Key points

- **Global and U.S. economies are on track** - Consensus expectations for the strongest two-year global economic growth since 1972-1973

- **Global oil market recovery in progress**
  - U.S. petroleum demand of 19.6 mb/d in April 2021 climbed to within 3.5% of its Q2 2019 level, which was its highest for the month in 11 years.
  - **Record growth**. EIA projects growth of +5.4 million barrels per day (mb/d) in 2021 and +3.7 mb/d in 2022 – record 2-year gains and new highs by Q4 2022
  - **Who gains?** Every producing region could participate in the recovery, but U.S. production recovery remains a question

- **Natural gas** – Solid overall natural gas demand recovery and pull for record U.S. natural gas exports

- **The crux**: Robust economic and energy market recovery contrasts with historically low capital investment and drilling activity. Global liquids spare capacity could become tight in 2022

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First quarter 2021 by the numbers

- **Benchmark price averages**
  - Brent crude oil: $60.69 per barrel
  - WTI crude oil: $58.13 per barrel
  - NGL composite: $6.70 per mmBtu
  - Natural gas (Henry Hub): $3.37 per mmBtu

- **Revenues** $557 B
- **Net income** $13 B
- **Capital expenditures** $38 B

U.S. petroleum demand 18.4 mb/d

U.S. refinery throughput 14.1 mb/d

U.S. oil & gas production 31.6 mb/doe

U.S. drilling activity 393 rigs

5-year range

Quarterly increase

Quarterly decrease

- Financial compilation based on API 200 companies with shares listed on U.S. stock exchanges.
- Sources: EIA; API Monthly Statistical Report; Bloomberg and company reports; Baker Hughes; API Team analysis
Industry capital expenditures fell to $38 billion – lowest on record for any quarter since 2008, and the backlog of U.S. projects under construction shrank to $174 billion.

- The industry invested $37.8 billion in Q1 2021, compared with $65.5 billion in the same quarter of 2019.
- Across the energy value chain, API is monitoring 94 oil & gas-related projects currently under construction worth $174 billion.

### Capital expenditures by industry segment

**Billion dollars (2021$)**

- **Downstream and Petrochemical**: $20 billion
- **Equipment & Services**: $26 billion
- **Midstream**: $33 billion
- **Global integrated**: $20 billion
- **Upstream**: $7 billion

### $174 billion in current U.S. energy infrastructure investments

- **8 LNG**: $63 billion
- **26 PetChem**: $65 billion
- **20 Refinery expansions**: $18 billion
- **33 Pipelines**: $27 billion
- **7 Gas storage**: $92 million

*All other oil & gas industry companies sources: Bloomberg; publicly-available company reports; BLS

Sources: S&P Market Intelligence; Oil & Gas Journal; American Chemistry Council; API Team calculations as of May 2021.
Global oil drilling and investment decreased in level and in relation to other energy sources, even in the most consistent region.

- Middle East & North Africa (MENA) drilling and investment historically have been the most consistent but dropped in 2020.
- MENA planned oil investments (2021-2025) decreased and lost share among total energy investments per APICORP.

**Global oil drilling activity and capital investment, quarterly**

- **Rigs**
  - United States: 3,000
  - Latin America: 2,000
  - Africa: 1,000
  - Europe: 1,000
  - Asia Pacific: 1,000
  - Middle East: 1,000

- **Global energy investment**
  - Trillion dollars (2021$)
    - 2016: 1.0
    - 2017: 0.8
    - 2018: 0.6
    - 2019: 0.4
    - 2020: 0.2

**MENA energy investment outlook**

- **Planned by sector, 2021-2025**
  - Oil: $0.5 trillion (20%)
  - Power: $0.1 trillion (20%)
  - Chemical: $0.1 trillion (20%)
  - Gas: $0.1 trillion (20%)

- **Committed by sector, 2021-2025**
  - Oil: $0.1 trillion (42%)
  - Gas: $0.1 trillion (20%)
  - Chemical: $0.1 trillion (20%)
  - Power: $0.1 trillion (20%)

Sources: Baker Hughes; IEA; Bloomberg; API Team analysis.
Global Economy
The global economy is broadly expected to sustain above-average growth over the next two years.

In a reversal from recent years, developed (OECD) economies are expected to lead global GDP growth in 2021 and 2022.
Global economy on firmer ground, but with divergent recoveries amid high uncertainty

- **Improved outlook.** Upgraded 2021 and 2022 GDP forecasts by +0.8% and +0.2%, respectively
- **Divergent impacts.** Disproportionate losses in countries reliant on tourism, commodity exports and those with “limited policy space to respond”
- **High uncertainty remains** with the health crisis
- **Policy priorities** vary by country but generally should boost productive capacity, foster efficient resource allocations, and scale back gradually (“avoid sudden cliffs”)

*International Monetary Fund*, April 2021

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### The Innovation Imperative for Developing East Asia

- Much of global GDP growth depends on East Asia, and the region’s developing economies face headwinds of decreased productivity and global trade plus technological advances that threaten the region’s traditional growth engine of export-oriented manufacturing
- The region focus must spur innovation via broad adoption and diffusion of existing technologies, not only invention of new ones. This requires improving 1) information on technologies reduced uncertainty about returns to their use; 2) workforce skills and management capabilities; and, 3) access to external financing for technology adoption or broader innovation projects

X. Cirera et. al., *World Bank Group* (2021)

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### Oil Market Report, May 2021

- IEA downgraded its 2021 world oil demand growth projection to a still-strong 5.4 mb/d
- As vaccination rates rise and mobility restrictions ease, global oil demand is set to soar from 93.1 mb/d in 1Q21 to 99.6 mb/d by year-end
- “Under the current OPEC+ production scenario, supplies won’t rise fast enough to keep pace with the expected demand recovery”

*International Energy Agency*, May 2021
Oil Markets
Global oil demand has continued to rebound along with real GDP and could reach new highs in late 2022.

- Global oil demand has historically changed in tandem with the economy, and this relationship remained intact through the 2020 COVID-19 recession.

**Global oil demand and GDP**

Million barrels per day

- 100
- 90
- 80
- 70
- 60
- 50
- 40
- 30
- 20
- 10

Real GDP (Trillion 2010$)

- 0
- 20
- 40
- 60
- 80
- 100

- 1970
- 2022
- 2021

- Great Financial Crisis (2008-2009)
- 2020 COVID-19 recession

*Market exchange rate basis

sources: EIA; Bloomberg; IMF; API Team calculations
Global oil demand could set a new record-high by the end of 2022 per EIA

- Led by emerging economies’ demand, EIA projects global oil demand could exceed 102 mb/d and achieve record highs over the latter half of 2022.
- EIA projects OPEC and Russian & Caspian producers to redeploy 4.6 mb/d of their spare capacity between Q3 2021 and Q4 2022 – and for the U.S. to add another 0.5 mb/d in the second half of this year and another 1.2 mb/d in 2022, which would require increased investment and drilling.

source: EIA STEO (June 2021)
Despite projected OPEC+ and U.S. supply increases, EIA expects that global oil demand could continue to exceed supply through Q4 2021 and support oil prices of about $60 per barrel in 2022.

EIA global supply/demand and Brent price estimates as of June 2021

Million barrels per day (mb/d)

Supply less demand
Brent crude oil prices

EIA estimates

2021$/Bbl

sources: EIA STEO (June 2021); Bloomberg
EIA projects U.S. liquid fuels consumption could return to its 2019 levels by the second half of 2022

- Indicators of industrial and chemical production, daily flights and mobility statistics, and vehicle miles traveled tracking show broad progress year-on-year and year-to-date – with motor fuels now showing single-digit percentage declines from 2019 levels
- EIA projects 2H 2021 to see strongest refined product demand increases in jet fuel and other oil categories

**Refined product key U.S. demand indicators, May 2021 year-to-date**

- **Passenger VMT**: +10%
- **Truck VMT**: +5%
- **Total Flights**: +23%
- **Manufacturing**: +3%
- **Apple Mobility**: +35%
- **DAT Spot Loads**: +15%
- **TSA Passengers**: +98%
- **Chemicals**: +2%

**U.S. liquid fuel consumption by fuel**

- Motor gasoline
- Distillates/diesel fuel
- Jet fuel
- Residual fuel oil
- Other (naphtha/gasoil; HGLs)

**Sources:** EIA; API MSR

**Sources:** U.S. Federal Highway Administration; FlightRadar24; ISM PMI; ACC; TSA; Apple; DAT
As U.S. oil well productivity edged down from record levels in Q2 2021, estimated breakeven prices have diverged by region.

- EIA reported oil well productivity fell by more than 6% year-to-date in the Permian and DJ Niobrara basins.
- BTU Analytics’ estimated breakeven prices by basin stood below recent market prices.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Bakken</th>
<th>Eagle Ford</th>
<th>DJ Niobrara</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
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<td></td>
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<td>2018</td>
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<td>2020</td>
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<tr>
<td>2021</td>
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<td></td>
</tr>
</tbody>
</table>

**source:** EIA Drilling Productivity Report

### Oil estimated breakeven prices*

<table>
<thead>
<tr>
<th>Basin</th>
<th>May 2020</th>
<th>May 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakken</td>
<td></td>
<td></td>
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<tr>
<td>Eagle Ford - West</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eagle Ford - East</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DJ Niobrara</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permian - Delaware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permian - Midland</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**source:** BTU Analytics; CME Group

*Half cycle breakevens assuming 10% discount factor.
Permian oil pipeline capacity expansions have recently outpaced production, but could position the basin to participate in an oil market recovery.

- EIA estimated Permian oil production recovered in Q2 2021 to its December 2020 level and could increase in the near-term.
- Pipeline delays and cancellations reflect the current production outlook but also imply there has been spare egress capacity.

**Permian Basin pipeline capacity balance**

<table>
<thead>
<tr>
<th>Million barrels per day (mb/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

**Potential midstream project delays**

- Refining capacity
- WA Line and Line 0
- Basin
- Midland-ECHO 1
- Cactus
- Permian Express IV
- Gray Oak
- Wink-to-Webster
- Centurion
- Amdel
- Longhorn
- Midland-ECHO 2
- Permian Express II
- Longview
- Cactus II
- West Texas Gulf
- Wink
- Lone Star
- Midland-ECHO 3
- Permian Express III
- Sunrise
- Permian Express IV
- EPIC
- Rail capacity

*Sources: EnSys; Rystad; Bloomberg; EIA; API Monthly Statistical Report*
Bakken oil production could depend heavily on rail without the Dakota Access Pipeline (DAPL)

- EIA estimated Bakken oil production remained down by more than 8% in Q2 2021 versus its December 2020 level and could remain flat in the near-term
- An oil production recovery in the Bakken could be enabled in part by DAPL

Bakken Formation pipeline infrastructure

Bakken pipeline capacity balance

Million barrels per day (mb/d)

- Bakken production
- ETP DAPL
- Refinery capacity
- Enbridge Line 26
- Enbridge Line 81
- Enbridge Line 83
- Bakken Expansion
- Tesoro High Plains
- Hiland / Double H Pipeline
- Rail capacity

sources: EnSys; Bloomberg; EIA; API Monthly Statistical Report

EIA estimated Bakken oil production remained down by more than 8% in Q2 2021 versus its December 2020 level and could remain flat in the near-term.

An oil production recovery in the Bakken could be enabled in part by DAPL.
U.S. liquids production fell along with the 2020 COVID-19 recession and has remained steady ever since, propelling a return to petroleum net imports.

- In 2020, the U.S. became a petroleum net exporter on an annual basis for the first time since 1958.
- However, domestic production fell along with the 2020 COVID-19 recession and has remained flat with historically weak drilling activity since then.
- The U.S. reverted to being a net importer in Q2 2020 and EIA projects net imports to continue in 2021 and 2022.

**U.S. liquids production and petroleum trade**

- Flat production since COVID-19.
- Net imports.
- Net exports.

*Sources: EIA, API*
Natural gas market resiliency in Asia Pacific and Europe keyed record trade and U.S. liquefied natural gas (LNG) exports through April 2021

- Following the Q1 winter heating season, Asian and European natural gas demand and benchmark prices have risen.
- Despite the U.S. Gulf Coast polar vortex temporarily disrupting liquefaction activities, the U.S. set new natural gas export records in April 2021.

**U.S. LNG export volume by terminal**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elba Island</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Cove Point</td>
<td>300</td>
<td>250</td>
</tr>
<tr>
<td>Freeport</td>
<td>200</td>
<td>150</td>
</tr>
<tr>
<td>Corpus Christi</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Cameron</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Sabine Pass</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

Sources: DOE, IHS; Marine Traffic; API Team analysis.

**Regional gas hub pricing**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>UK Benchmark (NBP)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Dutch Benchmark (TTF)</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Asian Benchmark (JKM)</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Henry Hub</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Sources: Bloomberg; Quandl; EIA.

**Notes:**
- Natural gas market resiliency in Asia Pacific and Europe is driven by record trade and U.S. liquefied natural gas (LNG) exports through April 2021.
- Despite the U.S. Gulf Coast polar vortex temporarily disrupting liquefaction activities, the U.S. set new natural gas export records in April 2021.

**U.S. LNG export volume by terminal**

- Elba Island: 350 billion cubic feet in 2020, 250 in 2021
- Cove Point: 300 billion cubic feet in 2020, 200 in 2021
- Freeport: 200 billion cubic feet in 2020, 150 in 2021
- Corpus Christi: 150 billion cubic feet in 2020, 100 in 2021
- Cameron: 100 billion cubic feet in 2020, 50 in 2021
- Sabine Pass: 50 billion cubic feet in 2020, 0 in 2021

Sources: DOE, IHS; Marine Traffic; API Team analysis.

**Regional gas hub pricing**


Sources: Bloomberg; Quandl; EIA.
Natural gas-dedicated drilling has sustained strong productivity and historically low breakeven prices

- For dedicated dry gas drilling, producers sustained near-record rig productivity in Q2 2021 per EIA.
- Estimated natural gas breakeven prices moved in different directions by producing region but generally remained below recent natural gas futures prices.

**Natural gas well productivity – production per rig**

- Million cubic feet per day nat. gas-equivalent
- Source: EIA Drilling Productivity Report

**Natural gas estimated breakeven prices**

- Dollars per million Btu (mmBtu)
- Henry Hub month-ahead futures price

- Haynesville
  - May 2021
  - May 2020

- Appalachia - Northeast PA
- Appalachia - Southwest PA
- Appalachia - Ohio

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

Sources: BTU Analytics; CME Group

Henry Hub month-ahead futures price: June 8, 2021
Appalachian natural gas production has continued to grow despite the 2020 COVID-19 recession and likely requires more pipeline capacity to enable future growth.

- With natural gas production growth of 3.8% y/y in 2020 and another 2.0% y/y in 2021 per EIA, Appalachian has needed more pipeline egress capacity.
- With the Mountain Valley pipeline’s tentative completion in 2022, parts of Appalachia could have sufficient egress capacity for the near-term, but cancellations of the proposed Atlantic Coast and Constitution pipelines in 2020 could limit the region’s production growth.

### Appalachian Basin gas pipeline capacity utilization

Billion cubic feet per day (bcf/d)

As of Q1 2021.

**Key Appalachian gas pipeline updates**

- Production sources: EIA; Rystad; EnSys; Global Energy Monitor; API Team analysis

**Appalachian Basin gas pipeline capacity utilization**

<table>
<thead>
<tr>
<th>1Q18</th>
<th>2Q18</th>
<th>3Q18</th>
<th>4Q18</th>
<th>1Q19</th>
<th>2Q19</th>
<th>3Q19</th>
<th>4Q19</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hammerhead</td>
<td>Demand</td>
<td>ET Rover</td>
<td>ANR GC</td>
<td>EOT System</td>
<td>Adelphia</td>
<td>Buckeye Xpress</td>
<td>KM Rex 2</td>
<td>Leach Xpress</td>
<td>Columbia Gas Trans</td>
<td>National Fuel Gas</td>
</tr>
</tbody>
</table>

**Sources:** EIA
With Permian natural gas pipeline completions, pipeline capacity could readily enable production growth and LNG export opportunities.

With an estimated 6.1 bcf/d of Permian gas pipeline capacity by end of 2021, lines stand to benefit post-COVID from increased demand, dry exports to Mexico, and LNG exports via the Gulf to emerging markets.

Permian Basin gas pipeline capacity utilization
Billion cubic feet per day (bcf/d)

Source: EIA; Rystad; EnSys; Global Energy Monitor; API Team analysis

Key Permian gas pipeline updates
As of Q1 2021

- Permian Global Access Pipeline
- Gulf Coast Express
- Permian Highway
- Pecos Trail
- Permian-Katy
- Whistler

Cancelled
Completed
On Hold
Est. 2021

Source: Permian Texans for Natural Gas
Bakken natural gas pipeline capacity has historically matched well with production and appeared ample relative to recent changes.

### Bakken gas pipeline capacity utilization
Billion cubic feet per day (bcf/d)

- **North Bakken Expansion**
- **Current Bakken egress on Northern Border and Alliance pipelines**
- **Demand**
- **Production**

### Key Bakken gas pipelines
As of Q2 2021

*source: RBN Energy*

*sources: EIA; Rystad; EnSys; Global Energy Monitor; API Team analysis*
As natural gas prices have recovered, power sector fuel competition has backed out gas in most U.S. regions but been largely offset by increased exports.

- Power sector gas consumption, which was affected by February polar vortex disruptions varied by region.
- Record natural gas exports have largely offset the power sector’s fuel substitution, and EIA projects resumed increases over the next three years.

### U.S. power sector gas consumption

Year-to-date through May 1st, y/y%

- Northwest: -4.0%
- CAISO: +7.5%
- Southwest: -23.2%
- ERCOT: +2.7%
- SWP: -26.8%
- MISO: -19.2%
- PJM: -0.2%
- ISO-NE: +8.4%
- ISO-NY: +17.4%

### U.S. natural gas consumption and production by sector, Trillion cubic feet

**Net Exports**

- 2020: 30 Tcf
- 2021: 31 Tcf
- 2022: 32 Tcf
- 2023: 33 Tcf
- 2024: 34 Tcf

**Electric Power**

- 2020: 25 Tcf
- 2021: 26 Tcf
- 2022: 27 Tcf
- 2023: 28 Tcf
- 2024: 29 Tcf

**Industrial**

- 2020: 15 Tcf
- 2021: 16 Tcf
- 2022: 17 Tcf
- 2023: 18 Tcf
- 2024: 19 Tcf

**Res / Comm**

- 2020: 10 Tcf
- 2021: 11 Tcf
- 2022: 12 Tcf
- 2023: 13 Tcf
- 2024: 14 Tcf

*Sources: EIA Hourly Grid Monitor; FERC, EIA AEO 2021*
API economics resources available at www.api.org