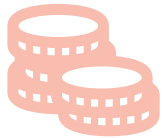


# Impact of Inflation and the Effects of Supply Chain on the Virginia Department of Transportation and the Department of Rail and Public Transportation





# Economic Study



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

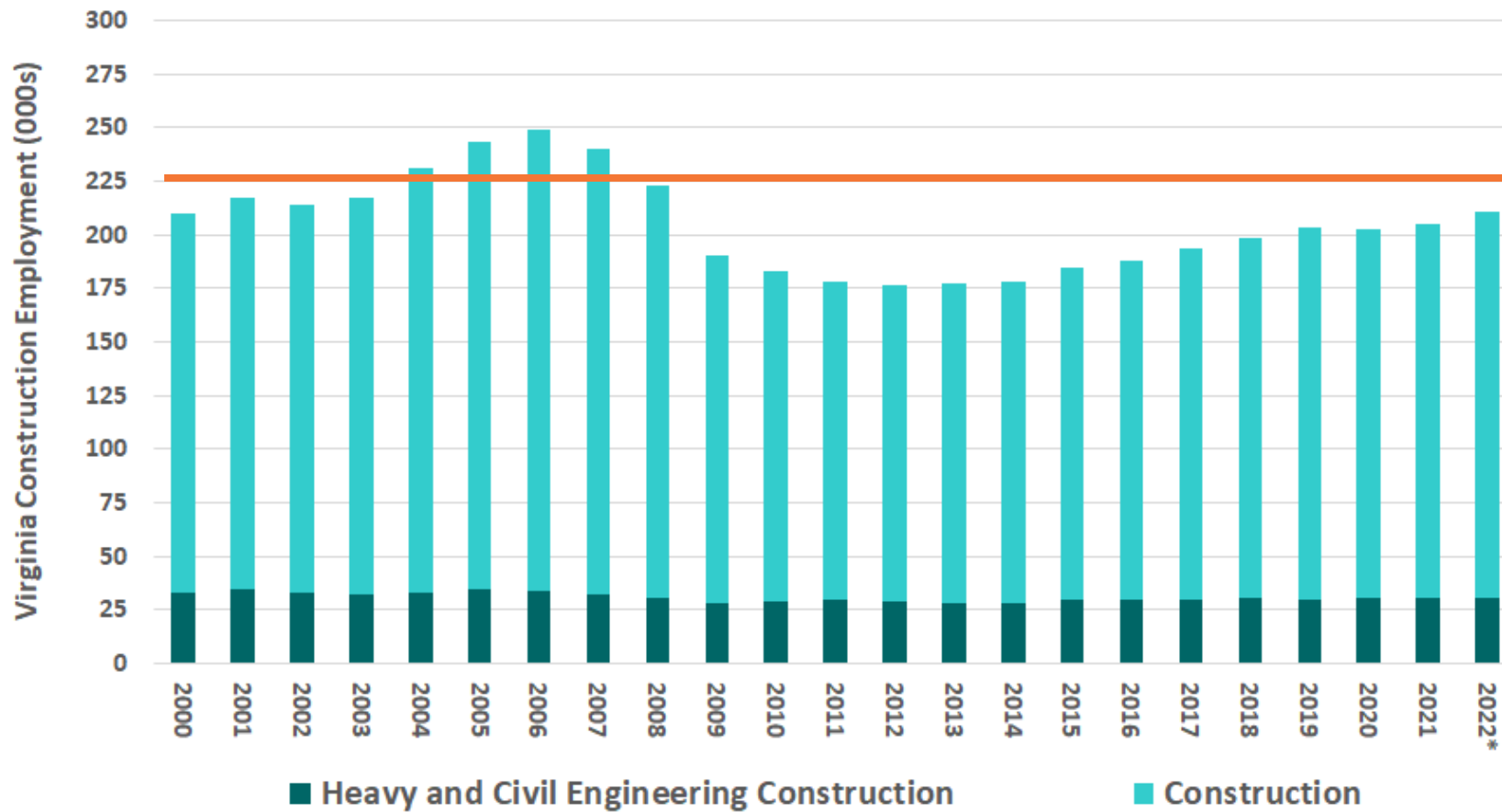


During the global recovery from the COVID-19 pandemic, a series of supply chain disruptions occurred, labor markets tightened, and Russia invaded Ukraine. Construction costs have increased.



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

# Tight Labor Market



Source: BLS; \*VA Works Short-term Projections

- 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

# General Market Conditions

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

## Legend

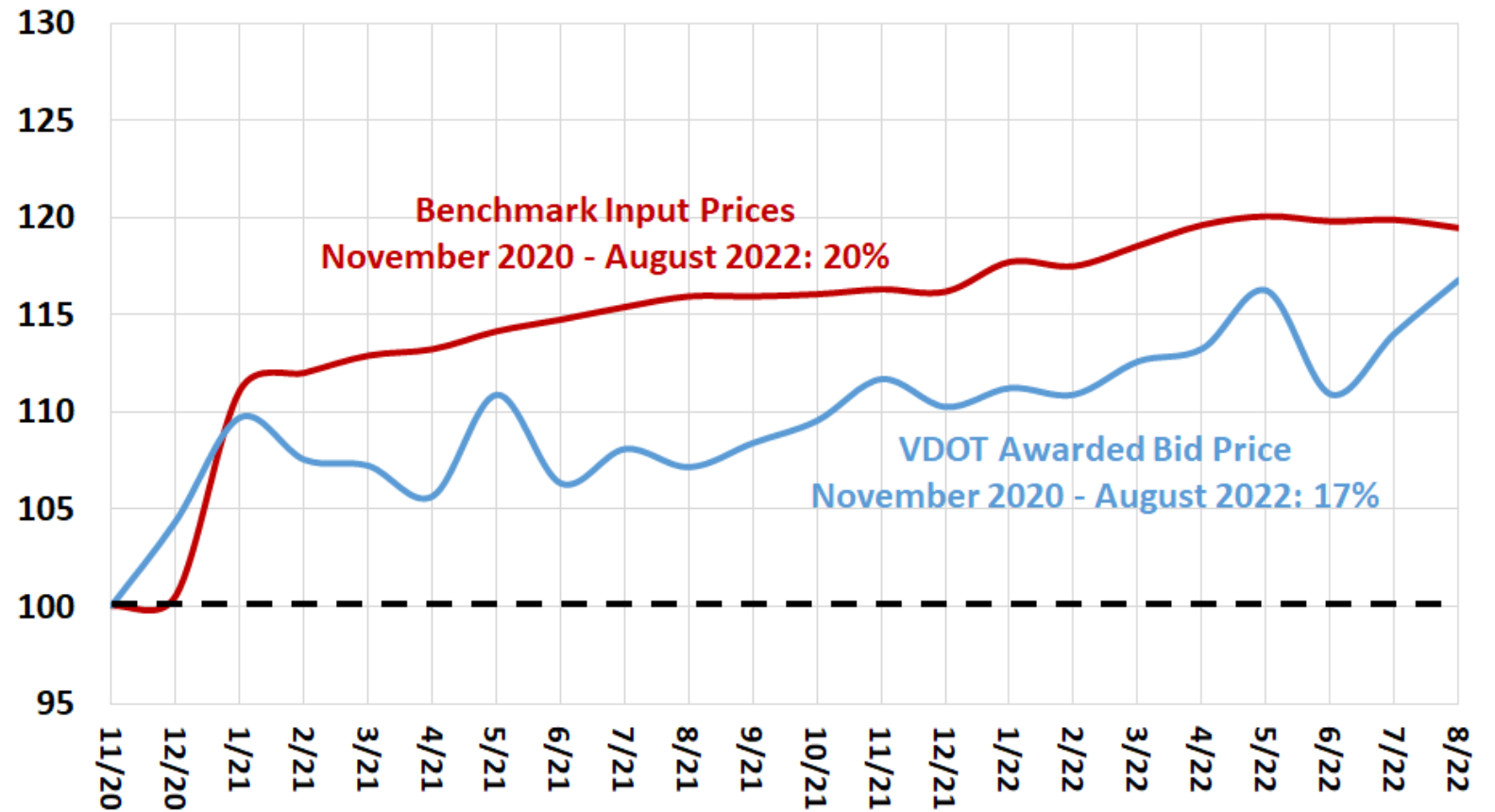
Exerting negative influence on construction costs

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

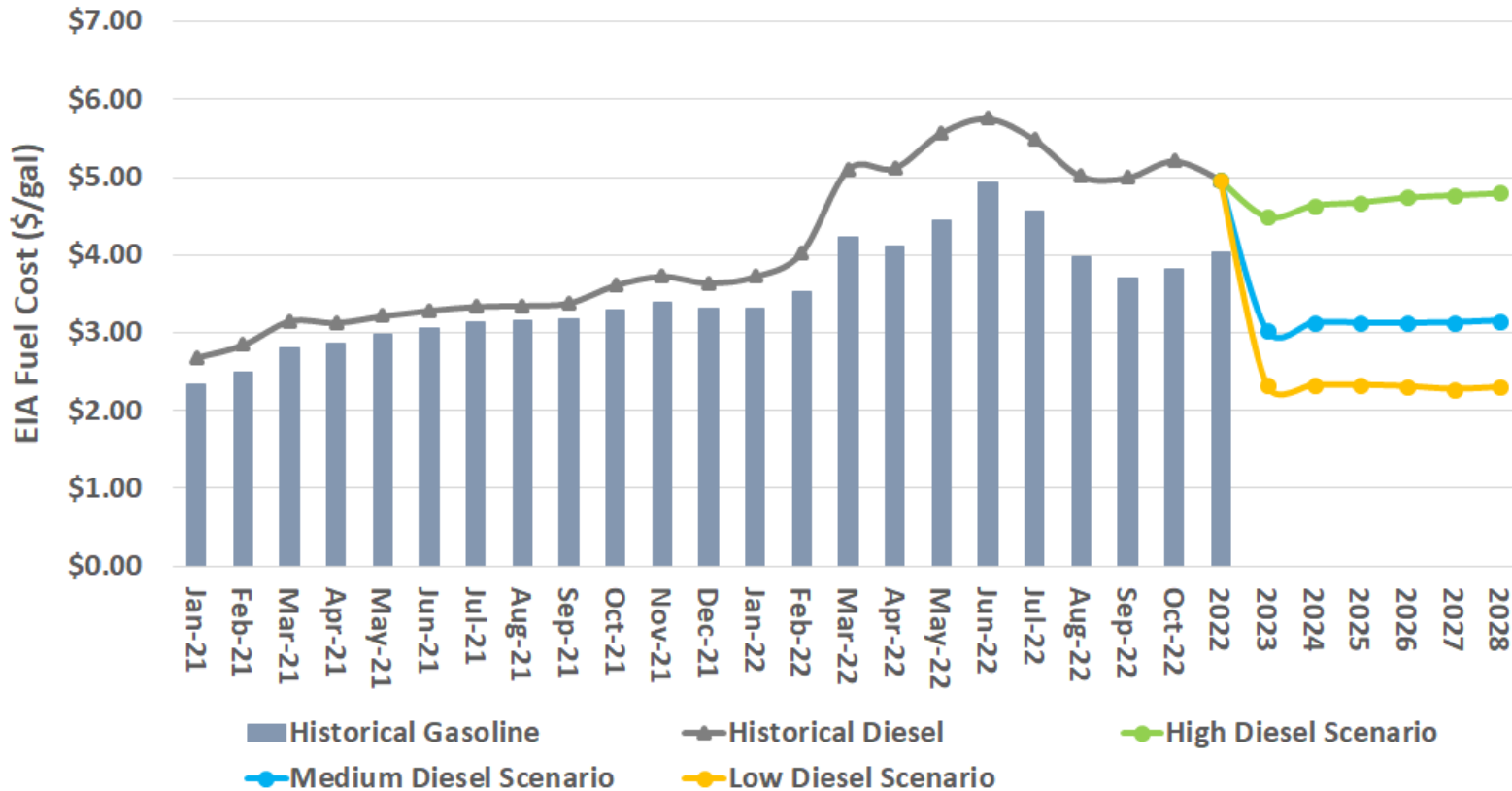
**\$130 M**

## 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)

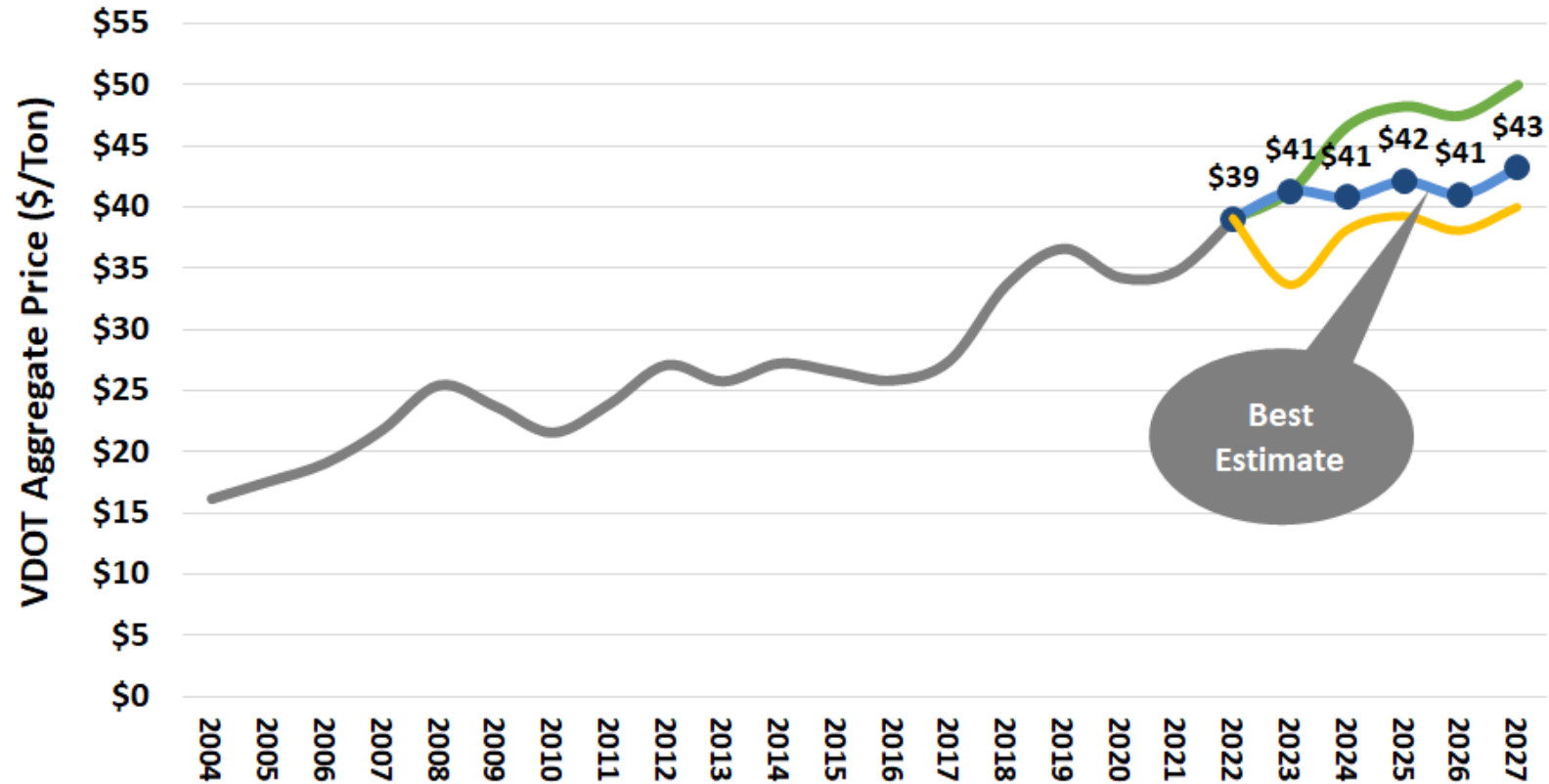
**EIA Short-term Energy Outlook:**  
Forecasts updated monthly for the current and following year

**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

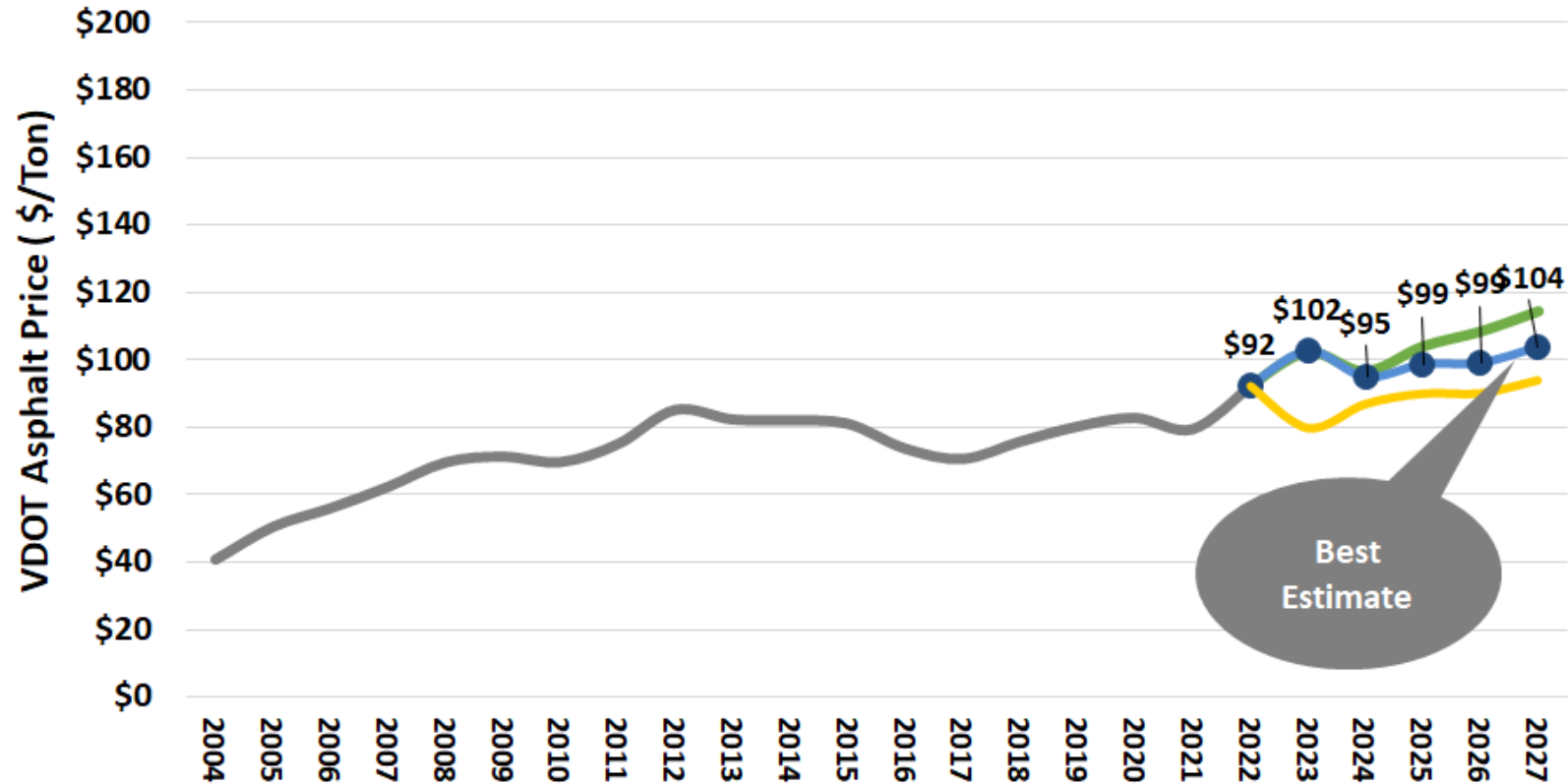
**Best Estimate:** medium crude oil price, spending, non-farm employment

**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 |

# 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

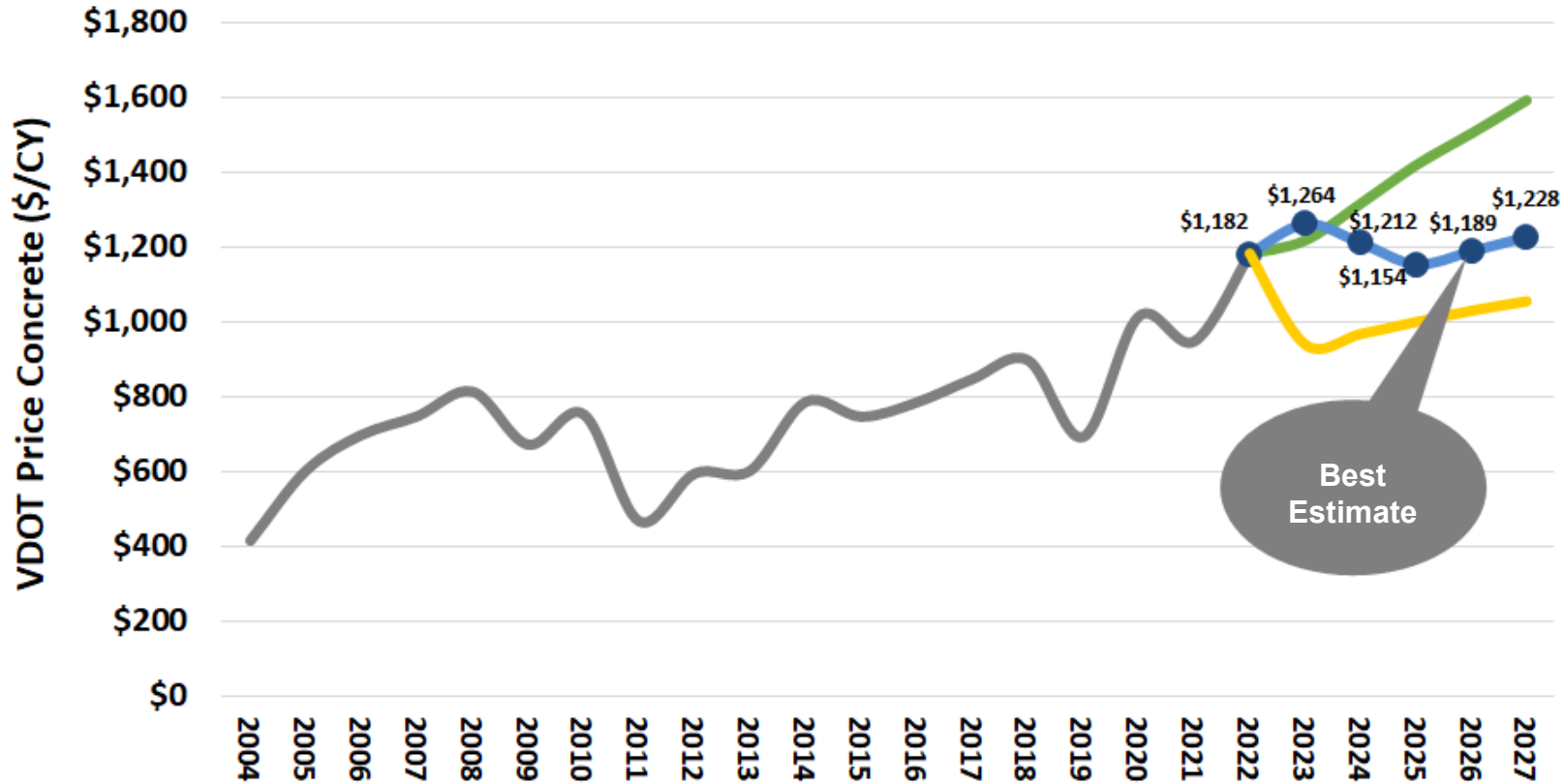
**Lower Bound:** low crude, non-farm employment, spending

- 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

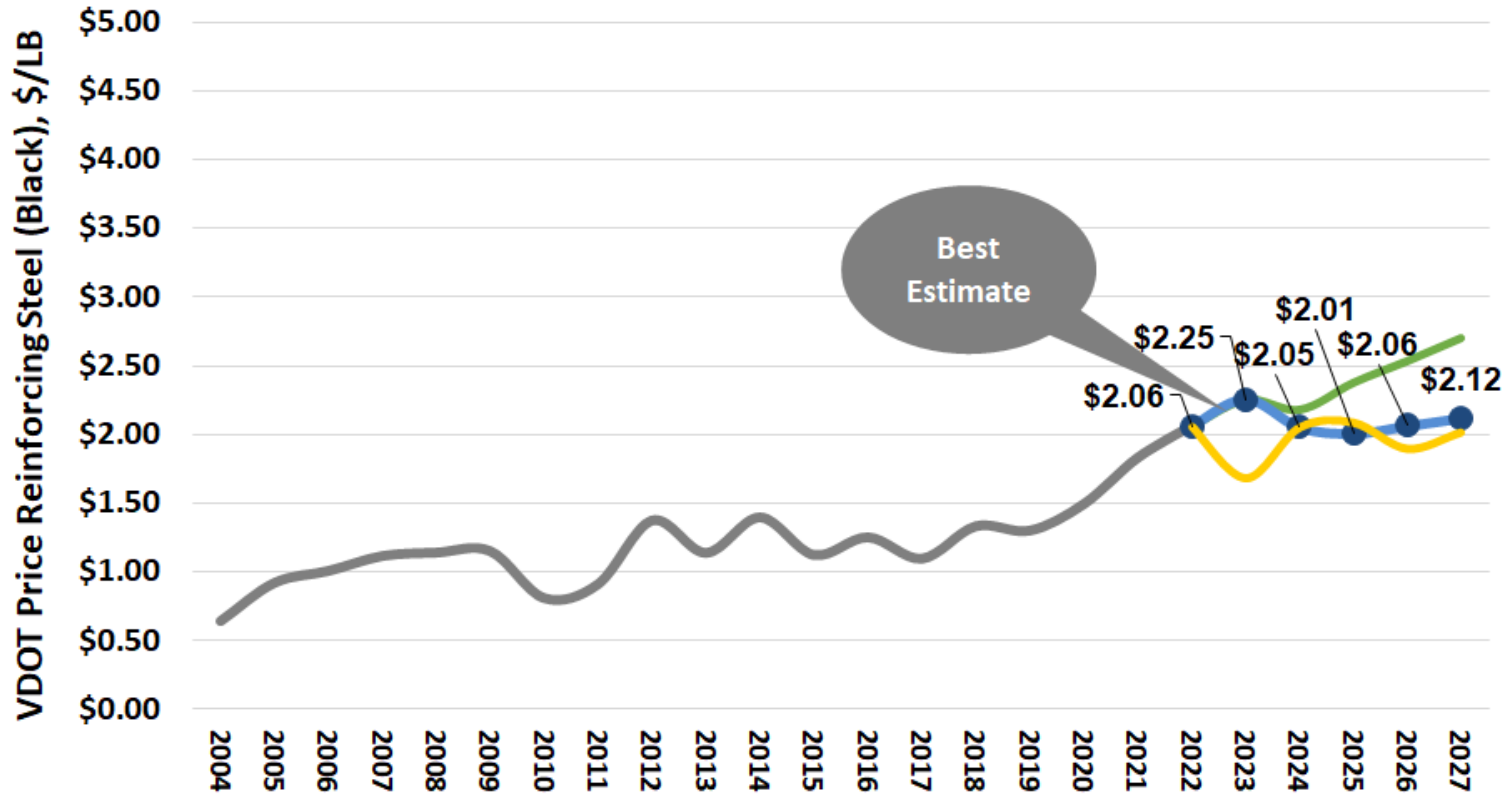
**Lower Bound:** increasingly scarce fly ash, low crude oil price

- 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

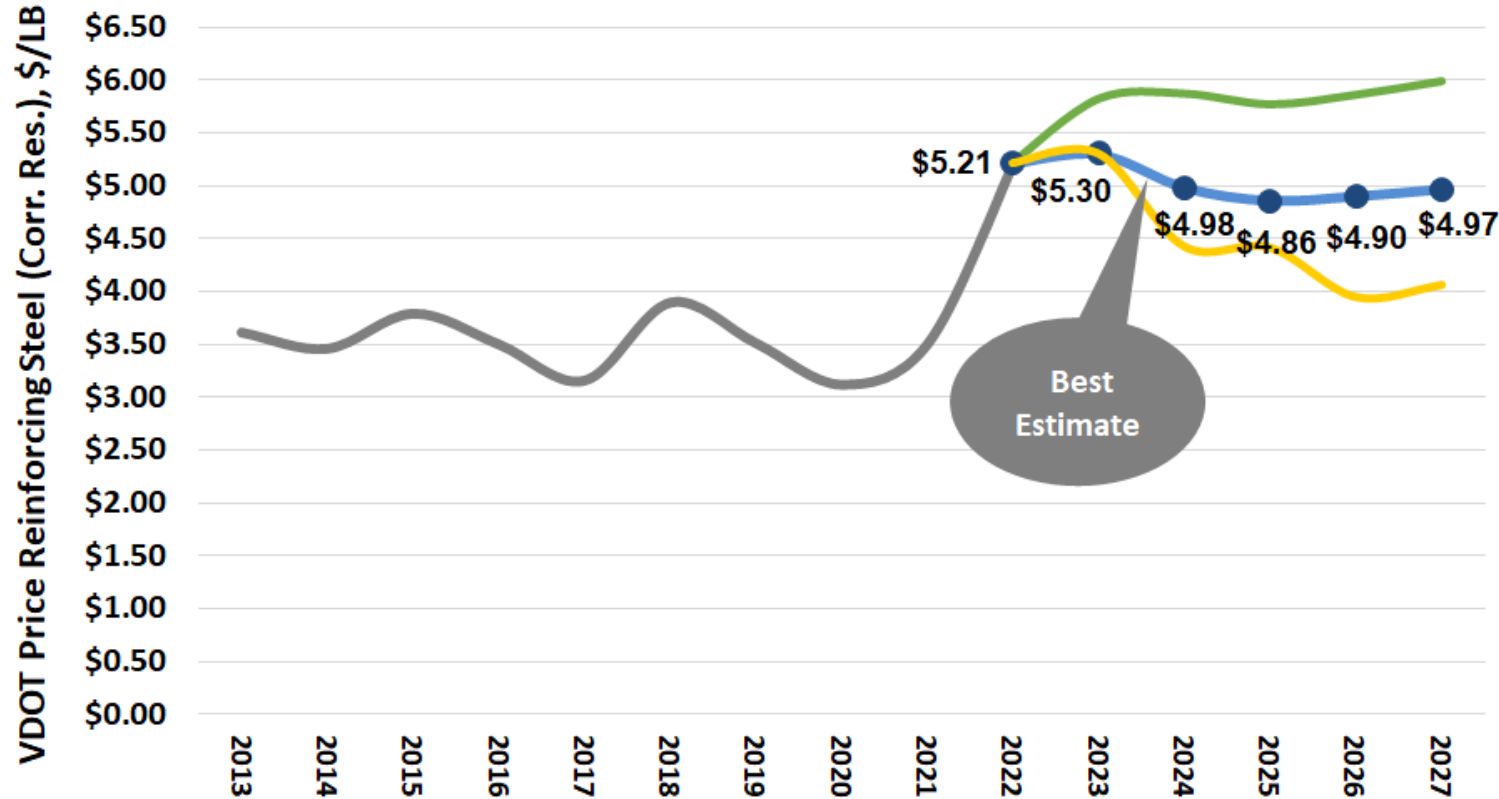
**Lower Bound:** medium crude oil price, spending, non-farm employment

- 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 |

# 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

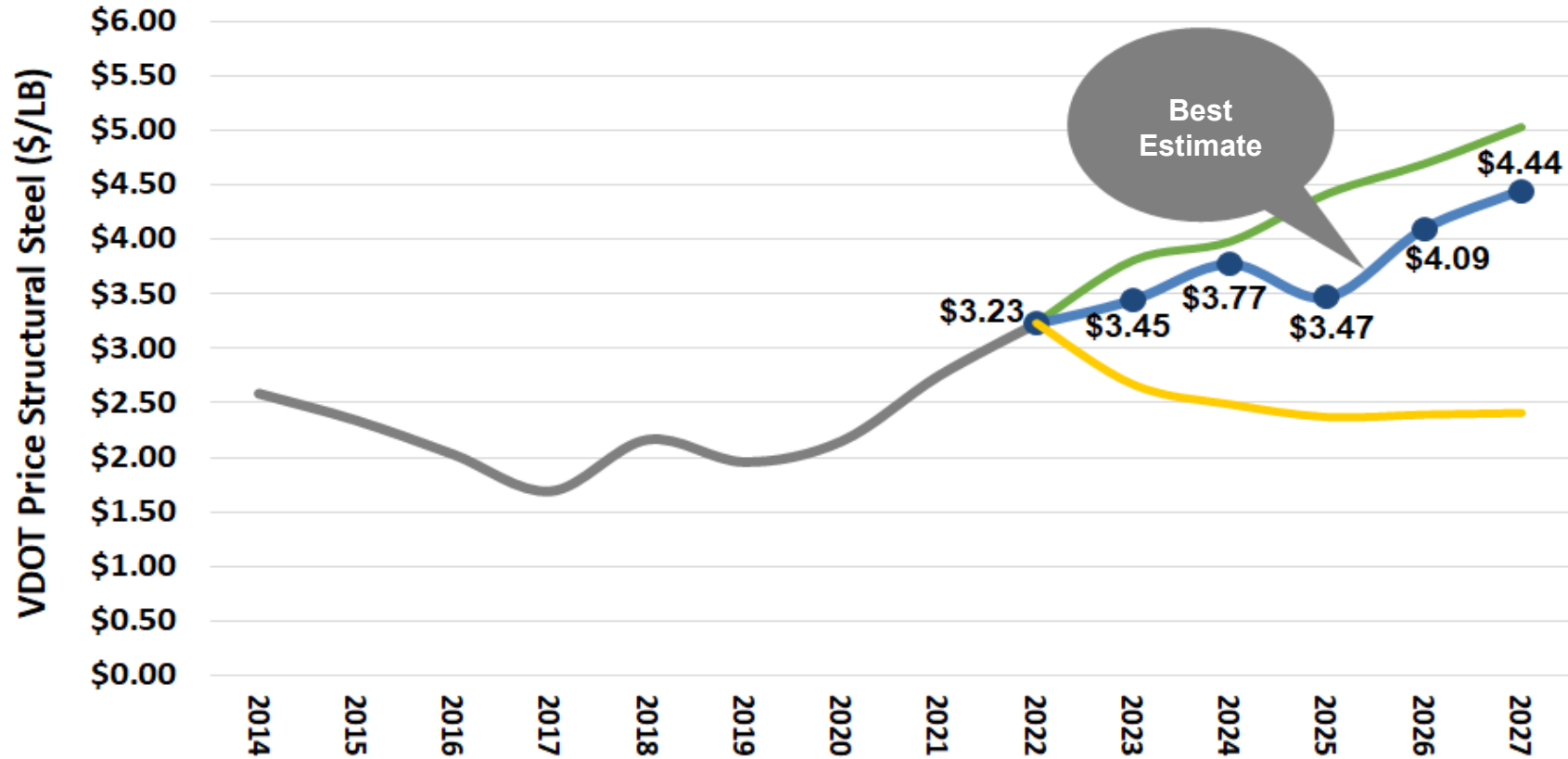
**Lower Bound:** medium crude oil price, spending, non-farm employment

- 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 |

# 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

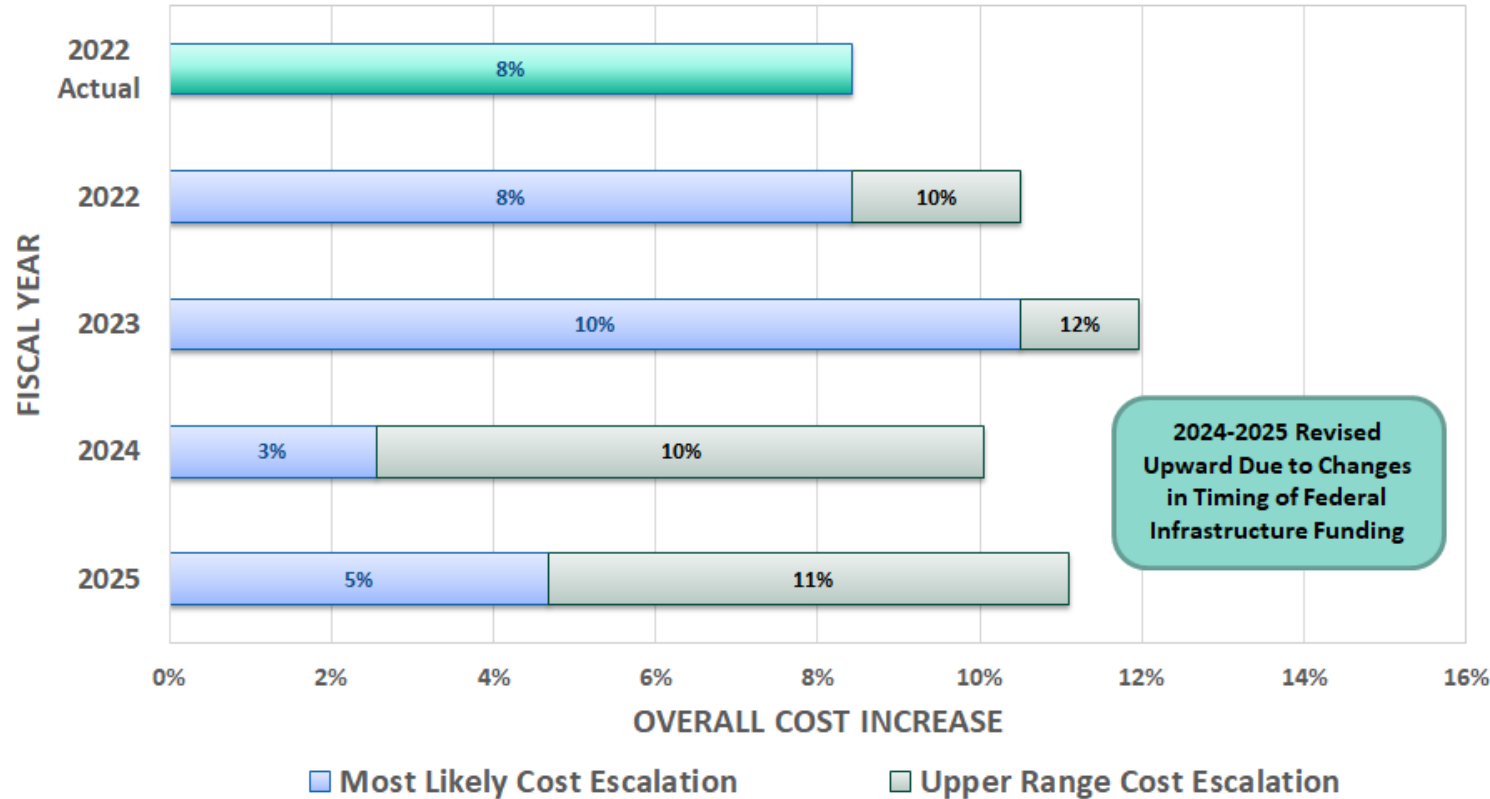
**Lower Bound:** medium iron ore price, low crude oil price

- 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 |

# Forecasted Cost Escalation



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

- 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



# 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

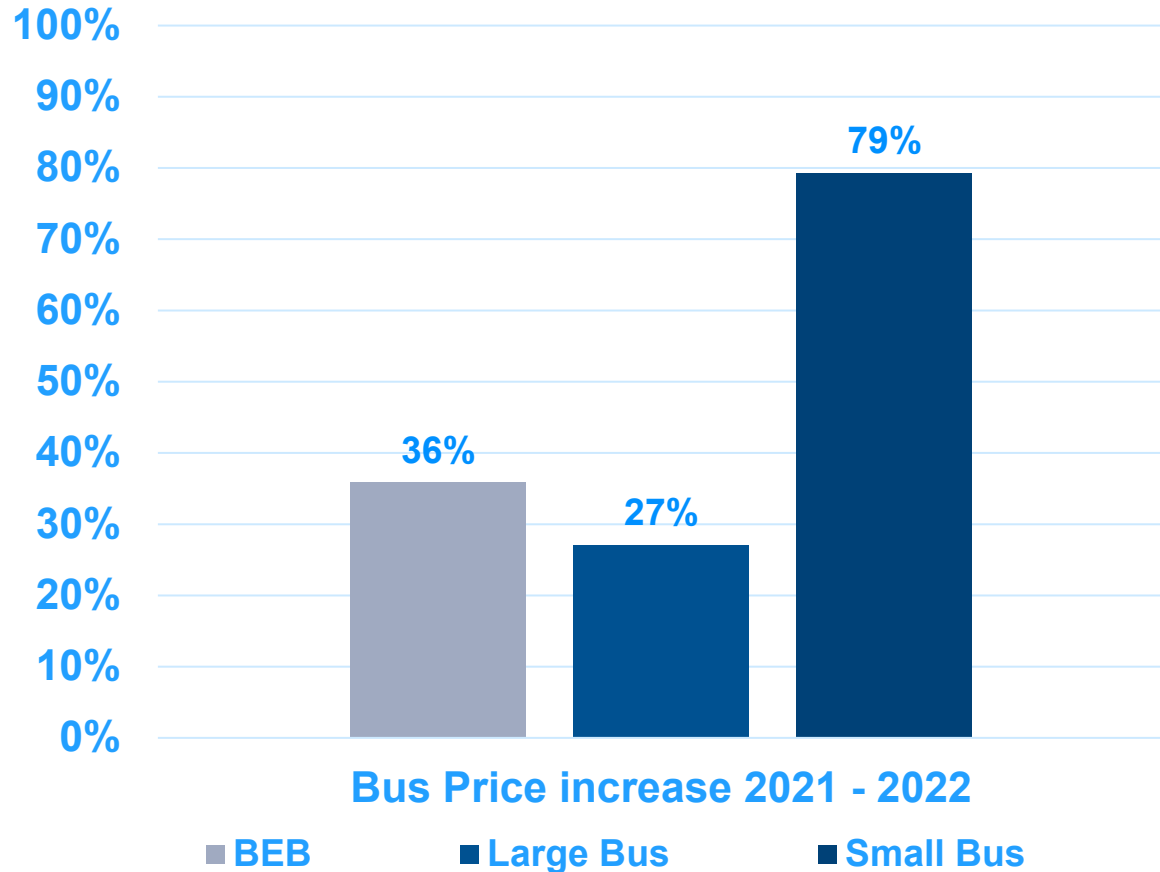
## Labor Markets

- 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



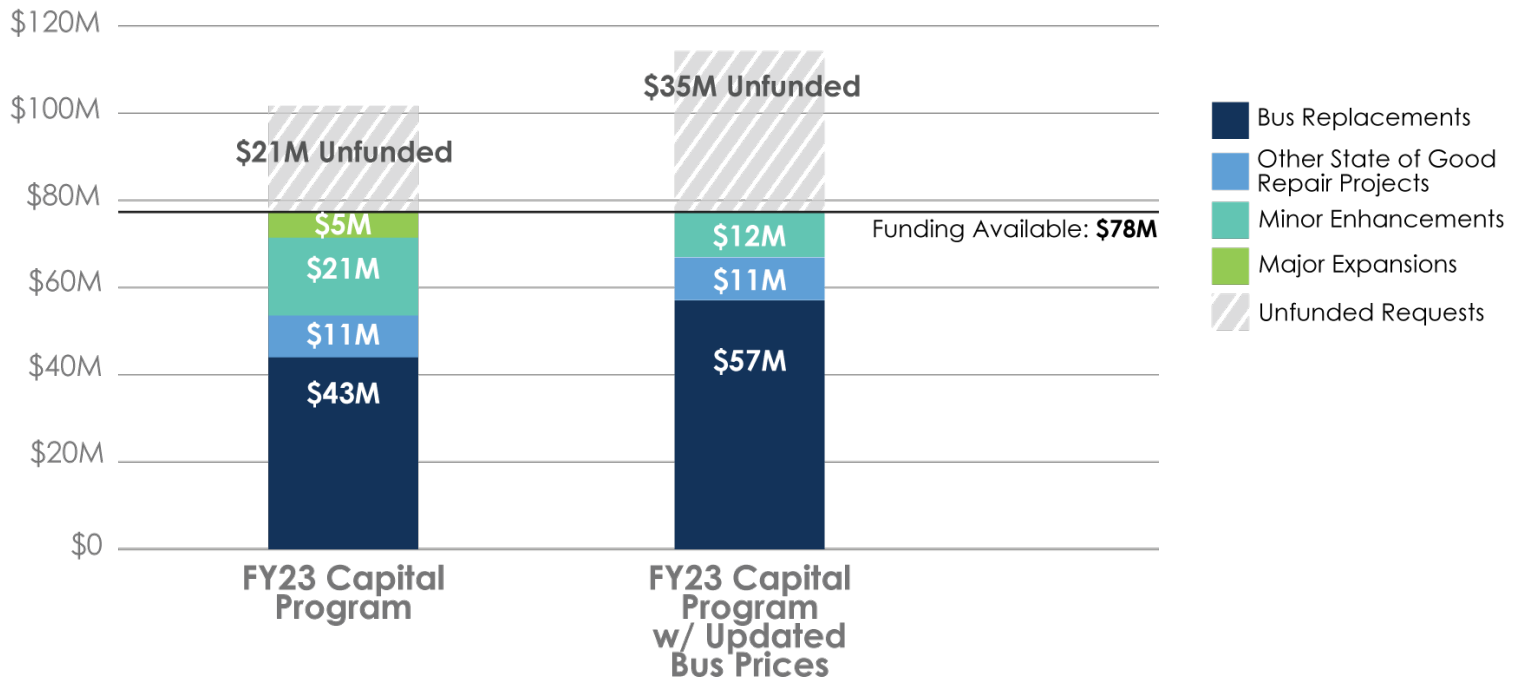
- Large cost increases and shortages across operations, vehicle costs, and facilities construction
  - Up to 79% increase per vehicle
  - Wage cost increases for drivers and mechanics
  - Associated General Contractors of America data shows increase of 69% for fuel
  - Bus driver employment sustained 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

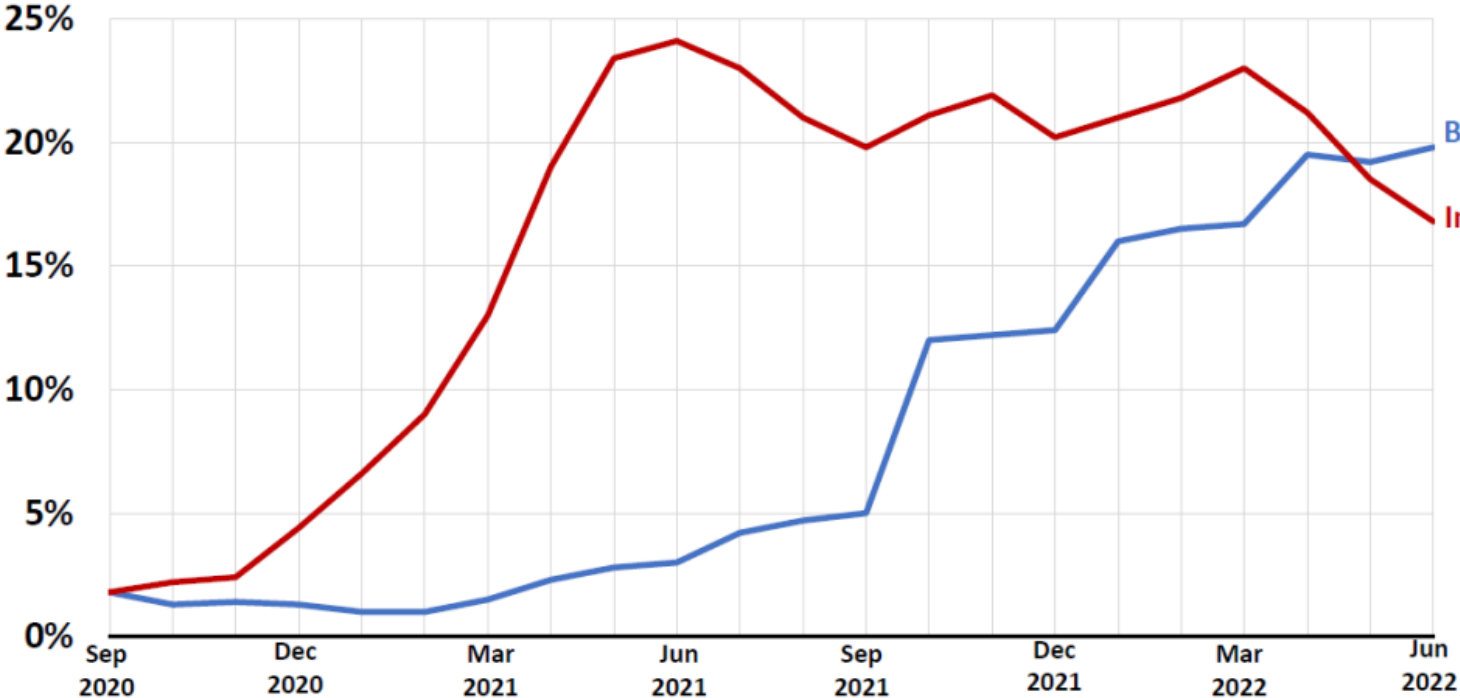
- DRPT State Capital Program prioritizes State of Good Repair (SGR) first
- Vehicle cost increases will reduce the number of minor enhancement and major expansion projects DRPT is able to support

### Impact of Bus Price Increases on the State Capital Program



# Input Costs vs. Bid Prices Vertical Construction

**Costs vs. bid prices for new nonresidential construction**  
Year-over-year change in PPIs, Sep 2020-Jun 2022, not seasonally adjusted



**12 months to:**

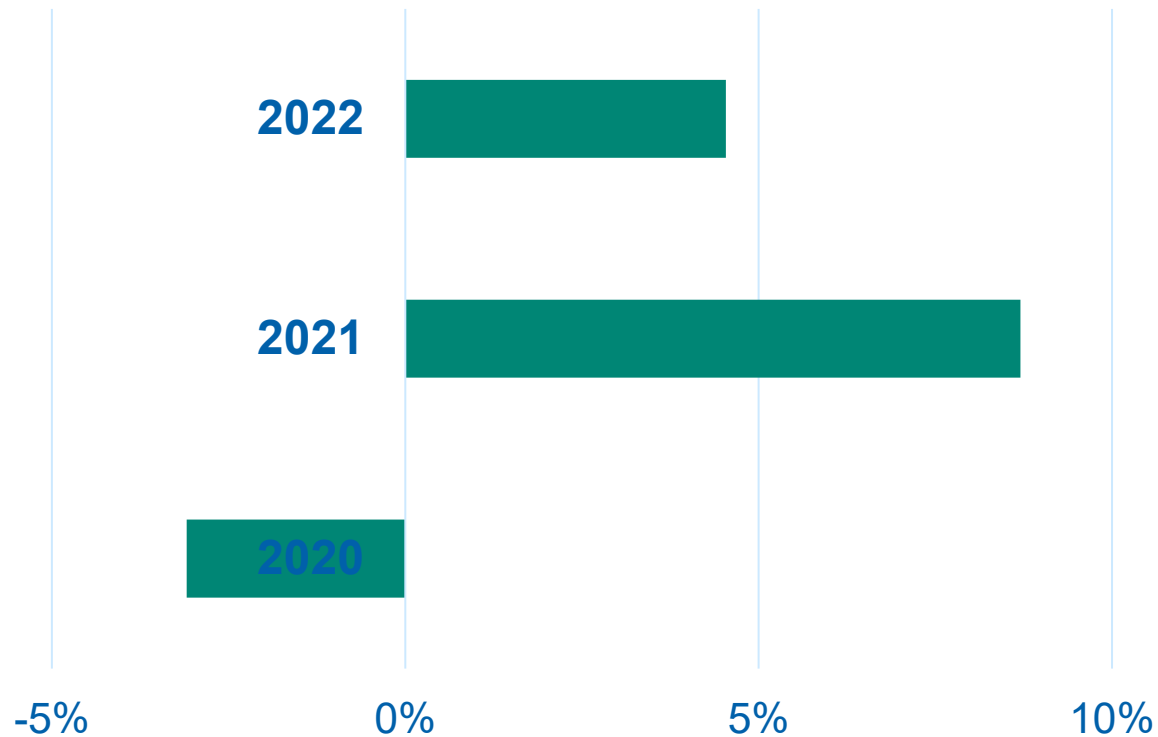
| Sep 2020            | Jun 2022 |
|---------------------|----------|
| Bid price PPI: 1.8% | 19.8%    |
| Inputs PPI: 1.8%    | 16.8%    |

- 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

Source: Bureau of Labor Statistics, producer price indexes, [www.bls.gov/ppi](http://www.bls.gov/ppi)

# Rail Cost Trends

U.S. Rail Input Inflation



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

