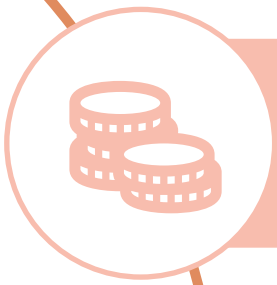
Impact of Inflation and the Effects of Supply Chain on the Virginia Department of Transportation and the Department of Rail and Public Transportation

the balmoral group

VDOT


VDOT

Economic Study

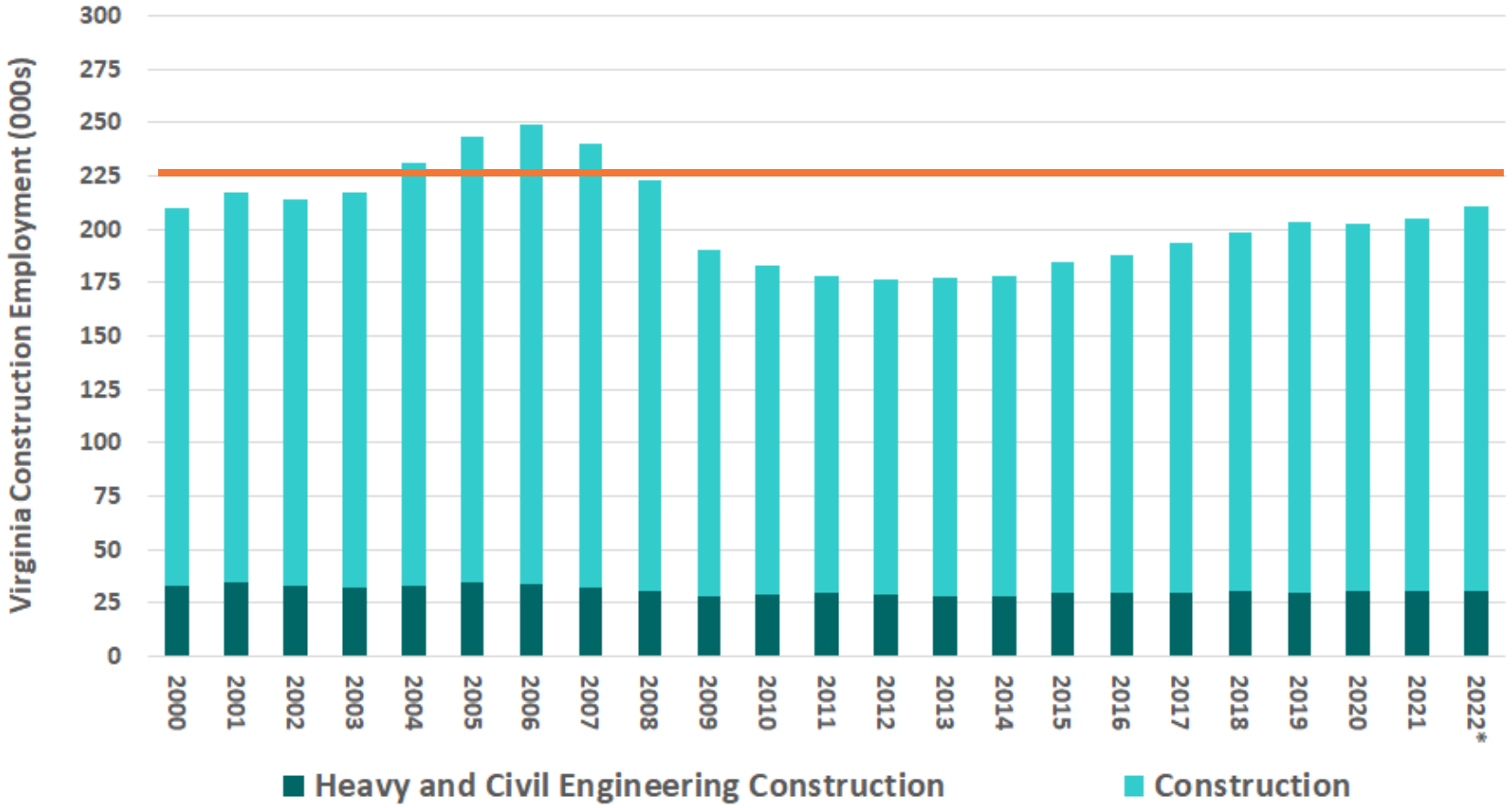


The Virginia Department of Transportation (VDOT) has faced bid price increases since Spring 2021 due to rapidly changing market conditions.

During the global recovery from the COVID-19 pandemic, a series of supply chain disruptions occurred, labor markets tightened, and Russia invaded Ukraine. Construction costs have increased.

The Department undertook a study to better understand and manage future resource supply and cost issues affecting its programs.

Tight Labor Market



- Virginia construction employment has grown in recent years, but remains well below 2006 highs
- Surveyed contractors report tight labor pool as a constraint on capacity

Source: BLS; *VA Works Short-term Projections

General Market Conditions

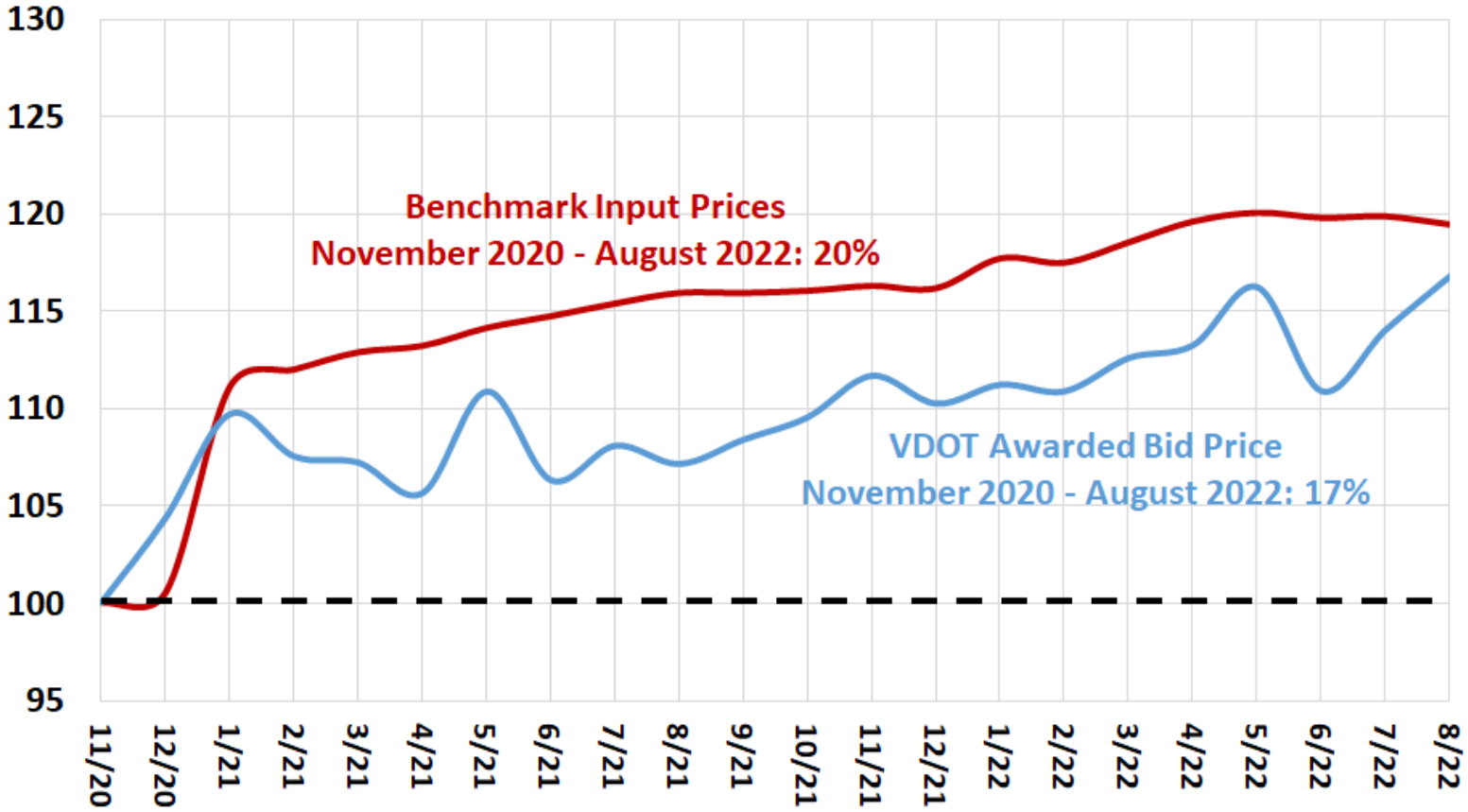
	Raw Materials	Skilled labor	Competition	Trucking	Global Shipping	Geopolitics
Aggregate	=	↑	↓	↑	=	=
Asphalt	↑	↑	=	↑	=	↑
Concrete	↑	↑	=	↑	↑	↑
Steel	↑	↑	=	=	↑	↑
Heavy Equipment	↑	↑	=	=	↑	↑
Labor	=	↑	↑	↑	=	=
Industry Capacity	↑	↑	↑	↑	=	=

Legend

Exerting negative influence on construction costs
Exerting positive influence on construction costs
Neutral or N/A

Benchmark Input Prices vs VDOT Bids

- Uptick in VDOT bid prices reflects input price increases that contractors can no longer absorb
- VDOT bid prices were 17% higher in August compared to the end of 2020
- Benchmark industry input costs were 20% higher over the same period



Source: TBG calculated from VDOT historical bid data and benchmark industry input prices.

Key Market Influences

Supply Chain

- VDOT is likely to see higher prices – around 10% higher for asphalt due to energy costs
- CDL driver shortage may push up the cost of transporting aggregates, 6-10%

Demand & Inflation

- Globally, greatest commodity price increases since 1970s
- Based on the modeling, every additional $1 billion in infrastructure funding adds about 3% to VDOT's costs

Ukraine War

- VDOT can expect steel and other metals costs to increase up to 12% and remain high through 2023
- Precast concrete will also be affected due to high reinforcing steel costs. Lead times remain long

2022 – VDOT Created Reserve Fund

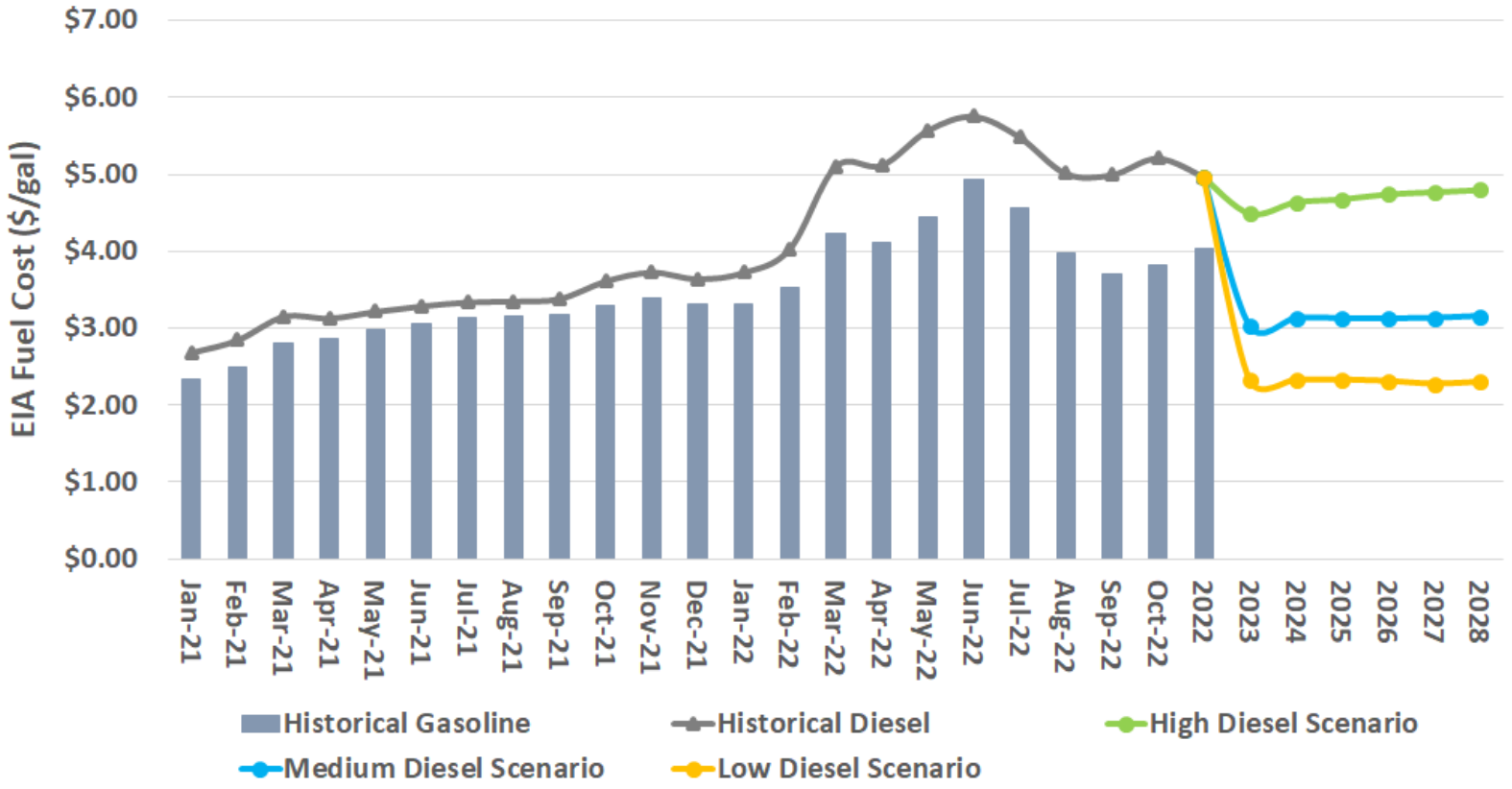
$130 M

VDOT recommended and the CTB adopted

- Paving (fuel, asphalt)
- VDOT operations (vehicles, ferries)
- City street maintenance

- Construction (steel, fuel, asphalt)
  - Absorbed by project contingency or other resources in the SYIP

Fuel Cost Projections



2022 EIA Diesel Price
$4.97 per gallon

2023 – 2028 Forecast

EIA Long-term Energy Outlook:
Annual forecast of three scenarios – High, Medium, Low (latest March 2022)

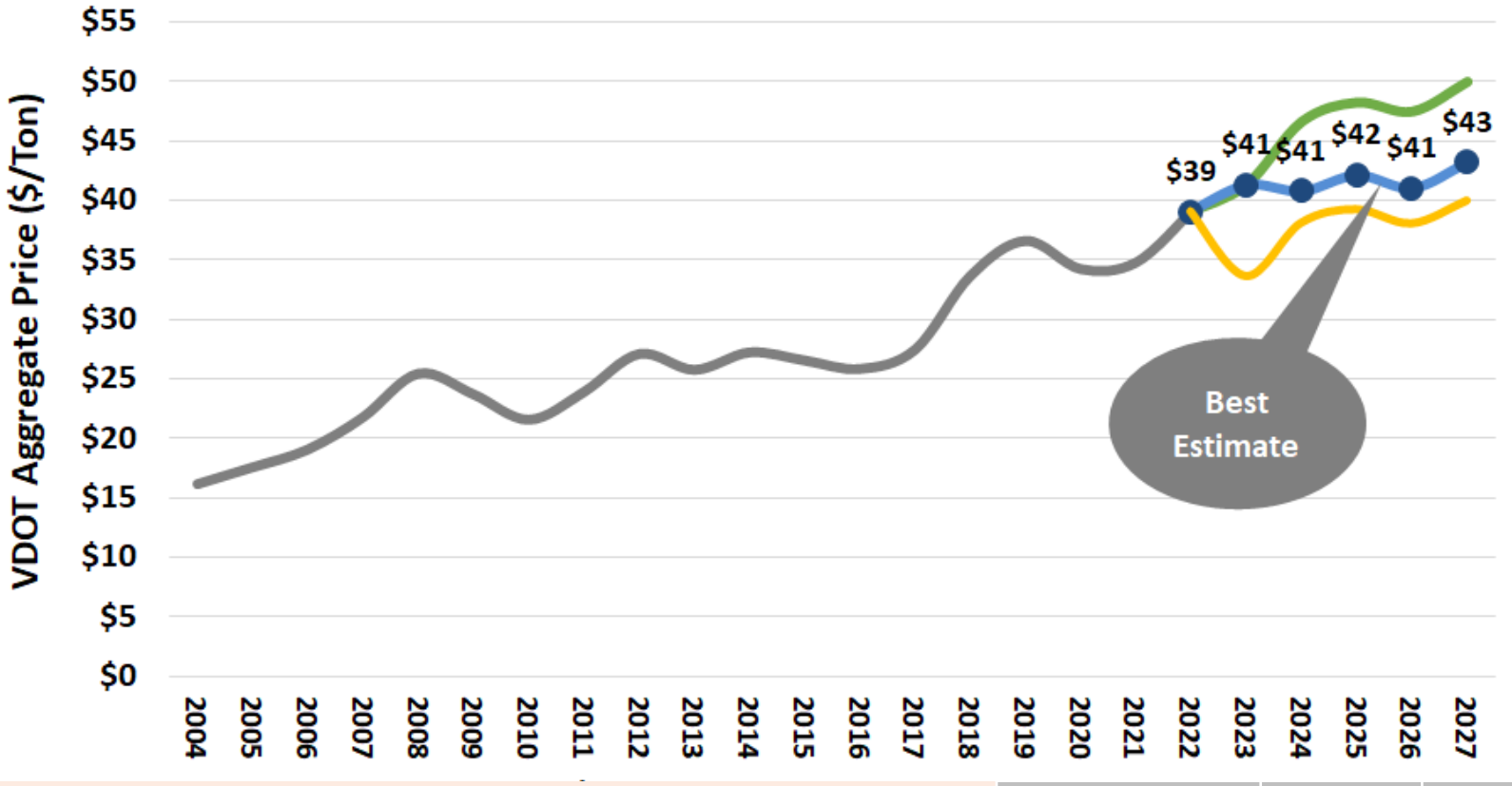
EIA Short-term Energy Outlook:
Forecasts updated monthly for the current and following year

October 2022 Short-term Forecast
shows 2023 expected diesel prices of $4.29 per gallon and gasoline prices of $3.57 per gallon

- Crude oil price volatility an ongoing issue
- Diesel prices have not come down like gasoline after recent crude declines

Diesel ($/gal)	2022	2023	2024	2025	2026	2027	2028
Upper Bound	$4.97	$4.49	$4.64	$4.68	$4.74	$4.77	$4.80
Best Estimate	$4.97	$3.02	$3.13	$3.13	$3.12	$3.13	$3.15
Lower Bound	$4.97	$2.32	$2.33	$2.33	$2.31	$2.27	$2.30

Aggregate Cost Projections



2022
$39 per ton

2023 – 2027 Forecast

Upper Bound: high crude oil price, spending, non-farm employment

Best Estimate: medium crude oil price, spending, non-farm employment

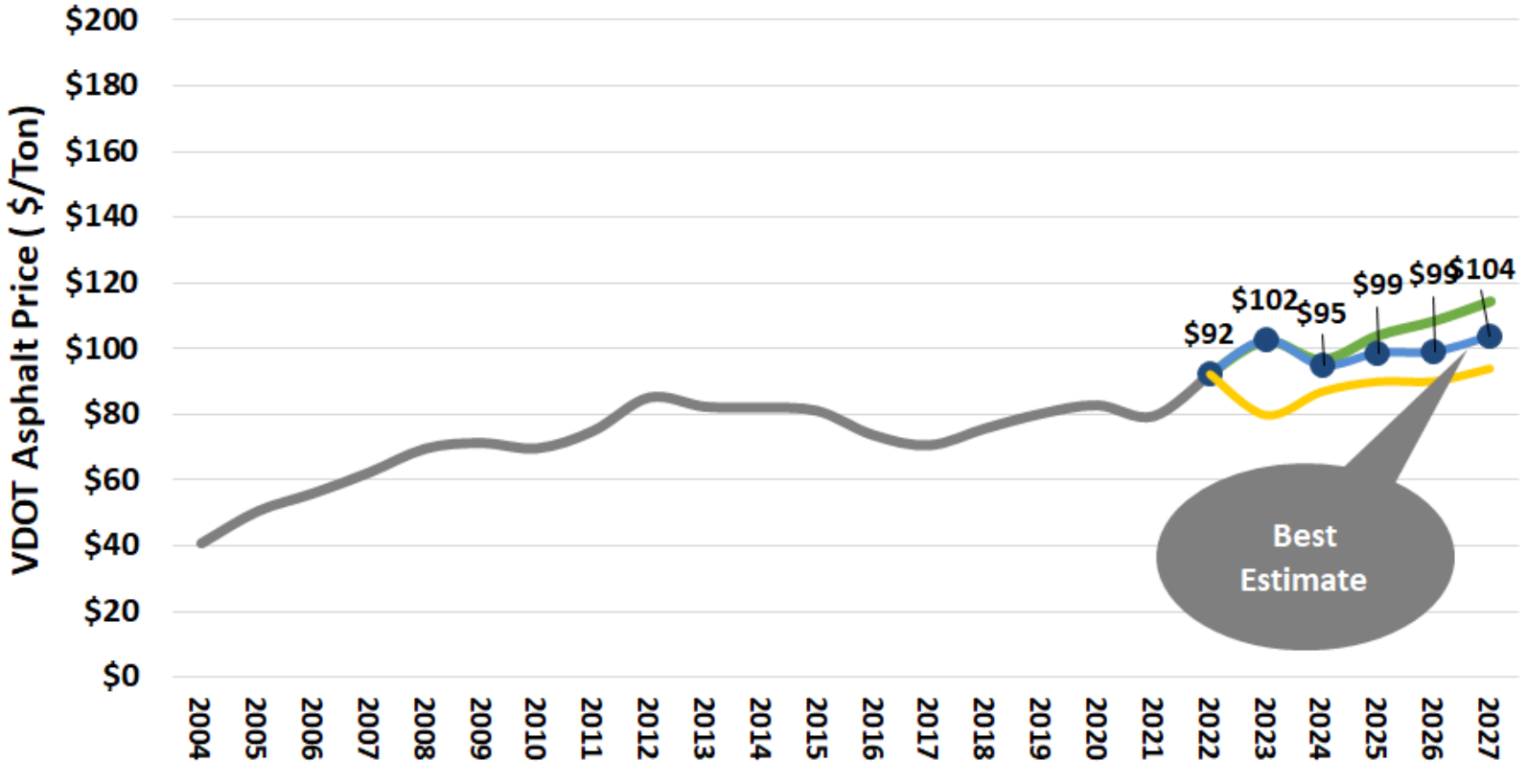
Lower Bound: low crude, spending, non-farm employment

- Crude oil prices (High, Med, Low Scenarios)
- Employment
- Infrastructure spending

FY ($/ton)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$35	$39	$41	$47	$48	$48	$50
Best Estimate	$35	$39	$41	$41	$42	$41	$43
Lower Bound	$35	$39	$34	$38	$39	$38	$40

*Actual Data, Final Weighted Average Price

Asphalt Cost Projections



2022
$92 per ton

2023 – 2027 Forecast

Upper Bound: high crude oil and binder prices

Best Estimate: medium crude oil price, non-farm employment, spending

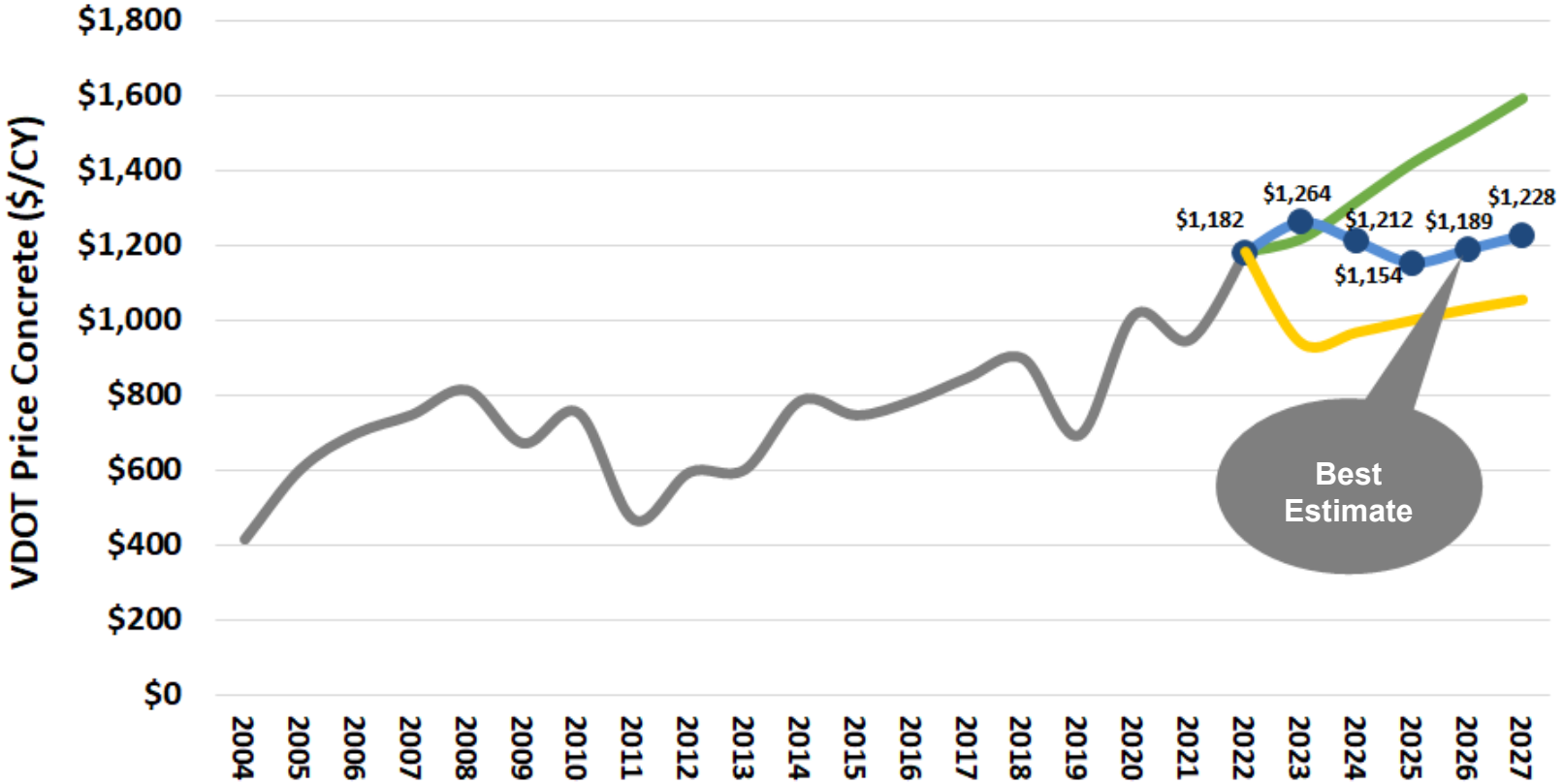
Lower Bound: low crude, non-farm employment, spending

- Binder prices
- Crude oil prices
- Employment
- Infrastructure spending

FY ($/ton)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$79	$92	$102	$97	$104	$109	$115
Best Estimate	$79	$92	$102	$95	$99	$99	$104
Lower Bound	$79	$92	$80	$87	$90	$90	$94

*Actual Data, Final Weighted Average Price

Concrete Cost Projections



2022
$1,182 per CY

2023 – 2027 Forecast

Upper Bound: GSP (Gross State Product), construction employment

Best Estimate: increasingly scarce fly ash, medium crude oil price

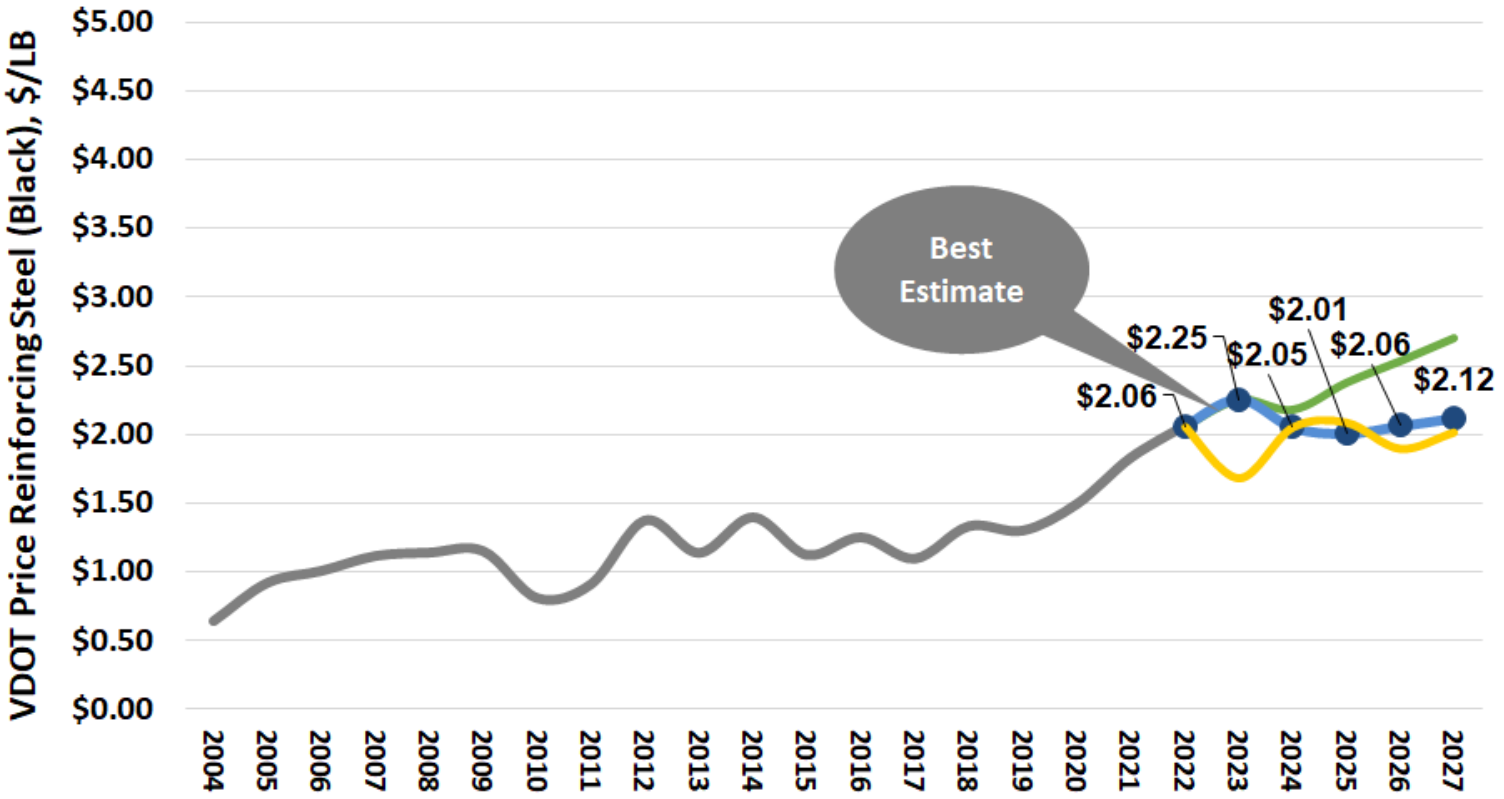
Lower Bound: increasingly scarce fly ash, low crude oil price

- Fly ash production and consumption – increasing scarcity
- Overall economy – GSP, employment
- Crude oil prices

FY ($/CY)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$947	$1,182	$1,216	$1,315	$1,418	$1,503	$1,591
Best Estimate	$947	$1,182	$1,264	$1,212	$1,154	$1,189	$1,228
Lower Bound	$947	$1,182	$938	$966	$998	$1,028	$1,054

*Actual Data, Final Weighted Average Price

Reinforcing Steel (Black) Cost Projections



2022
$2.06 per lb.

2023 – 2027 Forecast

Upper Bound: medium crude oil price, construction employment, GSP

Best Estimate: medium crude oil & iron ore prices, non-farm employment

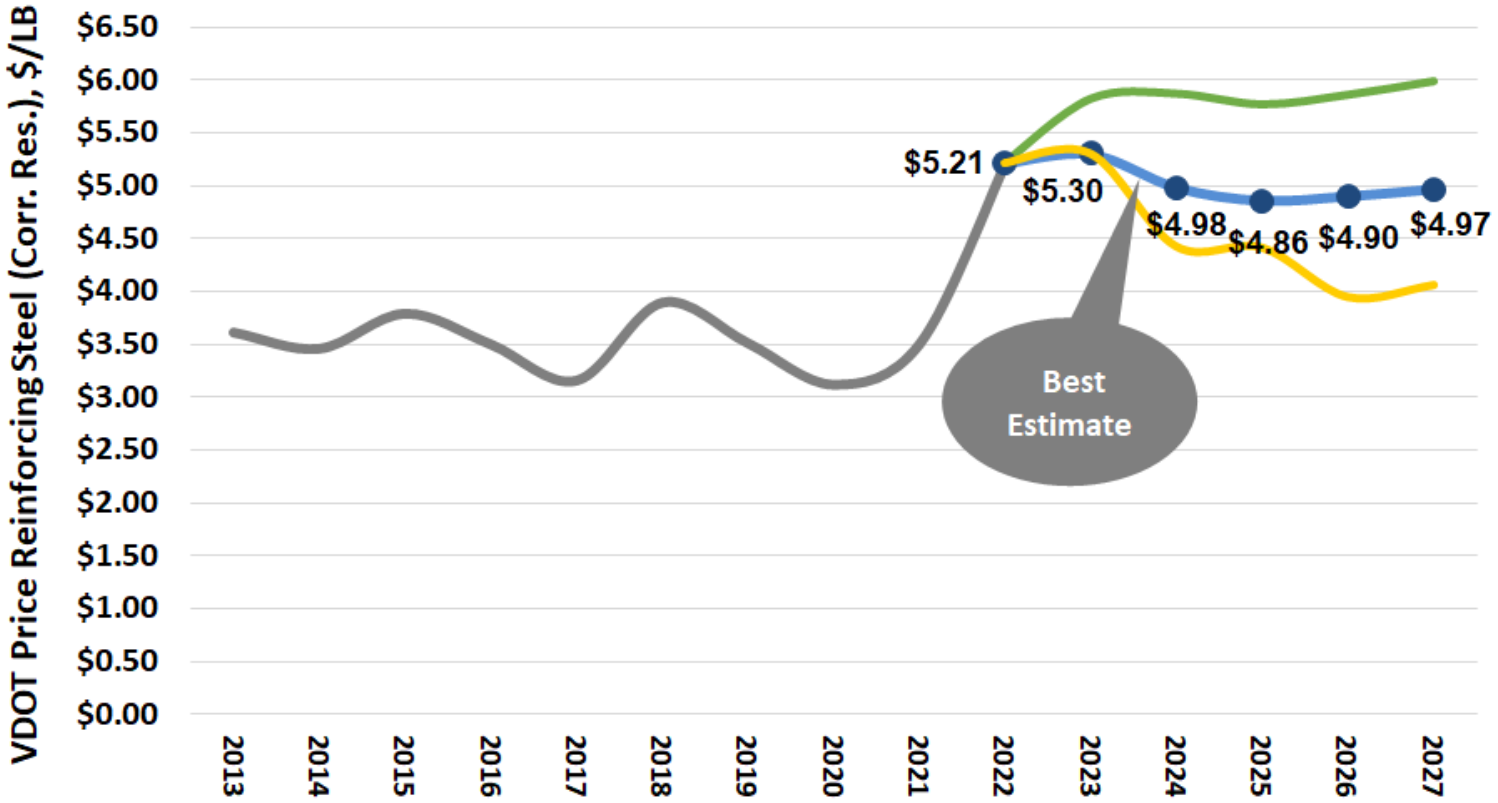
Lower Bound: medium crude oil price, spending, non-farm employment

- Iron ore prices
- Energy prices
- Macroeconomic conditions – Employment
- Infrastructure spending

FY ($/lb.)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$1.83	$2.06	$2.25	$2.18	$2.38	$2.53	$2.70
Best Estimate	$1.83	$2.06	$2.25	$2.05	$2.01	$2.06	$2.12
Lower Bound	$1.83	$2.06	$1.69	$2.05	$2.09	$1.90	$2.02

*Actual Data, Final Weighted Average Price

Reinforcing Steel (Corrosion Resistance) Cost Projections



2022
$5.21 per lb.

2023 – 2027 Forecast

Upper Bound: higher crude oil & iron ore prices, non-farm employment

Best Estimate: medium crude oil & iron ore prices, non-farm employment

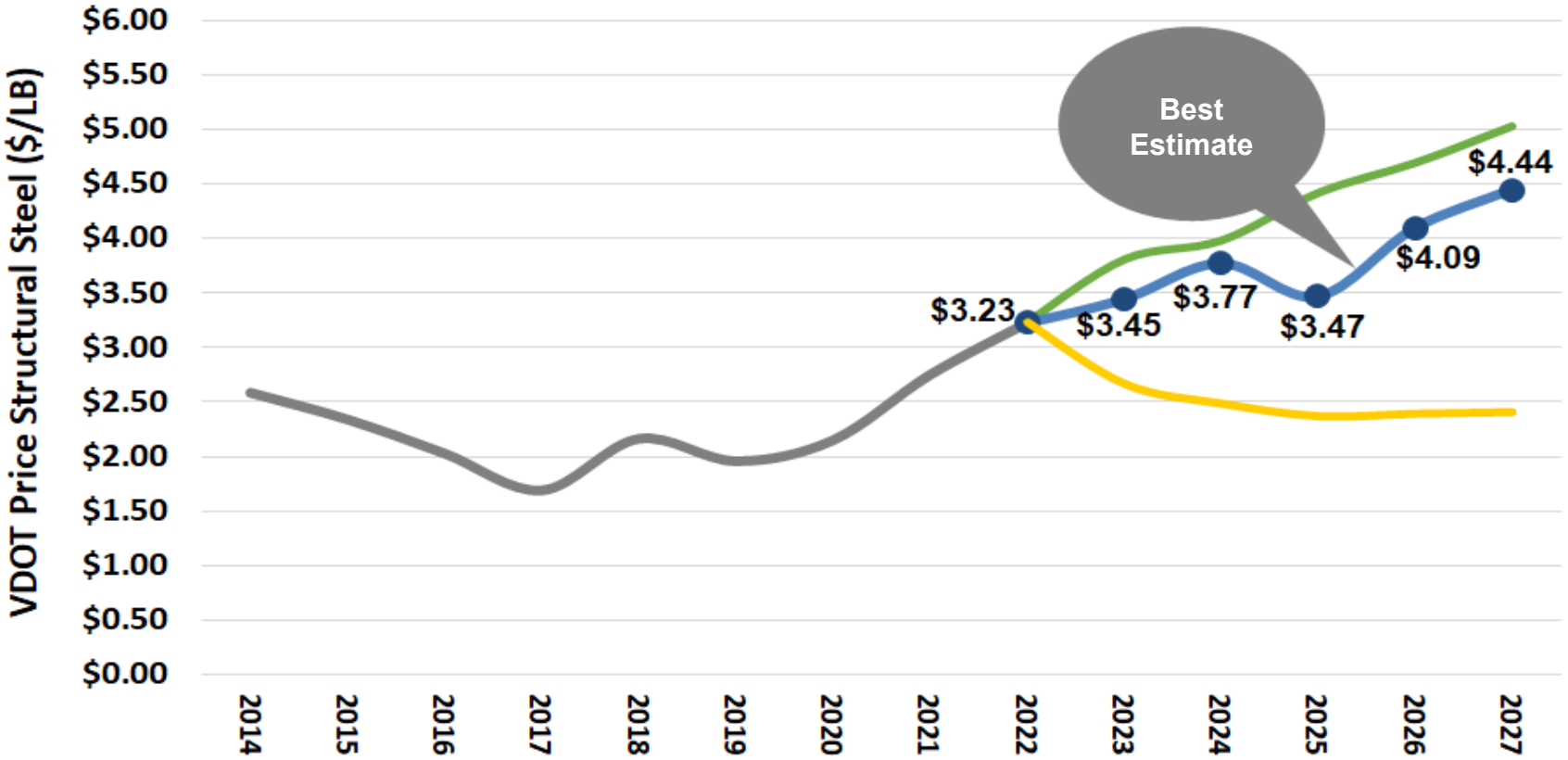
Lower Bound: medium crude oil price, spending, non-farm employment

- Iron ore prices
- Energy prices
- Macroeconomic conditions – Employment
- Infrastructure spending

FY ($/lb.)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$3.50	$5.21	$5.83	$5.88	$5.77	$5.86	$5.99
Best Estimate	$3.50	$5.21	$5.30	$4.98	$4.86	$4.90	$4.97
Lower Bound	$3.50	$5.21	$5.30	$4.43	$4.42	$3.95	$4.06

*Actual Data, Final Weighted Average Price

Structural Steel Cost Projections



2022
$3.23 per lb.

2023 – 2027 Forecast

Upper Bound: high crude oil price, optimistic housing starts, spending

Best Estimate: high crude oil price, slowdown in housing starts, spending

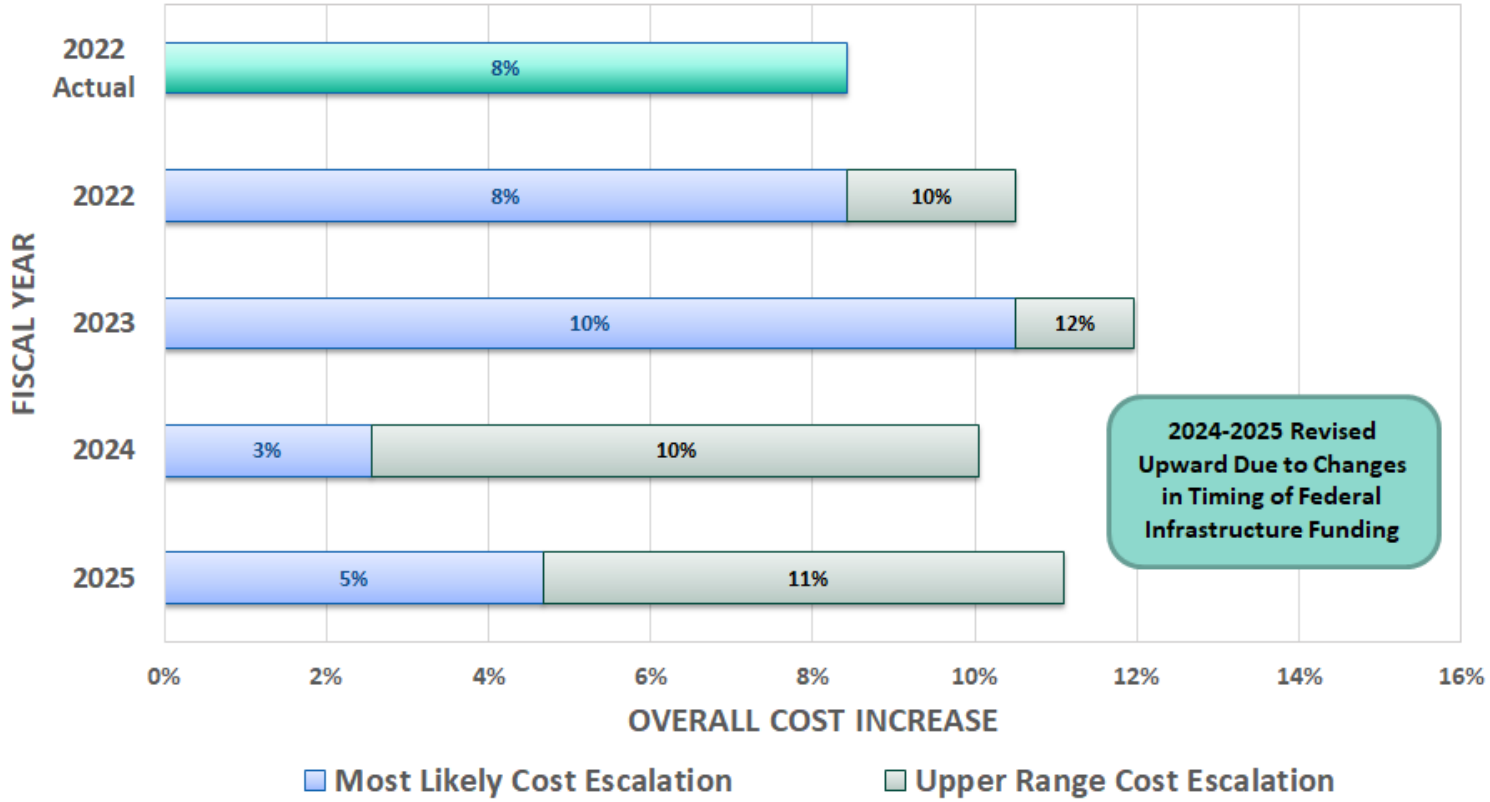
Lower Bound: medium iron ore price, low crude oil price

- Iron ore prices
- Energy prices
- Competition from other sectors/overall economy
- Infrastructure spending

FY ($/lb.)	2021*	2022*	2023	2024	2025	2026	2027
Upper Bound	$2.75	$3.23	$3.81	$3.98	$4.42	$4.70	$5.03
Best Estimate	$2.75	$3.23	$3.45	$3.77	$3.47	$4.09	$4.44
Lower Bound	$2.75	$3.23	$2.67	$2.49	$2.37	$2.39	$2.41

*Actual Data, Final Weighted Average Price

Forecasted Cost Escalation



- No one flips a switch on July 1 – costs continue to escalate through the calendar year
- Recent updates on timing of federal infrastructure funding may extend pressure on construction sector
- For planning purposes, the midpoint of 11% for 2023 is still appropriate

Inflation shown is not cumulative and based on current SYIP budgets:
- $100 M in current budget is expected to cost $110 by 2023
- $100 M in current budget is expected to cost $103 by 2024
- In current dollars; i.e. *not* considering discount rates/time value of money

Impact to Program

- Projects for advertisement FY23 reviewed for commodity and inflation impacts
  - Contingency funding considered before adding funds
- Post FY23 advertisements
  - Monitor fluctuations in commodity forecast
  - Review ongoing
- Update to SYIP to occur in spring 2023


DRPT
VIRGINIA DEPARTMENT OF RAIL
AND PUBLIC TRANSPORTATION

Key Market Influences

Supply Chain

- Up to an 80% increase in vehicle prices
- Manufacturing and delivery times increasing from months to years
- Capital projects competing for materials in an overheated economy

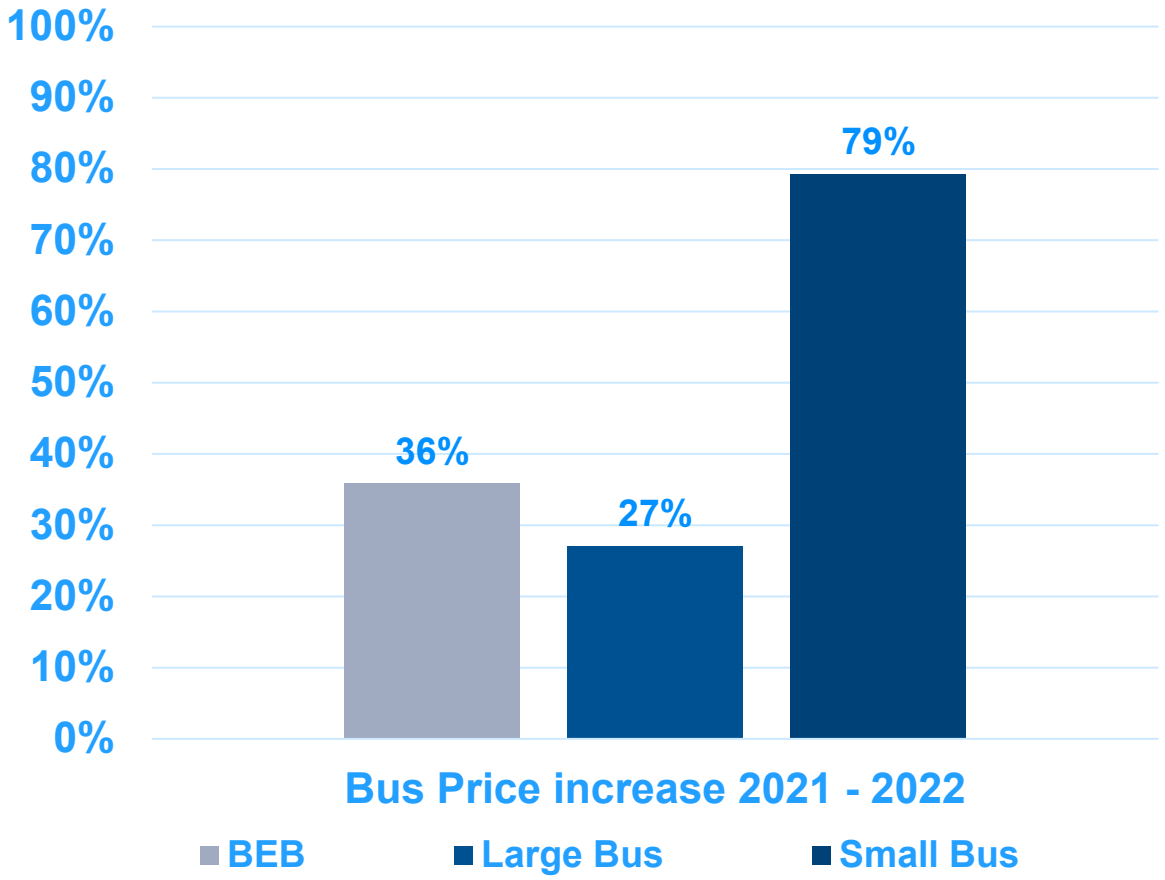
Labor Markets

- CDL Drivers have not fully returned to the market
- Wages and benefits for CDL operators expected to rise in FY23
- 92% of public transportation providers struggling to hire new employees (APTA)

Energy Costs

- Diesel costs have not recovered with other fuel cost declines
- Continued energy price uncertainty with FY23 expected to flatten at already high prices or increase 12%
- U.S. Energy Information Administration forecasts record natural gas consumption in 2022 (CNG buses)

Transit Cost Trends

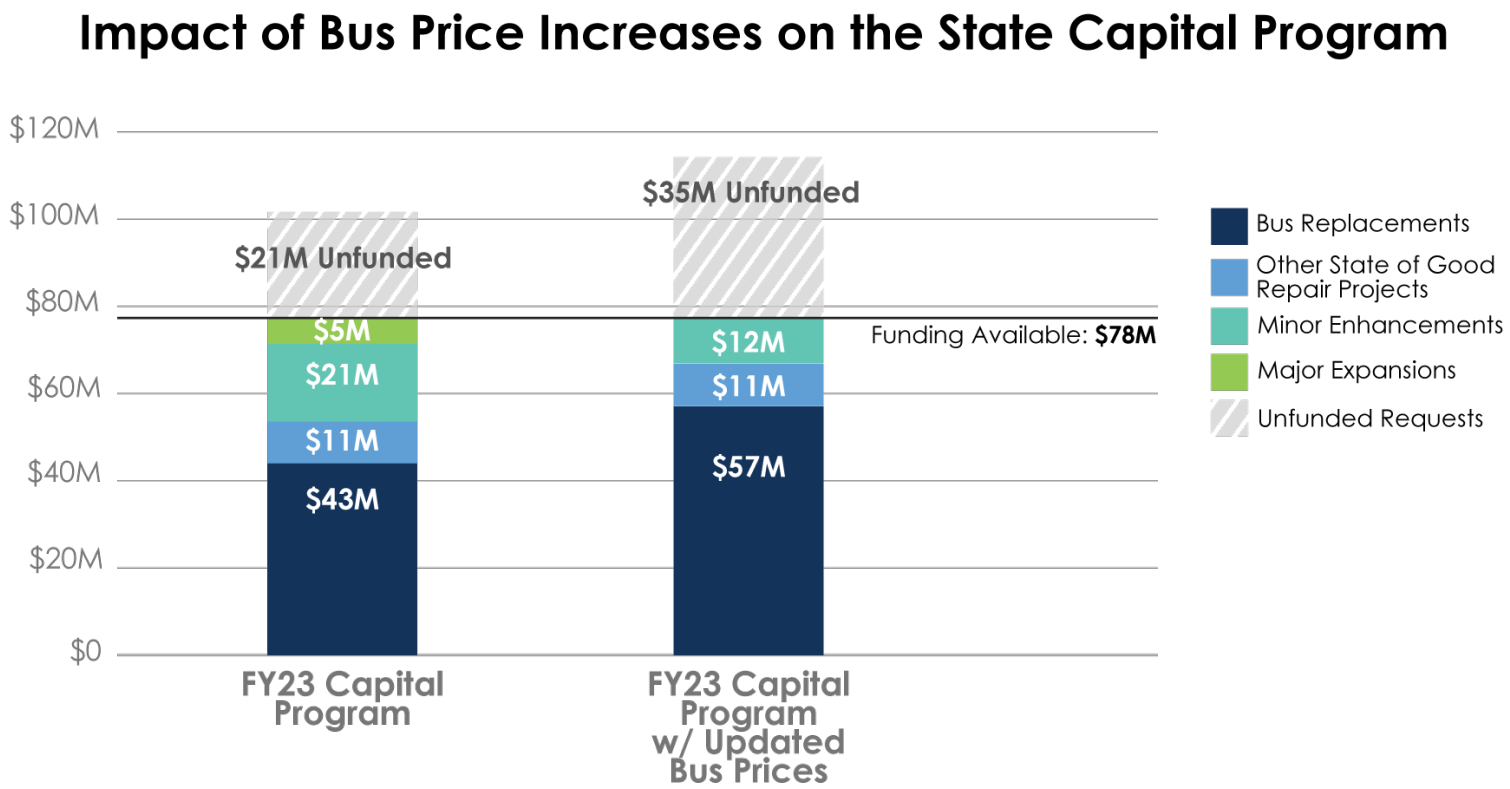


- Large cost increases and shortages across operations, vehicle costs, and facilities construction
  - Up to 79% increase per vehicle
  - Wage cost increases for drivers and mechanics
  - Associated General Contractors of America data shows increase of 69% for fuel
  - Bus driver employment sustained heavy losses since 2020
- **Bus Manufacturing and Delivery: Increased from 6 months to 3 years**

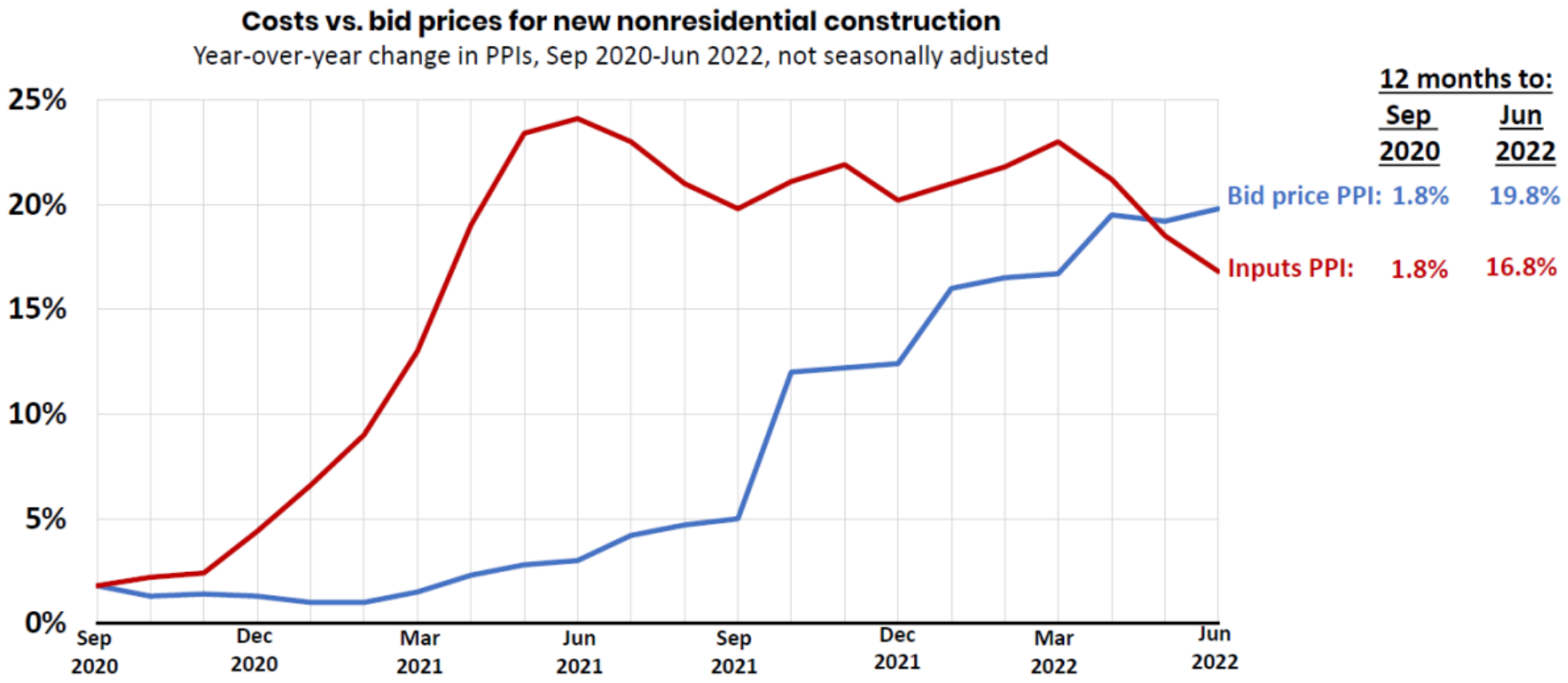
Transit Cost Trends

Impacts on Bus Price Increases on the State Capital Program

- DRPT State Capital Program prioritizes State of Good Repair (SGR) first
- Vehicle cost increases will reduce the number of minor enhancement and major expansion projects DRPT is able to support



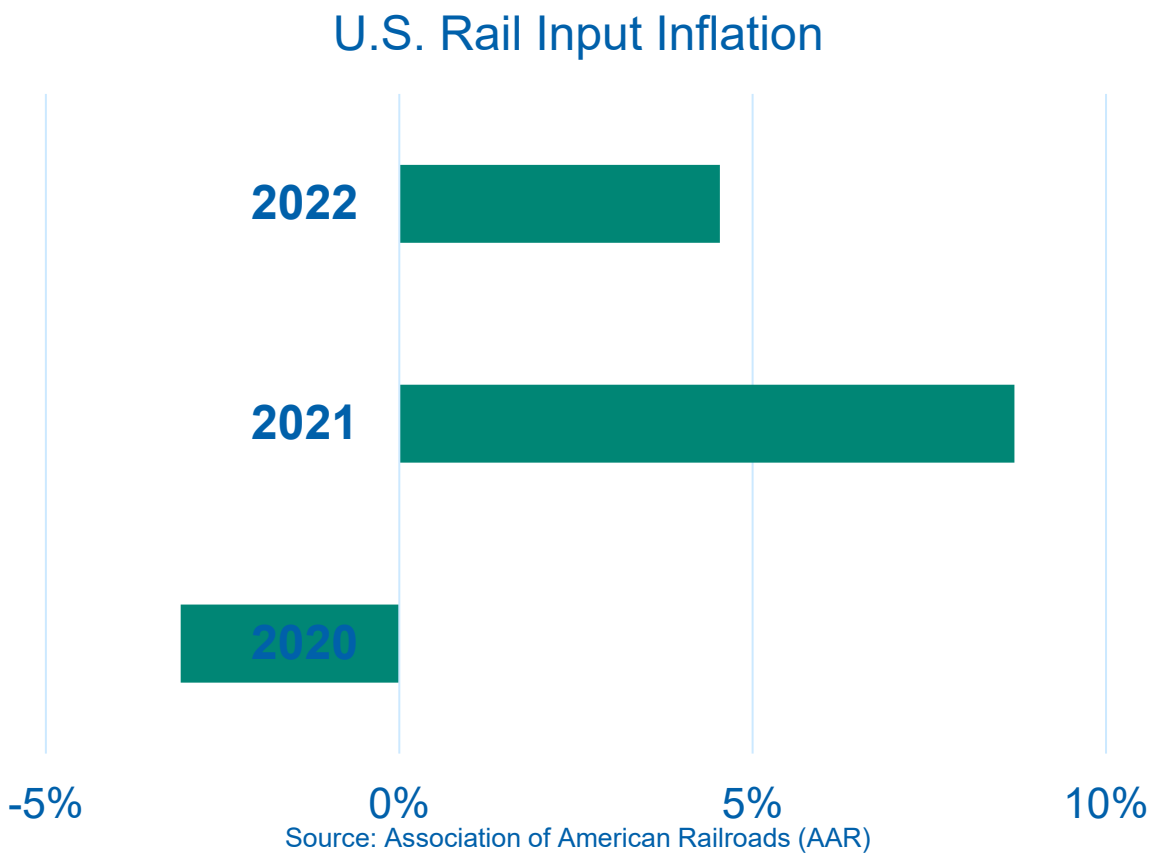
Input Costs vs. Bid Prices
Vertical Construction



Source: Bureau of Labor Statistics, producer price indexes, www.bls.gov/ppi

- Nationally, bids have continued to increase even as input costs have flattened as contractors seek to protect themselves from more cost uncertainty and recoup losses

Rail Cost Trends



Source: Association of American Railroads (AAR)

- **Key factors affecting cost increases:**
  - Personnel, labor shortages: short about 4,100 workers, or about 9.4% (Loop Capital)
  - Fuel: +85% in from Jan. 2020 to Sep. 2022 (AAR)
  - Maintenance: materials and supplies up 9% in the last quarter alone (AAR)
  - Inflationary pressures on capital program consistent with transit and highway projects

Management Tools

Federal Aid

Maximize-apply for every available penny

State of Good Repair

DRPT funds capital projects and programs to replace or rehabilitate existing assets FIRST

Innovative Procurements

Statewide procurements for vehicles, bus shelters, amenities—economies of scale help reduce overall costs

Labor

Ongoing investments to retain and grow workforce will reduce long-term costs

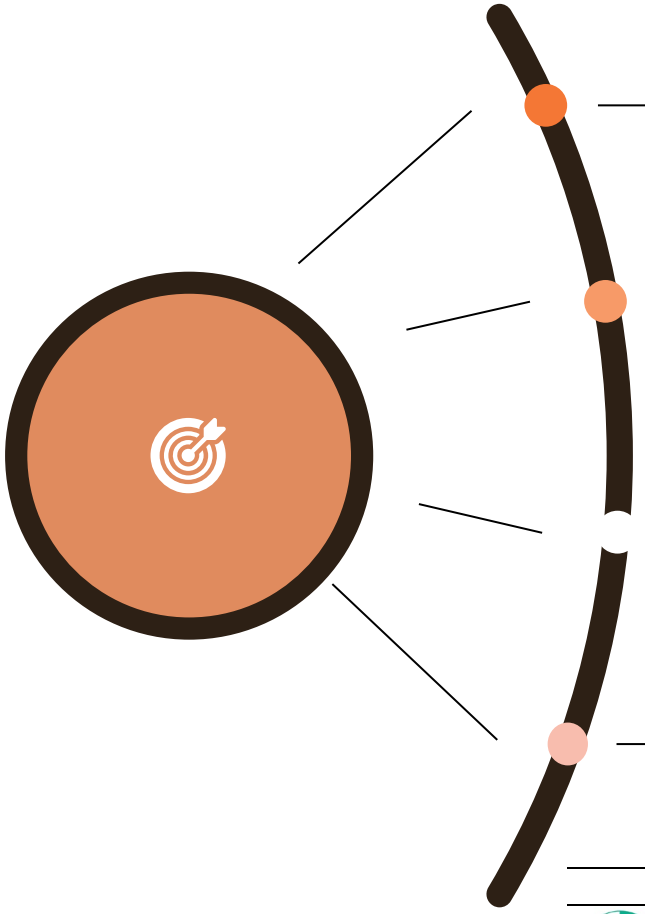
Optimization in Planning

Statewide: analyzing ridership, stops, and routes to optimize resources

Outsourcing

Turn-key services, federal certifications, P3 delivery of major capital expansions

Things to Watch – Next 24 Months



Ukraine War

Continued disruption to steel, chemicals, parts, and shipping. With broader conflict, resources diverted from civil to military

US/Global Recession

U.S. economy collapses under its own weight; 78% of firms report costs still rising. Plus, war impacts on global economies

Energy prices

OPEC+ intervention causing uncertainty; Europe transition to renewables

China

COVID disruption, affecting supply chains, geopolitical conflict

Probability