Drilling Productivity Report

For key tight oil and shale gas regions

Note:

The DPR rig productivity metric \textit{new-well oil/gas production per rig} can become unstable during periods of rapid decreases or increases in the number of active rigs and well completions. The metric uses a fixed ratio of estimated total production from new wells divided by the region's monthly rig count, lagged by two months. The metric does not represent new-well oil/natural gas production per newly completed well.

The DPR metric \textit{legacy oil/gas production change} can become unstable during periods of rapid decreases or increases in the volume of well production curtailments or shut-ins. This effect has been observed during winter weather freeze-offs, extreme flooding events, and the 2020 global oil demand contraction. The DPR methodology involves applying smoothing techniques to most of the data series because of inherent noise in the data.

Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year-over-year summary</td>
<td>2</td>
</tr>
<tr>
<td>Anadarko Region</td>
<td>3</td>
</tr>
<tr>
<td>Appalachia Region</td>
<td>4</td>
</tr>
<tr>
<td>Bakken Region</td>
<td>5</td>
</tr>
<tr>
<td>Eagle Ford Region</td>
<td>6</td>
</tr>
<tr>
<td>Haynesville Region</td>
<td>7</td>
</tr>
<tr>
<td>Niobrara Region</td>
<td>8</td>
</tr>
<tr>
<td>Permian Region</td>
<td>9</td>
</tr>
<tr>
<td>Explanatory notes</td>
<td>10</td>
</tr>
<tr>
<td>Sources</td>
<td>11</td>
</tr>
</tbody>
</table>
New-well oil production per rig
barrels/day

- 0
- 500
- 1,000
- 1,500
- 2,000
- 2,500
- 3,000
- 3,500
- 4,000

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

New-well gas production per rig
thousand cubic feet/day

- 0
- 5,000
- 10,000
- 15,000
- 20,000
- 25,000
- 30,000
- 35,000

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Legacy oil production change
thousand barrels/day

- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400
- 450

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Legacy gas production change
million cubic feet/day

- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Indicated monthly change in oil production (Sep vs. Aug)
thousand barrels/day

- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400
- 450

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Indicated monthly change in gas production (Sep vs. Aug)
million cubic feet/day

- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Oil production
thousand barrels/day

- 0
- 1,000
- 2,000
- 3,000
- 4,000
- 5,000
- 6,000

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian

Natural gas production
million cubic feet/day

- 0
- 6,000
- 12,000
- 18,000
- 24,000
- 30,000
- 36,000

- Anadarko
- Appalachia
- Bakken
- Eagle Ford
- Haynesville
- Niobrara
- Permian
**Anadarko Region**

**Drilling Productivity Report**

**August 2020**

**Drilling data through July**

**Projected production through September**

---

**Oil**

- **+26 barrels/day**
  - Month over month

- **1,301 barrels/day**
  - September

- **1,275 barrels/day**
  - August

- **Monthly additions from one average rig**

**Gas**

- **+153 thousand cubic feet/day**
  - Month over month

---

**Anadarko Region**

**New-well oil production per rig**

- **1,500 barrels/day**

**Rig count**

- **300 rigs**

---

**Anadarko Region**

**Legacy oil production change**

- **50 thousand barrels/day**

---

**Anadarko Region**

**Indicated change in oil production (Sep vs. Aug)**

- **+10 thousand barrels/day**
  - September

- **-23 thousand barrels/day**
  - August

- **-13 thousand barrels/day**

---

**Anadarko Region**

**Oil production**

- **1,200 thousand barrels/day**

**Natural gas production**

- **8,000 million cubic feet/day**

---

**Anadarko Region**

**New-well gas production per rig**

- **9,000 thousand cubic feet/day**

**Rig count**

- **300 rigs**

---

**Anadarko Region**

**Legacy gas production change**

- **250 million cubic feet/day**

---

**Anadarko Region**

**Indicated change in natural gas production (Sep vs. Aug)**

- **+62 million cubic feet/day**
  - September

- **-188 million cubic feet/day**
  - August

- **-126 million cubic feet/day**

---

**Anadarko Region**

**Natural gas production**

- **8,000 million cubic feet/day**

---

**August 2020**

**Drilling Productivity Report**

U.S. Energy Information Administration | Drilling Productivity Report
Appalachia Region
Drilling Productivity Report

August 2020

drilling data through July
projected production through September

Oil production

+2
barrels/day
month over month

171
September
August

169
barrels/day

Monthly additions from one average rig

September
August

24,930
24,204

kbbbl/day

Gas production

+726
thousand cubic feet/day
month over month

Appalachia Region
New-well oil production per rig

barrels/day

5,000
4,000
3,000
2,000
1,000
0


Rig count

180
150
120
90
60
30
0

Appalachia Region
New-well gas production per rig

thousand cubic feet/day

30,000
24,000
18,000
12,000
6,000
0


Rig count

180
150
120
90
60
30
0

Appalachia Region
Legacy oil production change

thousand barrels/day

-5,000
-2,500
0
2,500
5,000


Appalachia Region
Legacy gas production change

million cubic feet/day

-500
0
500


Appalachia Region
Indicated change in oil production (Sep vs. Aug)
thousand barrels/day

+6
-7
-1

Aug 115 Mbbbl/d
Production from new wells
Legacy production change
Net change
Sep 114 Mbbbl/d

Appalachia Region
Indicated change in natural gas production (Sep vs. Aug)
million cubic feet/day

+823
-1026
-203

Aug 32,616 MMcf/d
Production from new wells
Legacy production change
Net change
Sep 32,413 MMcf/d

Appalachia Region
Oil production

-1
thousand barrels/day
month over month

6,000
5,000
4,000
3,000
2,000
1,000
0


Appalachia Region
Natural gas production

-203
million cubic feet/day
month over month

36,000
30,000
24,000
18,000
12,000
6,000
0


U. S. Energy Information Administration | Drilling Productivity Report
Bakken Region

August 2020

Drilling Productivity Report

Monthly additions from one average rig

<table>
<thead>
<tr>
<th>Month</th>
<th>New wells</th>
<th>Legacy production change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>1,184 Mbbl/d</td>
<td>(1,250) million cubic feet/day</td>
</tr>
<tr>
<td>Sep</td>
<td>1,191 Mbbl/d</td>
<td>(750) million cubic feet/day</td>
</tr>
</tbody>
</table>

Indicated change in oil production (Sep vs. Aug)

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
<th>Legacy production change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>2,664 MMcf/d</td>
<td>(750) million cubic feet/day</td>
</tr>
<tr>
<td>Sep</td>
<td>2,679 MMcf/d</td>
<td>(1,000) million cubic feet/day</td>
</tr>
</tbody>
</table>

Indicated change in natural gas production (Sep vs. Aug)

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
<th>Legacy production change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>400 Mbbl/d</td>
<td>(200) thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>250 Mbbl/d</td>
<td>(150) thousand barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

New-well oil production per rig

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>2,099 barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>2,368 barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

Legacy oil production change

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>1,800 thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>3,600 thousand barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

New-well gas production per rig

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>1,600 thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>3,207 thousand barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

Legacy gas production change

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>2,369 thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>4,638 thousand barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

Oil production

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>1,500 thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>2,839 thousand barrels/day</td>
</tr>
</tbody>
</table>

Bakken Region

Gas production

<table>
<thead>
<tr>
<th>Month</th>
<th>Production from new wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>2,368 thousand barrels/day</td>
</tr>
<tr>
<td>Sep</td>
<td>4,638 thousand barrels/day</td>
</tr>
</tbody>
</table>

Drilling data through July

Projected production through September

U. S. Energy Information Administration | Drilling Productivity Report
### Haynesville Region

**New-well oil production per rig**
- **2011** to **2018**: Production per rig decreased from 1,800 barrels/day to 200 barrels/day.
- **2019** to **2020**: Production per rig stabilized at around 200 barrels/day.

**Rig count**
- **2011** to **2016**: Rig count decreased from 300 rigs to 100 rigs.
- **2017** to **2020**: Rig count stabilized at 100 rigs.

**Legacy oil production change**
- **2011** to **2020**: Legacy production decreased by 700 thousand barrels/day.

**Indicated change in oil production (Sep vs. Aug)**
- **Sep 2020**: +1 thousand barrels/day
- **Aug 2020**: -1 thousand barrels/day

**Oil production**
- **2011** to **2020**: Total production decreased from 14,000 thousand barrels/day to 2,000 thousand barrels/day.

**Natural gas production**
- **2011** to **2020**: Total production decreased from 100,000 million cubic feet/day to 20,000 million cubic feet/day.

**Legacy gas production change**
- **2011** to **2020**: Legacy production decreased by 600 million cubic feet/day.

**Indicated change in natural gas production (Sep vs. Aug)**
- **Sep 2020**: +359 million cubic feet/day
- **Aug 2020**: -421 million cubic feet/day

**Gas production**
- **2011** to **2020**: Total production decreased from 20,000 million cubic feet/day to 0 million cubic feet/day.
**Niobrara Region**

**Drilling Productivity Report**

**Oil**
- Barrels/day
- Month over month

**Rig count**
- Rigs

**Natural gas production**
- Million cubic feet/day
- Month over month

**Indicated change in oil production (Sep vs. Aug)**
- Thousand barrels/day
- +10
- -15
- -5

**Indicated change in natural gas production (Sep vs. Aug)**
- Million cubic feet/day
- +28
- -42
- -14

**Natural gas production**
- Million cubic feet/day
- Month over month

**New well oil production per rig**
- Barrels/day

**New well gas production per rig**
- Thousand cubic feet/day

**Legacy oil production change**
- Thousand barrels/day

**Legacy gas production change**
- Million cubic feet/day

**Oil plus 96 barrels/day month over month**

**Gas plus 109 thousand cubic feet/day month over month**

**New-well oil production per rig**
- New-well oil production per rig
- Rig count

**New-well gas production per rig**
- New-well gas production per rig
- Rig count

**Legacy production change**
- Legacy production change

**Net change**
- Net change

**September new-well oil production**
- 2,028 barrels/day

**August new-well oil production**
- 1,932 barrels/day

**September new-well gas production**
- 5,571 thousand cubic feet/day

**August new-well gas production**
- 5,462 thousand cubic feet/day

**Monthly additions from one average rig**
- September
- August
Permian Region
Drilling Productivity Report

Oil +164 barrels/day month over month

Permian Region
New-well oil production per rig
barrels/day

Rig count
gigs

Permian Region
Legacy oil production change
thousand barrels/day

Permian Region
Indicated change in oil production (Sep vs. Aug)
thousand barrels/day

Permian Region
Oil production
thousand barrels/day

Permian Region
Natural gas production
million cubic feet/day

Permian Region
New-well gas production per rig
thousand cubic feet/day

Rig count
gigs

Permian Region
Legacy gas production change
million cubic feet/day

Permian Region
Indicated change in natural gas production (Sep vs. Aug)
million cubic feet/day

Permian Region
Natural gas production
million cubic feet/day

9
The Drilling Productivity Report uses recent data on the total number of drilling rigs in operation along with estimates of drilling productivity and estimated changes in production from existing oil and natural gas wells to provide estimated changes in oil\(^1\) and natural gas\(^2\) production for seven key regions. EIA’s approach does not distinguish between oil-directed rigs and gas-directed rigs because once a well is completed it may produce both oil and gas; more than half of the wells do that.

**Monthly additions from one average rig**
Monthly additions from one average rig represent EIA’s estimate of an average rig’s\(^3\) contribution to production of oil and natural gas from new wells.\(^4\) The estimation of new-well production per rig uses several months of recent historical data on total production from new wells for each field divided by the region’s monthly rig count, lagged by two months.\(^5\) Current- and next-month values are listed on the top header. The month-over-month change is listed alongside, with +/- signs and color-coded arrows to highlight the growth or decline in oil (brown) or natural gas (blue).

**New-well oil/gas production per rig**
Charts present historical estimated monthly additions from one average rig coupled with the number of total drilling rigs as reported by Baker Hughes.

**Legacy oil and natural gas production change**
Charts present EIA’s estimates of total oil and gas production changes from all the wells other than the new wells. The trend is dominated by the well depletion rates, but other circumstances can influence the direction of the change. For example, well freeze-offs or hurricanes can cause production to significantly decline in any given month, resulting in a production increase the next month when production simply returns to normal levels.

**Projected change in monthly oil/gas production**
Charts present the combined effects of new-well production and changes to legacy production. Total new-well production is offset by the anticipated change in legacy production to derive the net change in production. The estimated change in production does not reflect external circumstances that can affect the actual rates, such as infrastructure constraints, bad weather, or shut-ins based on environmental or economic issues.

**Oil/gas production**
Charts present all oil and natural gas production from both new and legacy wells since 2007. This production is based on all wells reported to the state oil and gas agencies. Where state data are not immediately available, EIA estimates the production based on estimated changes in new-well oil/gas production and the corresponding legacy change.

**Footnotes:**
1. Oil production represents both crude and condensate production from all formations in the region. Production is not limited to tight formations. The regions are defined by all selected counties, which include areas outside of tight oil formations.
2. Gas production represents gross (before processing) gas production from all formations in the region. Production is not limited to shale formations. The regions are defined by all selected counties, which include areas outside of shale formations.
3. The monthly average rig count used in this report is calculated from weekly data on total oil and gas rigs reported by Baker Hughes.
4. A new well is defined as one that began producing for the first time in the previous month. Each well belongs to the new-well category for only one month. Reworked and recompleted wells are excluded from the calculation.
5. Rig count data lag production data because EIA has observed that the best predictor of the number of new wells beginning production in a given month is the count of rigs in operation two months earlier.
The data used in the preparation of this report come from the following sources. EIA is solely responsible for the analysis, calculations, and conclusions.

**Drilling Info** (http://www.drillinginfo.com) Source of production, permit, and spud data for counties associated with this report. Source of real-time rig location to estimate new wells spudded and completed throughout the United States.

**Baker Hughes** (http://www.bakerhughes.com) Source of rig and well counts by county, state, and basin.

**North Dakota Oil and Gas Division** (https://www.dmr.nd.gov/oilgas) Source of well production, permit, and completion data in the counties associated with this report in North Dakota.

**Railroad Commission of Texas** (http://www.rrc.state.tx.us) Source of well production, permit, and completion data in the counties associated with this report in Texas.

**Pennsylvania Department of Environmental Protection** (https://www.paoilandgasreporting.state.pa.us/publicreports/Modules/Welcome/Welcome.aspx) Source of well production, permit, and completion data in the counties associated with this report in Pennsylvania.

**West Virginia Department of Environmental Protection** (http://www.dep.wv.gov/oil-and-gas/Pages/default.aspx) Source of well production, permit, and completion data in the counties associated with this report in West Virginia.

**Colorado Oil and Gas Conservation Commission** (http://cogcc.state.co.us) Source of well production, permit, and completion data in the counties associated with this report in Colorado.

**Wyoming Oil and Conservation Commission** (http://wogcc.state.wy.us) Source of well production, permit, and completion data in the counties associated with this report in Wyoming.

**Louisiana Department of Natural Resources** (http://dnr.louisiana.gov) Source of well production, permit, and completion data in the counties associated with this report in Louisiana.

**Ohio Department of Natural Resources** (http://oilandgas.ohiodnr.gov) Source of well production, permit, and completion data in the counties associated with this report in Ohio.

**Oklahoma Corporation Commission** (http://www.occeweb.com/og/oghome.htm) Source of well production, permit, and completion data in the counties associated with this report in Oklahoma.