impact across Subsectors

◆ Indicates Increase in Cost ◆ Indicates Decrease in Efficiency



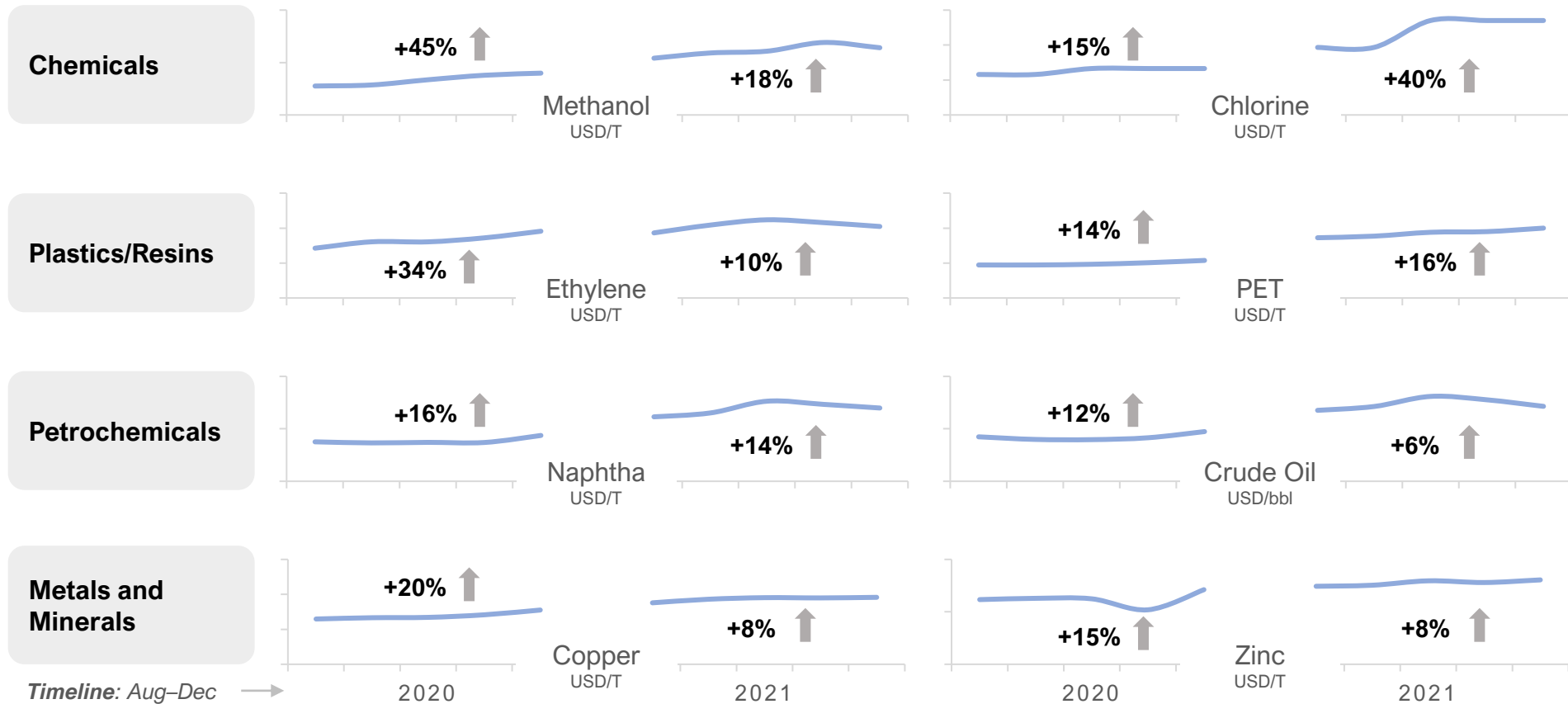
The hurricane-induced impact across the logistics, transportation, and infrastructure sectors further adds to production disruption, leading to the increased price of commodities.

Increased Cost of Sourcing: Owing to Production/Infrastructural Damages

Production, infra, and logistics disruption, coupled with elevated demand, pushes up cost of sourcing

Sourcing Cost Impact of Hurricanes on Key Commodities

Cost Impact Analysis of Major Hurricanes



The overall cost of sourcing witnesses a substantial rise during the hurricane season due to a decline in production and an increase in the price of commodities.

Note: The dual impact of hurricanes and COVID-19 has led to substantial double-digit growth in the prices of commodities.

Best Practices: Implementation of Effective Risk Mitigation

Aligning sourcing period, tracking indices, and scouting alternates among strategies adopted by firms

Key Industry Practices Followed by Companies

Risk Mitigation Measures by Companies



Shift/Align Sourcing Timeline

- *Disruptions caused by major hurricanes typically lead to supply-demand disparity.*
- *As a countermeasure to supply shortage, companies devise a proactive approach and shift the sourcing timeline to the pre-hurricane (second quarter) or post-hurricane (fourth quarter) season by analyzing historical price movements.*



Track Indices to Negotiate with Existing Suppliers

- *Based on the impact of the hurricanes, prices usually jump 10–45% during August–December, wherein they witness further fluctuation depending on the supply-demand situation.*
- *Considering the hurricane dynamics and the supply-demand impact, companies periodically track raw material market indices and accordingly make purchases.*



Explore Alternate Geographies for Sourcing

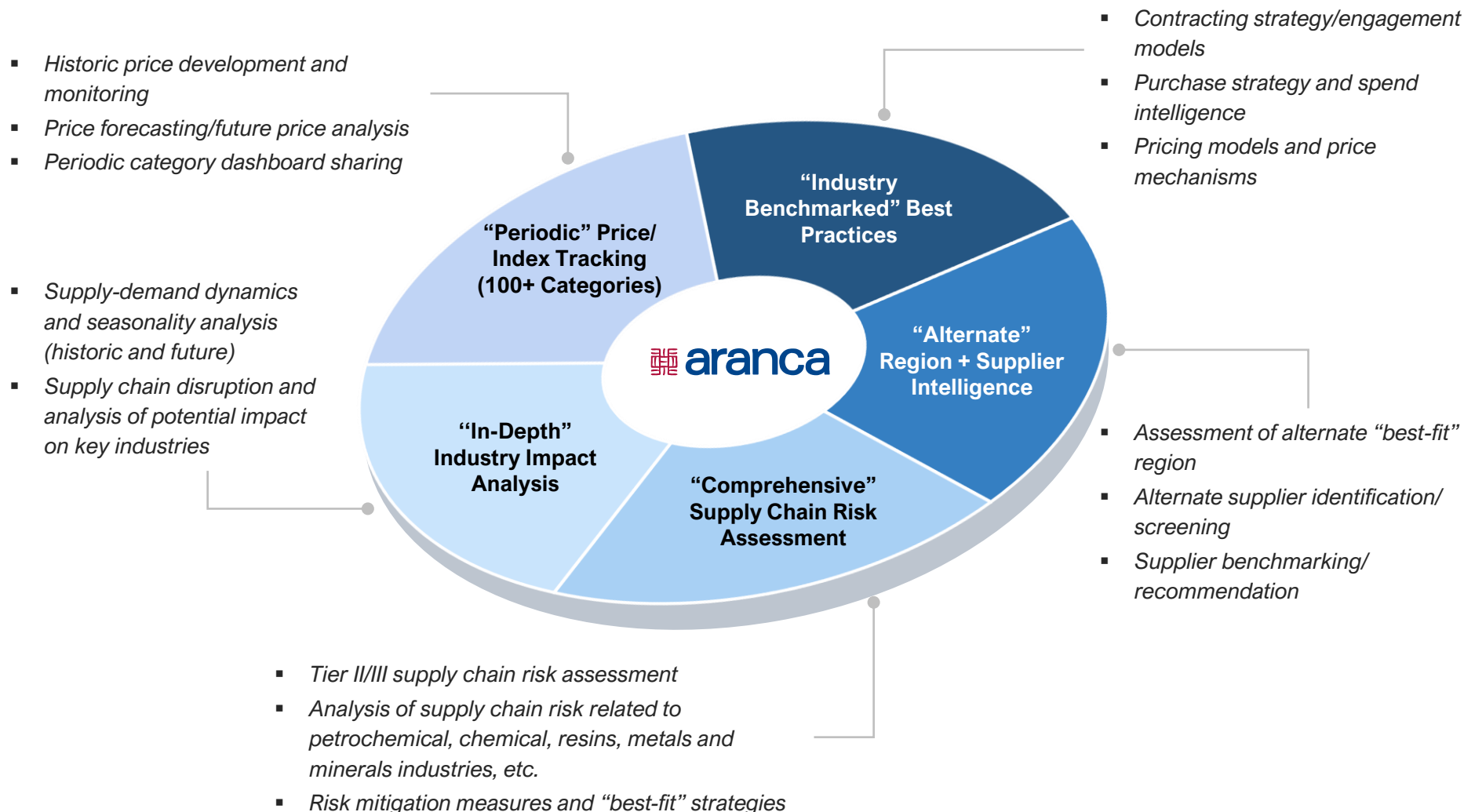
- *Companies explore alternate sourcing options for the required materials/commodities across geographies such as Asia Pacific, Europe, and the Middle East.*
- *Securing supplies from alternate economies generally provide potential price benefits amid local supply crunch and increased prices.*

Aranca Solutions Portfolio: Monitoring of Supply Chain Dynamics/Risks

Customized advisory for supply market, industry impact, pricing, and industry best practices

Aranca Offerings for Supply Chain Risk Analysis and Mitigation

Key Support Areas





500+

Market & Business Advisory
Projects

2500+

Global clients

120+

Sectors and sub-sectors
researched by our analysts

80+

Countries where we have
delivered projects

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Connect with our Team



Vipul Kumar

Senior Manager
Procurement Research

vipul.kumar@aranca.com



Laukik Patil

Engagement Lead
Procurement Research

laukik.patil@aranca.com



Sadhna Gupta

Engagement Lead
Procurement Research

sadhna.gupta@aranca.com

Reach us on Tel: +91 22 3937 9999

For more details: www.aranca.com | <https://www.linkedin.com/company/aranca> | <https://www.aranca.com/knowledge-library>

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