Promises and Perils: Port of Houston Poised for Growth
CAPT Bill Diehl USCG (Ret.), P.E., GHPB president

Federal Reserve Economic Outlook
July 17, 2019
Largest Petrochemical Facility Complex in the U.S.
Population and Energy Intensity

Asia Has Room For Dramatic Growth vs. Low-Growth USA

Source: EPD Fundamentals, World Bank
Liquid Hydrocarbon Demand Growth: Dominated by Emerging Markets

World Liquid Hydrocarbon Consumption by Region

Source: EPD Fundamentals

Source: IEA World Energy Outlook
More than 80% of growth is from Permian and Eagle Ford

Source: EPD Fundamentals
U.S. NGL Production By Major Basin

NGLs: About 75% of NGL growth is from Permian and Eagle Ford... destined for the Houston area

Source: EPD Fundamentals
Export Estimates: Total Volumes Available for Export to Triple By 2025

Volumes available for export have a monetary value rising from $0.4B/day to almost $16 every day. Without adequate export capacity, the entire Hydrocarbons value chain is put at Risk!

Source: EPD Fundamentals
This Volume Growth Would Result in 2.5X Additional Ships For To Support Exports

Incremental Vessel Traffic to Enable Potential US Exports

- Crude Oil
- Refined Products
- C3-C4
- C2

Source: EPD Fundamentals
Houston Ship Channel Through Galveston Bay
Gulf Coast Private Investments Dwarfs Investments by All Other Ports

<table>
<thead>
<tr>
<th>Region</th>
<th>Capital Spend By Ports 2016-2020</th>
<th>Private Sector Port Capital 2016-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Lakes</td>
<td>$0.5</td>
<td>$0.5</td>
</tr>
<tr>
<td>North Pacific</td>
<td>$1.3</td>
<td>$2.7</td>
</tr>
<tr>
<td>North Atlantic</td>
<td>$3.6</td>
<td>$1.2</td>
</tr>
<tr>
<td>South Pacific</td>
<td>$4.6</td>
<td>$3.1</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>$7.6</td>
<td>$1.8</td>
</tr>
<tr>
<td>Gulf Coast</td>
<td>$5.0</td>
<td><strong>$122.8</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$22.6</strong></td>
<td><strong>$132.1</strong></td>
</tr>
</tbody>
</table>

Source: EPD Fundamentals, American Association of Port Authorities; 2016-2020 Port Planned Infrastructure Survey

While most port's capital is driven by imports of foreign-made products, the Gulf Coast is driven by private investments supporting the U.S. Energy Revolution.
Permian Producer Economics are Driven by the Oil Component

What Comes With a Barrel of Permian Oil?

- Natural Gas
- NGL
- Oil

50% of NGL is Ethane

Value By Component

- Natural Gas
- NGL
- Oil

82% of value via Oil

Includes 12 cents T&F on NGLs and ~0.5 $/MMBtu NG basis

Source: EPD Fundamentals
2019 Executive Partners