Key points – Q1 2020

- Even before the coronavirus (COVID-19) appeared, strong U.S. oil & gas productivity plus new pipelines enabled February 2020 production records despite low prices and less drilling activity. Implications:
  - WTI-Brent price differentials narrowed with Permian pipeline growth – to par in March with oil near $20/Bbl
  - EIA projects U.S. oil & natural gas production to decrease year-on-year starting in Q4 2020

- Markets have responded to COVID-19 prevention measures that EIA projects will dissipate in coming quarters, but with oil prices that could remain low due to OPEC supply increases. Implications:
  - EIA and IEA forecasts previously assumed OPEC would increase supply cuts, rather than supply
  - Low oil prices have corresponded with a more rapid decrease in U.S. drilling – and less expected associated natural gas and natural gas liquids (NGL) production per EIA

- Silver linings that have reinforced market resilience:
  1. Low energy prices bolster household budgets and disproportionately benefit low-income households
  2. New U.S. trade agreements with China, Mexico and Canada should eventually boost U.S. energy exports (EIA)
  3. IMO 2020 regulatory changes since January 1 have been smooth
  4. Natural gas generation rose to a record 38% of U.S. net electricity generation in 2019
Quarterly highlights

- Demand at the top of the 5-year range
- Despite drilling activity at a 5-year low and having fallen in Q4 2019, record oil & gas production continued due to productivity gains and new pipeline capacity enabling drilled but uncompleted wells to come on stream
- Capital expenditures increased along with ongoing project commitments
- Net income fell with fourth quarter write-offs that were in the middle of the 5-year range (vs. 2015 lows)

* Financial compilation based on API 200 companies with shares listed on U.S. stock exchanges

sources: EIA, API MSR, Bloomberg, Baker Hughes, API Team Analysis
Investing for the long-haul: the industry's capital expenditures totaled $69 billion in Q4 and $266 billion for 2019

- Capital expenditures increased by 6.0% between the third and fourth quarters, with increases in most sectors but less in the midstream due to major pipeline completions.

Capital expenditures by industry segment

- **Global Integrated**: 18.0%
- **Upstream**: -7.4%
- **Midstream**: -9.6%
- **Downstream**: +31.5%
- **Specialty Petrochemical**: +31.3%
- **Equipment, Services and EPC**: +3.8%

* All other oil & gas industry companies

sources: Bloomberg, publicly-available company reports
Across the energy value chain, an estimated 161 oil & gas-related projects are under construction.

- **24 Refinery expansions**: $27.3 B
- **76 Pipelines**: $20.1 B
- **14 LNG**: $189 B
- **36 PetChem**: $108 B
- **11 Gas storage**: $145 M

In total, $344 Billion in estimated industry projects are under construction.

Sources: S&P Market Intelligence, Oil & Gas Journal, American Chemistry Council, API Team calculations as of Feb. 1, 2020.
Global economy & oil markets
Petroleum demand uncertainties and Non-OPEC production growth

- Global oil demand to plunge 2.5 mil b/d in Q1 on coronavirus, says IEA
  S&P Global

- Saudi Arabia doubles down on threat to flood the oil market
  CNN

- IEA says growth in non-Opec oil production to outstrip demand
  Financial Times

- Global oil price drop expected to impact Louisiana industry, budget
  Greater Baton Rouge Business Report

- Global events affecting Oklahoma oil industry
  Oklahoman.com

- US crude prices fall to 17-year low as coronavirus spreads
  CNBC

- In Big Spring, a Rural Community Braces for Another Oil Bust
  The Texas Observer
The D-E-I™ value of -0.3 for February 2020 and three-month average of -0.2 suggests a continued slowing of industrial production.
The U.S.-China phase one trade deal calls for increased U.S. energy exports

China’s commitments to buy U.S. energy exports

- China committed cumulatively to purchase $52.4 billion of U.S. energy over two years, over and above a 2017 baseline amount, including crude oil, LNG, metallurgical coal and specific refined products*

- API estimates the two-year commitment could include more than 1.0 mb/d of crude oil, 0.5 mb/d of refined products and 100 LNG cargoes, but these volumes rise as prices fall

- Given EIA’s expected growth in U.S. production, export capacity and marine logistics – including ability to utilize the Panama Canal – at least some of China’s purchases are likely not to be incremental growth of U.S. exports, but directionally should boost U.S.-China energy trade, provide a welcome de-escalation of trade tensions, and spur new opportunities for engagement on phase two trade issues

* Refined products under the agreement include naphtha, methanol, petroleum coke, propane, butane and other LPGs

sources: ITC, China customs statistics

Billion dollars

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$18.5 B</td>
<td>$33.9 B</td>
</tr>
</tbody>
</table>

2017 Baseline
Global economic growth has consistently required fossil fuels.

Linkages between global GDP growth and energy demand in total and for oil and natural gas have remained consistent.

Global primary energy demand versus GDP*

*Market exchange rate basis

sources: EIA, IEA, Bloomberg, IMF, API Team calculations
EIA's short-term projected changes in global oil demand and supply

Global oil demand changes - EIA

- **China**
  - 2019
  - 2020
  - 2021
  - China's demand picks up in 2021

- **U.S.**
  - 2019
  - 2020
  - 2021
  - U.S. demand grows slightly

- **Rest of World**
  - 2019
  - 2020
  - 2021
  - Rest of World demand growth hampered in 2020

Source: EIA

Global oil supply changes - EIA

- **OPEC**
  - 2019
  - 2020
  - 2021
  - OPEC expands production

- **U.S.**
  - 2019
  - 2020
  - 2021
  - U.S. supply contracts in 2021

- **Rest of Non-OPEC**
  - 2019
  - 2020
  - 2021
  - Non-OPEC growth in 2020

Source: EIA
After a near-term dip, EIA expects the global oil market to rebalance by Q4 2020.

EIA global supply/demand and Brent price estimates as of March 2020

Million barrels per day

Supply less demand
Brent crude oil prices

EIA estimates

sources: EIA STEO (Mar. 2020), Bloomberg
U.S. oil cost effectiveness and productivity improved, but market prices have recently fallen

- BTU Analytics’ estimated breakeven prices fell among most major crude oil production areas, while EIA’s productivity estimates rose

Oil estimated breakeven prices by production area – Feb. 2020*

![Breakeven Prices Chart]

- Eagle Ford - West
- Bakken
- Eagle Ford - East
- Permian - Delaware
- Permian - Midland

*Half cycle breakevens assuming 10% discount factor and play-specific costs

U.S. oil productivity – monthly new well production per rig

![Productivity Chart]

- Eagle Ford
- Bakken
- Permian

source: EIA Drilling Productivity Report (Mar. 2020)
During initial months of IMO 2020, the refining industry has been flexible to consumers’ benefit

- As we have suggested since 2018, the U.S. refining industry has been well positioned for IMO2020.

- Initial months of IMO2020 implementation show the industry has flexibly been able to produce less residual fuel oil and more ultra-low sulfur fuel oil, with a muted price response and inventory adjustments.

### Residual fuel oil inventories and production

<table>
<thead>
<tr>
<th>Year</th>
<th>Rest of World inventories</th>
<th>U.S. inventories</th>
<th>U.S. production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>45</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>2013</td>
<td>40</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>2016</td>
<td>35</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>2019</td>
<td>30</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

*Sources: JODI Oil World Database, EIA*

### U.S. residual fuel oil and diesel prices

<table>
<thead>
<tr>
<th>Year</th>
<th>Ultra-low sulfur diesel (ULSD)</th>
<th>Residual fuel oil No. 6 (1% sulfur)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2016</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>2019</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

*Sources: New York Harbor prices, CME Group and Bloomberg*
Motor gasoline and diesel fuel prices have generally moved with crude oil, and EIA expects limited impact from IMO 2020.
Seven spending categories account for the majority of household expenditures.

The lowest 40% of households by income generally outspend their after-tax income, so every dollar matters.

2018 U.S. household spending by category as a share of after-tax income

- Housing ex energy
- Food
- Transportation ex fuels
- Healthcare
- Energy
- Education
- Personal insurance
- Entertainment

Source: BLS Consumer Expenditure Survey
Lower household energy spending since 2014 has helped low-income households the most

For the average U.S. household, decreased energy prices and expenditures freed 1.6% of after-tax income for other spending needs between 2014 and 2018

The percent of income freed up for non-energy spending was twice as high for the lowest 20% income quintile

Change in household energy spending as a share of after-tax income, 2014-2018

source: BLS Consumer Expenditure Survey
Natural gas
Global LNG prices have been below historical levels but still generally twice those of the U.S.

Global natural gas landed prices (dollars per million Btu) – December 2019

Canada: $6.83
Mexico: $4.60
Lake Charles: $2.21
Belgium: $5.32
Spain: $4.53
UK: $4.66
Belgium: $5.32
India: $5.22
China: $5.42
Korea: $5.42
Japan: $6.70
Argentina: $5.05

sources: U.S. FERC (Mar. 2020) and METI
In 2019, U.S. LNG exports were from just six terminals, but served global markets.

**2019 U.S. LNG exports by terminal**

Trillion cubic feet (Tcf)

- Sabine Pass
- Corpus Christi
- Cove Point
- Cameron
- Freeport
- Elba Island

Source: U.S. DOE
U.S. natural gas production growth has been supported by cost effectiveness and productivity

- BTU Analytics estimates breakeven prices among most natural gas-producing regions improved over the past year
- EIA estimates Appalachia’s new well productivity slipped in Q1 2020

Natural gas estimated breakeven prices by production area – Feb. 2020*

<table>
<thead>
<tr>
<th>Production Area</th>
<th>Feb. 2020</th>
<th>Feb. 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haynesville</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appalachia - Northeast PA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appalachia - Southwest PA</td>
<td></td>
<td></td>
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<tr>
<td>Appalachia - Ohio</td>
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</tr>
</tbody>
</table>

*Half cycle breakevens assuming 10% discount factor and play-specific costs

source: BTU Analytics

U.S. natural gas productivity – new production per rig

source: EIA Drilling Productivity Report (Mar. 2020)
Real natural gas prices in Q1 2020 have been the lowest on record for the quarter in 45 years

Since the advent of shale gas production, which accelerated after 2010, U.S. natural gas prices and price volatility have fallen by about half compared with history.

U.S. natural gas spot prices*

2020 dollars per million Btu

Where enabled by pipeline connectivity, the energy revolution has lowered prices across the eastern United States

- In 2010, before the energy revolution, prices at most natural gas hubs were greater than those at Henry Hub, Louisiana.
- As Pennsylvania and Ohio became major gas producers, prices fell across the eastern U.S. except in New England, which largely failed to expand its pipeline infrastructure.

Natural Gas Spot Price Differences from Henry Hub
(annual averages)

Dollars per million Btu

- Paid a premium above Henry Hub
- Received a discount below Henry Hub

Source: Bloomberg
In 2019, natural gas grew to a 38% percent share of U.S. electricity generation and led gains by all sources

- Natural gas achieved a record 38% share of U.S. net electricity generation in 2019
- As natural gas and renewables have replaced coal in power generation since 2010, U.S. power sector CO₂ emissions fell by 22%, while the region’s SO₂ and NOₓ emissions decreased by 71% and 40%, respectively

**U.S. electricity net generation**

- Coal: 2,000 million megawatt hours
- Nuclear: 3,000 million megawatt hours
- Natural gas: 4,000 million megawatt hours
- Wind: 1,000 million megawatt hours
- Hydroelectric: 1,000 million megawatt hours
- Other: 2,000 million megawatt hours
- Oil: 1,000 million megawatt hours
- Solar: 4,000 million megawatt hours

**Power sector emissions by pollutant**

- CO₂: 2400 million metric tons in 2010, decreasing to 0 in 2018
- SO₂ and NOₓ:Decreasing from 6 million metric tons in 2010 to 0 in 2018

Sources: EIA Electric Power Annual (2018)
Resources: Chief Economist’s section at www.api.org