

WESTERN ENERGY & WATER RECORD

PRESENTED BY THE COLORADO ENERGY & WATER INSTITUTE





The **West** is rich in many things: wilderness, wildlife, unmatched landscapes and natural resources. From fossil fuels to abundant sunshine to headwaters of dozens of rivers, the **West** is home to much of the energy and water that supplies the lower 48 states.

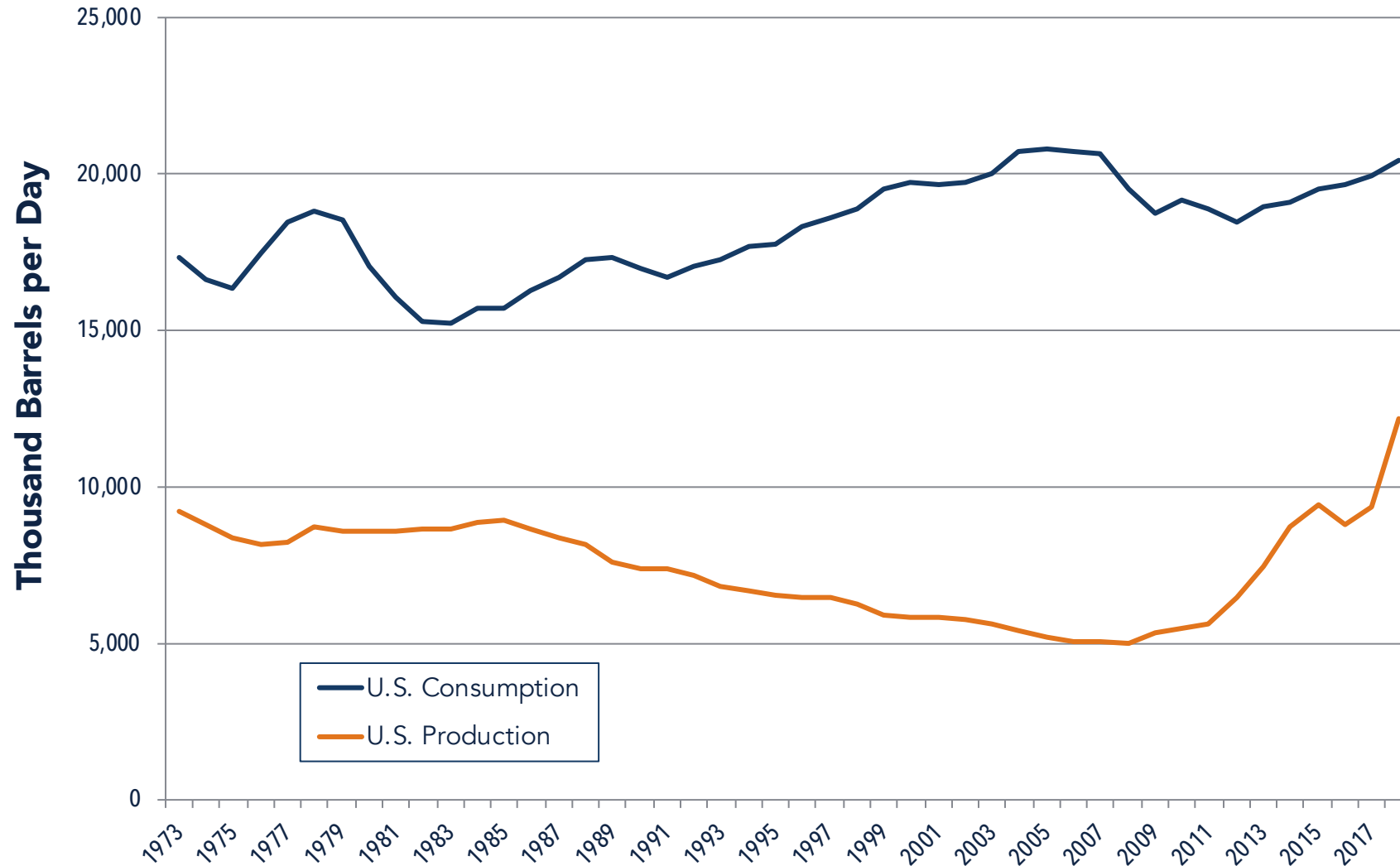
The 2019 Western Energy & Water Record is a quantifiable look at the **West's** abundant natural resources. Our goal is to publish this data compilation annually as a resource for governments and others.

Enjoy learning more about the resource in the **West**.

**WESTERN
ENERGY &
WATER
RECORD**
PRESENTED BY CEWI

U.S. CRUDE OIL PRODUCTION & CONSUMPTION, 1973-2018*

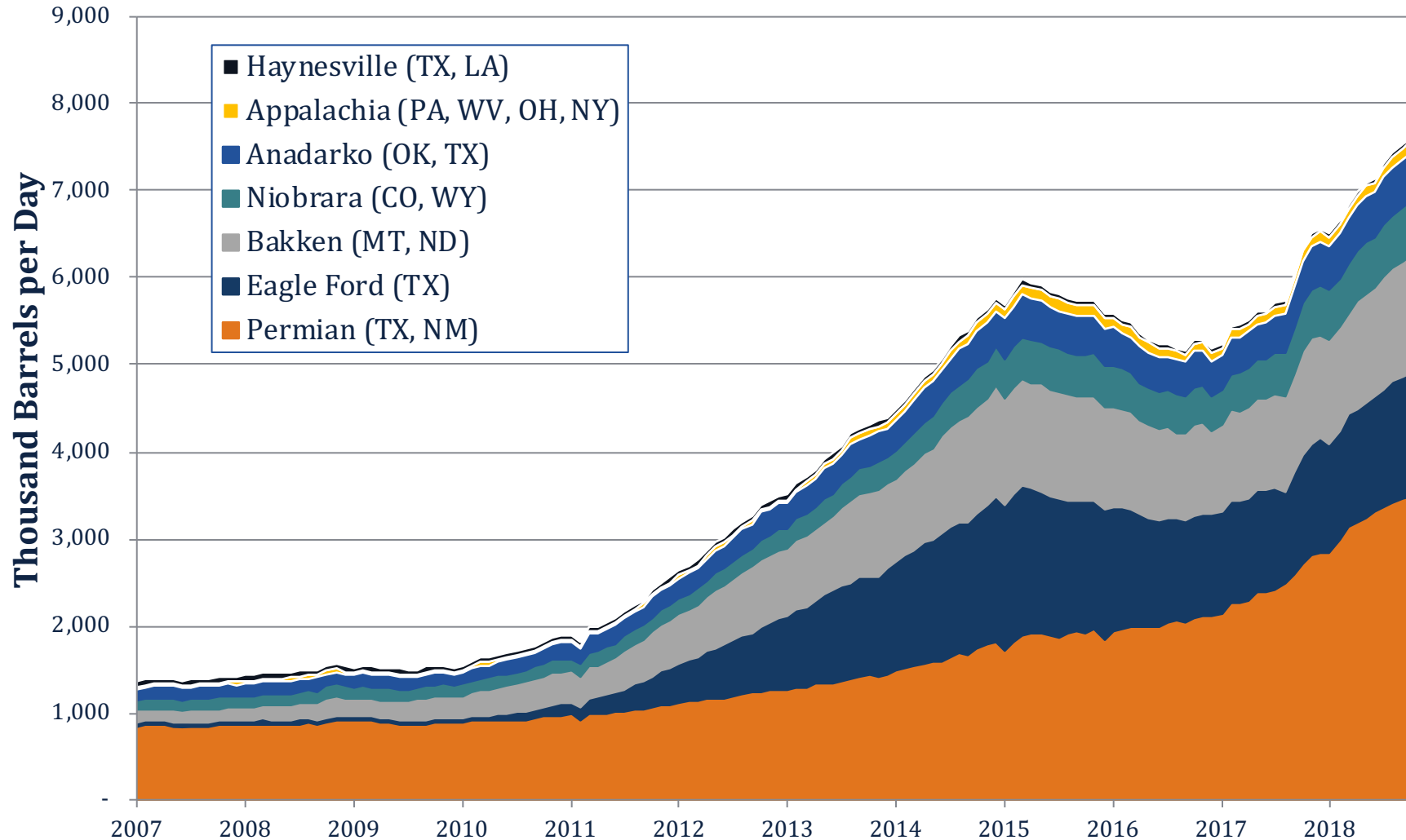
YTD 2018, U.S. refiners processed 20.4 million barrels per day compared to domestic U.S. production of 12.2 million barrels per day



Source: U.S. Department of Energy, Energy Information Administration
*2018 year-to-date represents January to July average

U.S. SHALE OIL PRODUCTION BY MAJOR RESOURCE PLAY

Approximately 626,000 barrels per day in the Niobrara formation in November 2018

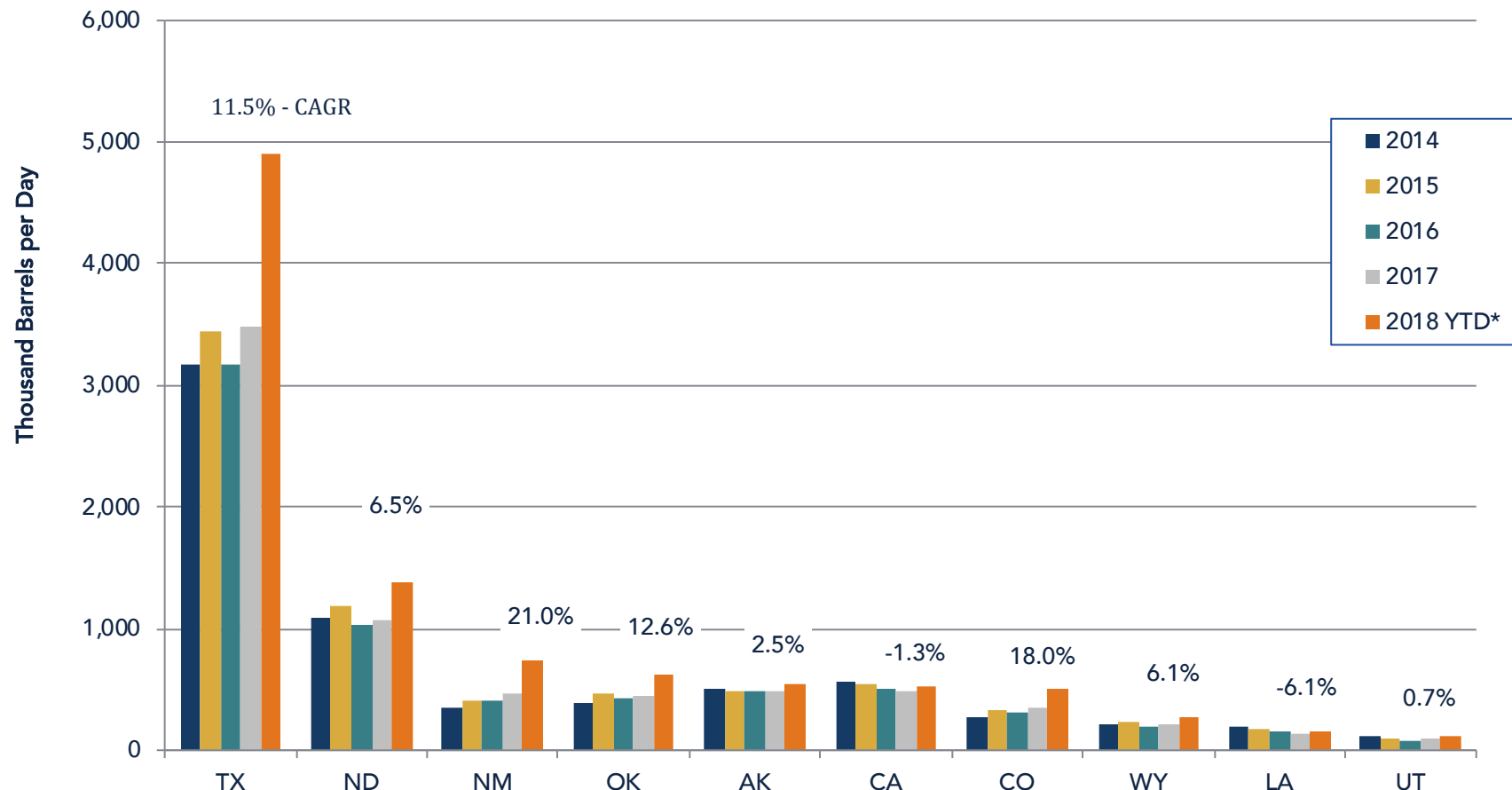


Source: U.S. Department of Energy, Energy Information Administration, Drilling Productivity Report
Note: Does not include legacy production; 2018 data through November



CRUDE OIL PRODUCTION BY STATE, 2014-2018

U.S. 2014-2018 compound annual growth rate (CAGR) was 8.6% compared with 18% in Colorado and 11.5% in Texas



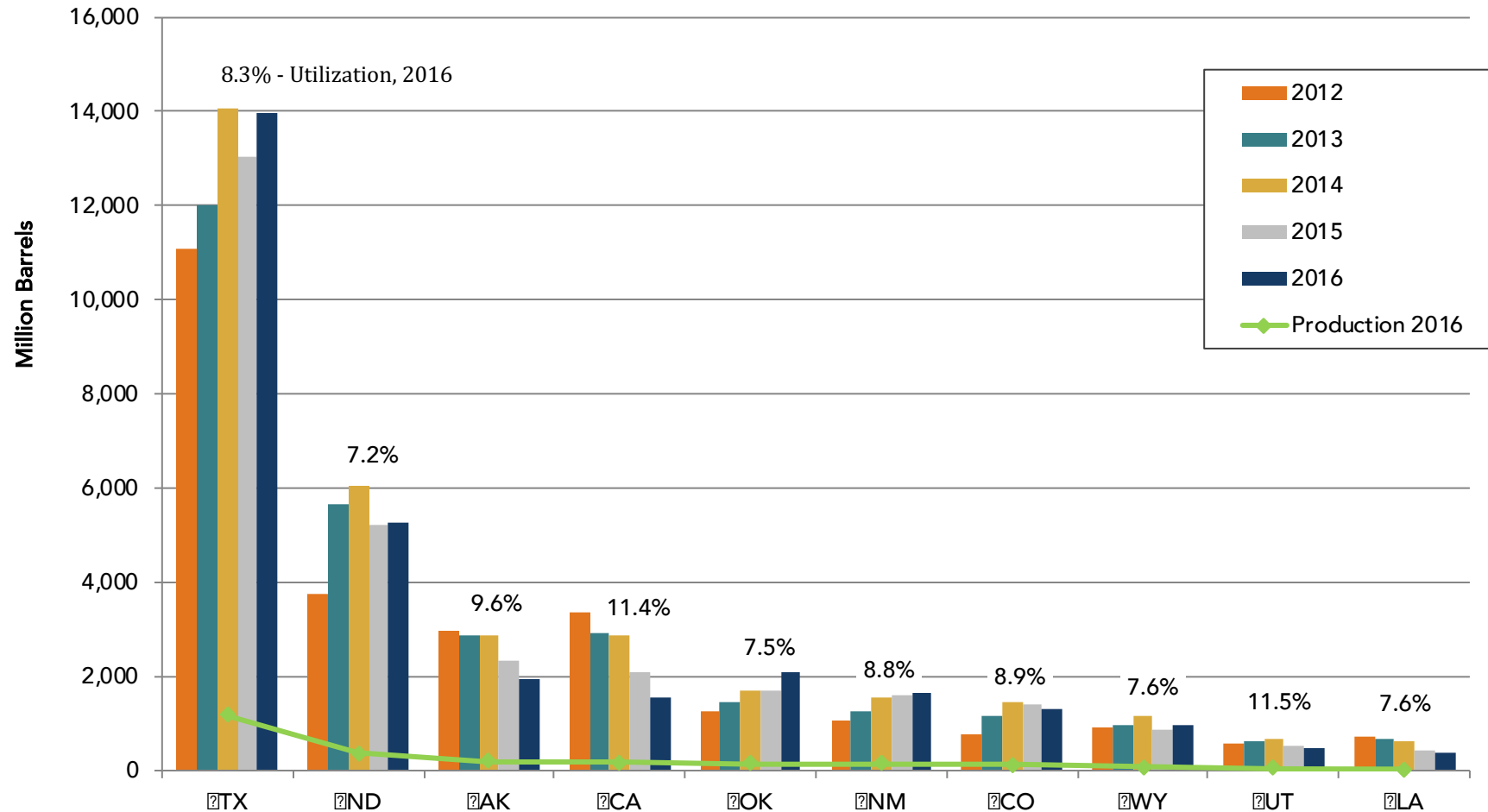
Source: U.S. Department of Energy, Energy Information Administration

Note: Crude oil includes lease condensate recovered as liquid from natural gas wells.

*2018 year-to-date represents January to July

CRUDE OIL RESERVES & UTILIZATION RATE, 2012-2016

Technology improvements contribute to growing reserves

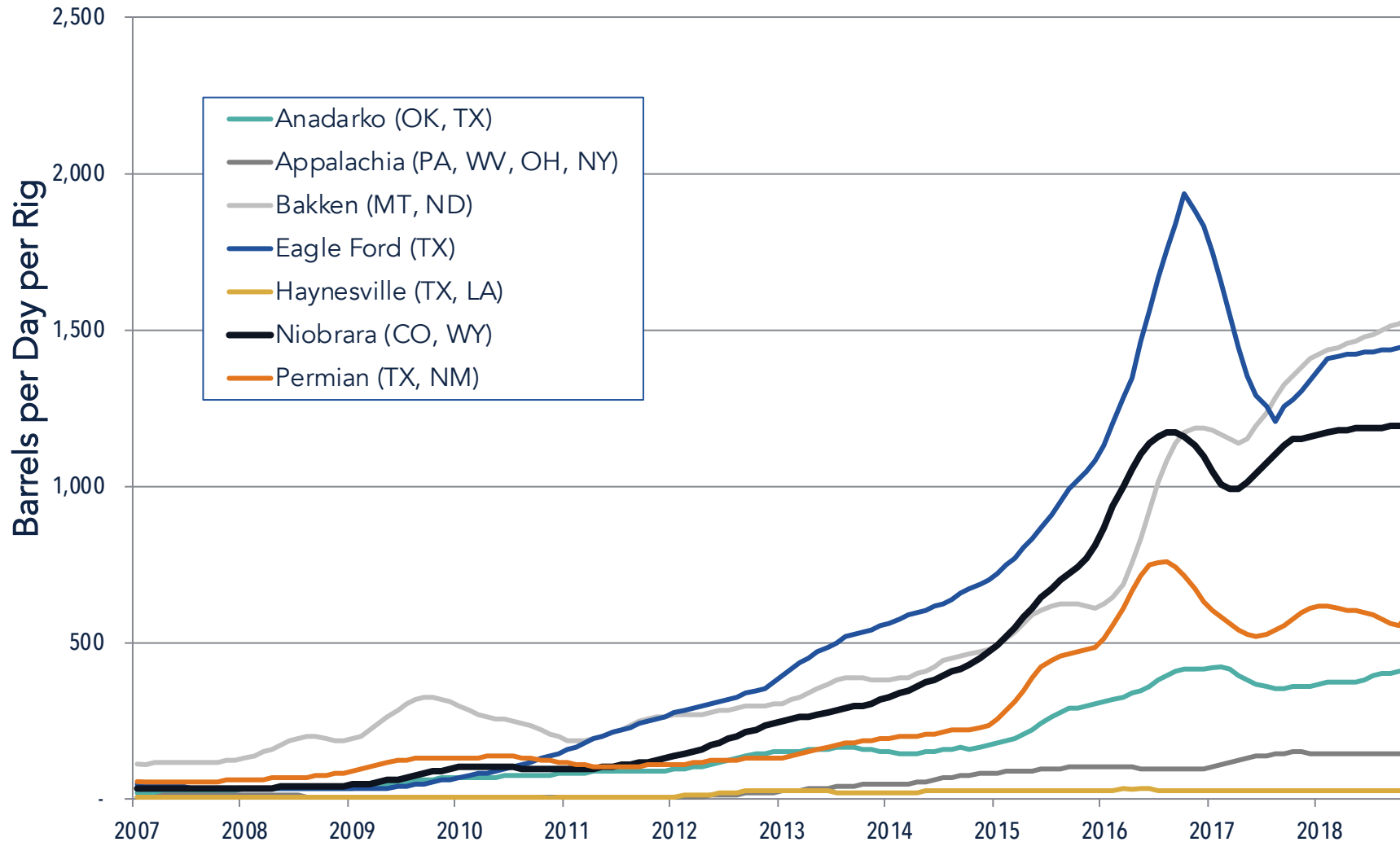


Source: U.S. Department of Energy, Energy Information Administration. Note: Utilization rate is the amount of reserves developed/produced annually; crude oil reserves include lease condensate.

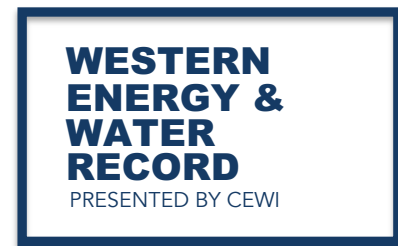


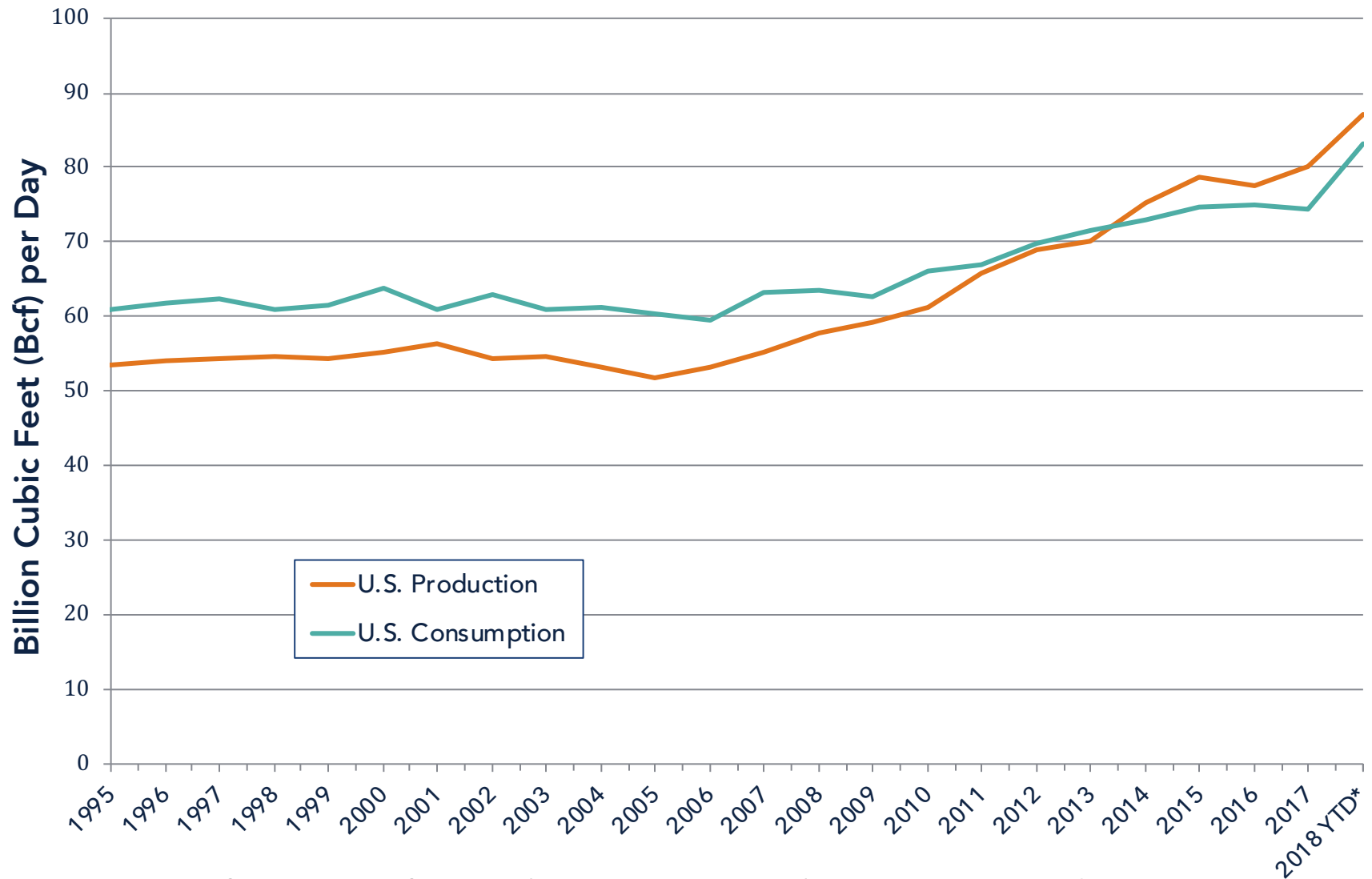
U.S. SHALE OIL DRILLING EFFICIENCY BY MAJOR PLAY |

Productivity in the Niobrara formation has increased by nearly 13 times since January 2011



Source: U.S. Department of Energy, Energy Information Administration. Drilling Productivity Report
Note: Does not include legacy production; 2018 data through November



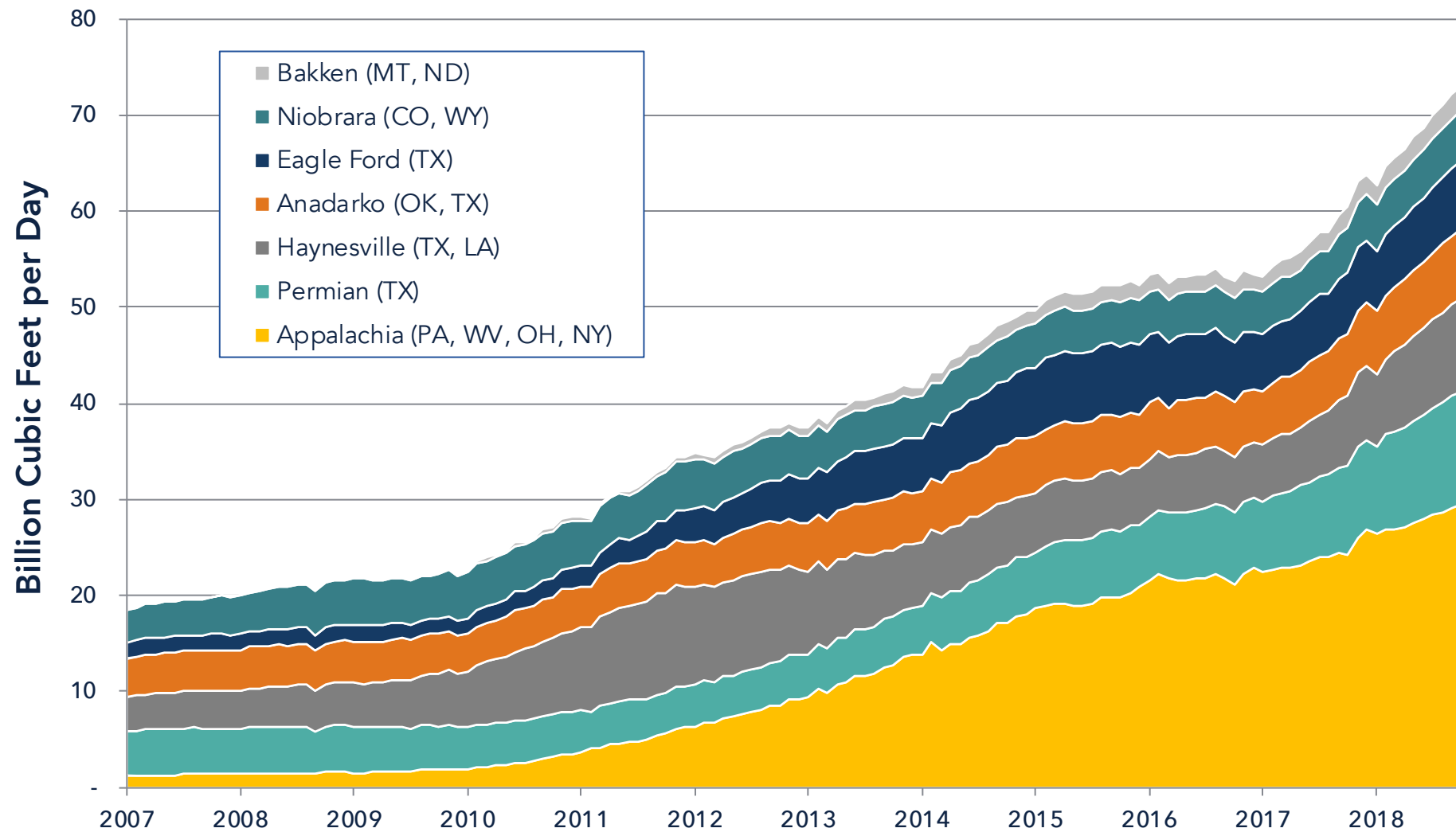


Source: U.S. Department of Energy, Energy Information Administration. *2018 year-to-date represents January to July



U.S. SHALE GAS PRODUCTION BY MAJOR RESOURCE PLAY

5.2 bcf per day in the Niobrara formation as of November 2018

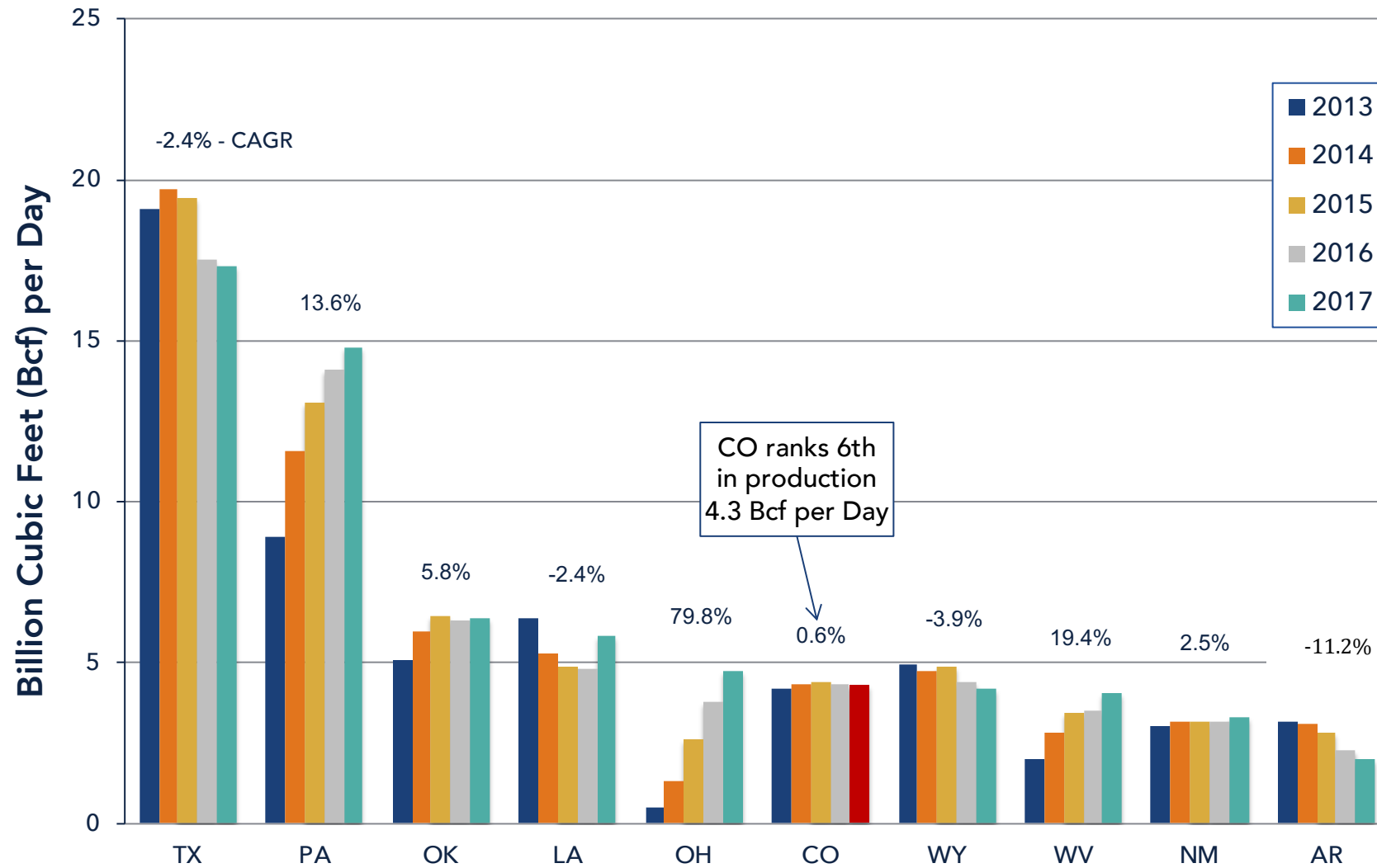


Source: U.S. Department of Energy, Energy Information Administration, Drilling Productivity Report
Note: Excludes legacy production; 2018 data through November



NATURAL GAS PRODUCTION BY STATE, 2013-2017

Colorado's production has remained stable since 2013; U.S. production has increased at a CAGR of 3% since 2013

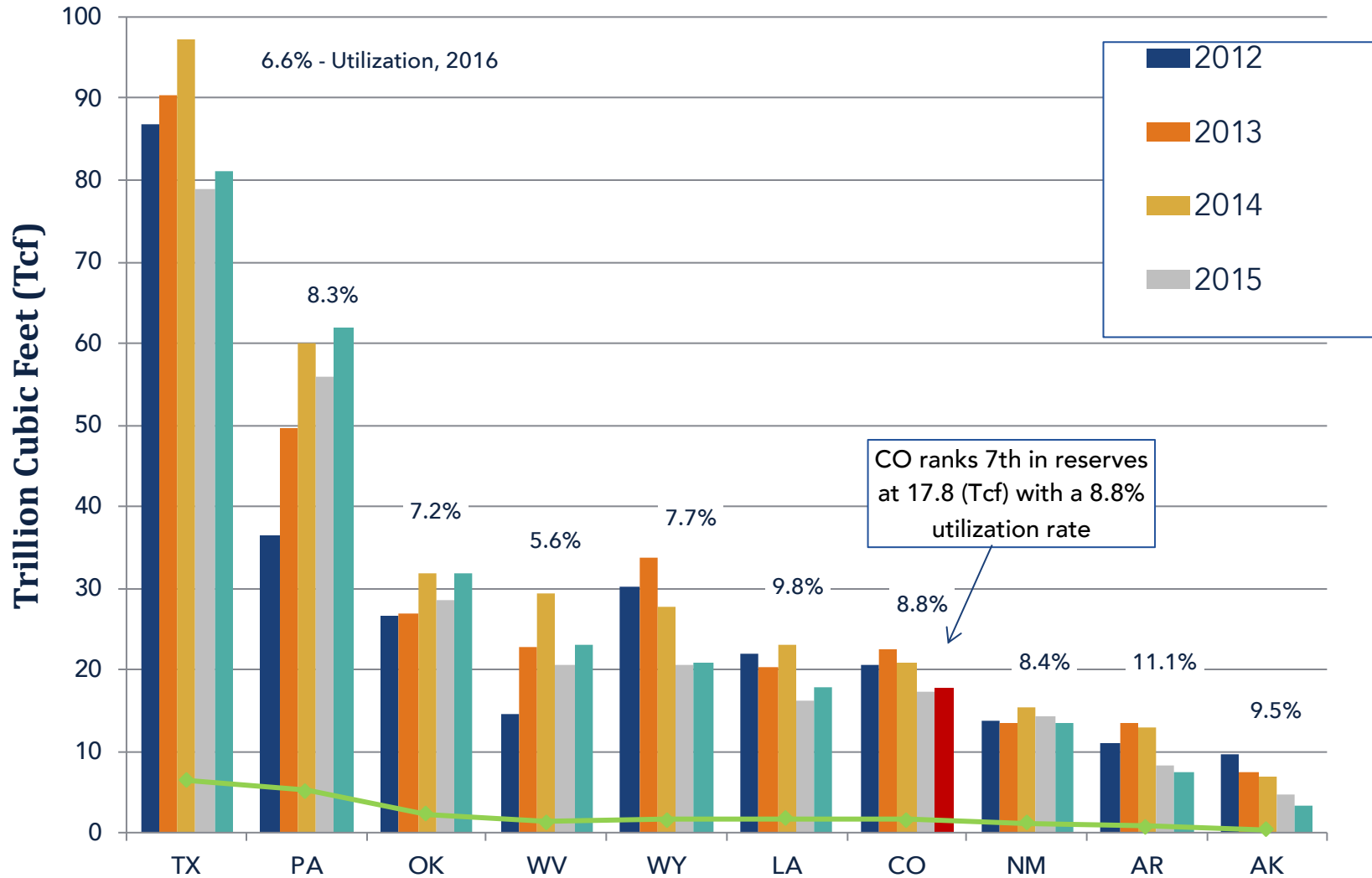


Source: U.S. Department of Energy, Energy Information Administration

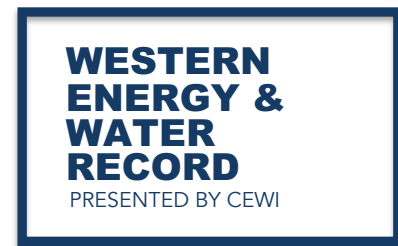


NATURAL GAS RESERVES & UTILIZATION RATE, 2012-2016

Low natural gas prices have reduced the size of economically accessible reserves

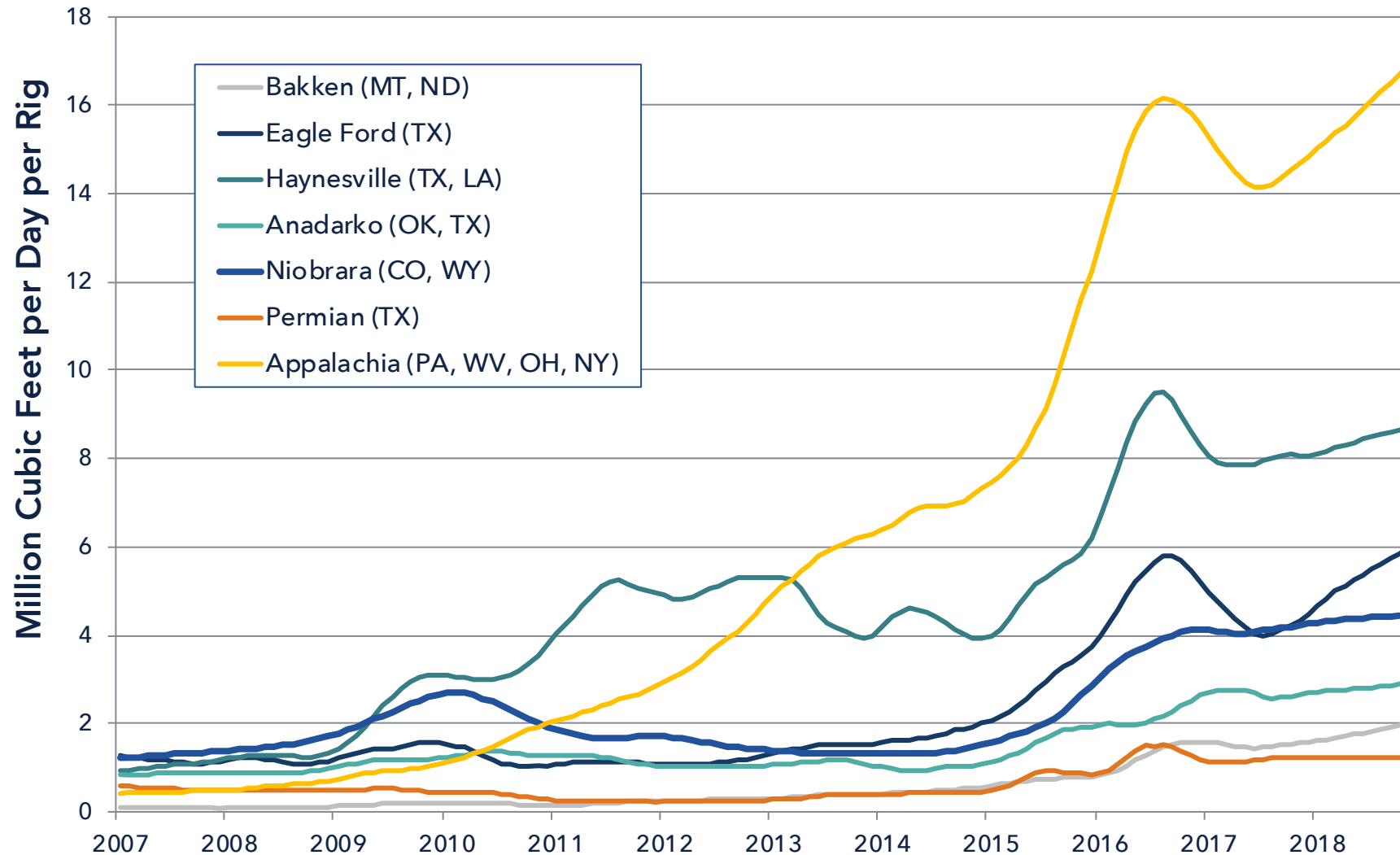


Source: U.S. Department of Energy, Energy Information Administration. Note: Top ten states including Colorado; utilization rate is the amount of reserves developed/produced annually; reserves are defined as resources that can be recovered with reasonable certainty under existing economic and operating conditions



U.S. SHALE GAS DRILLING EFFICIENCY BY MAJOR RESOURCE PLAY

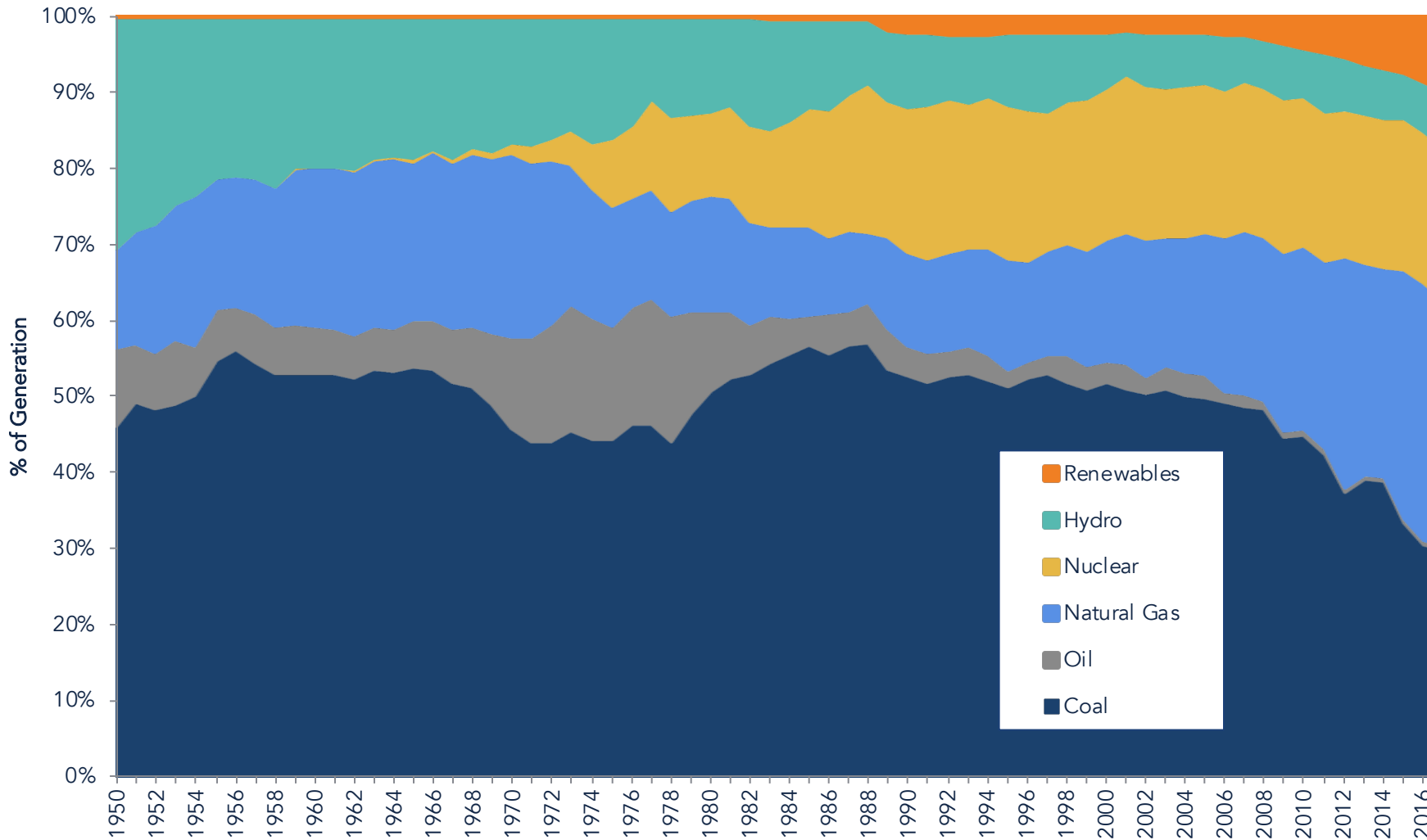
Each Niobrara rig produces 4.4 mmcf per day as of November 2018



Source: U.S. Department of Energy, Energy Information Administration. Note: Excludes legacy production; 2018 data through November



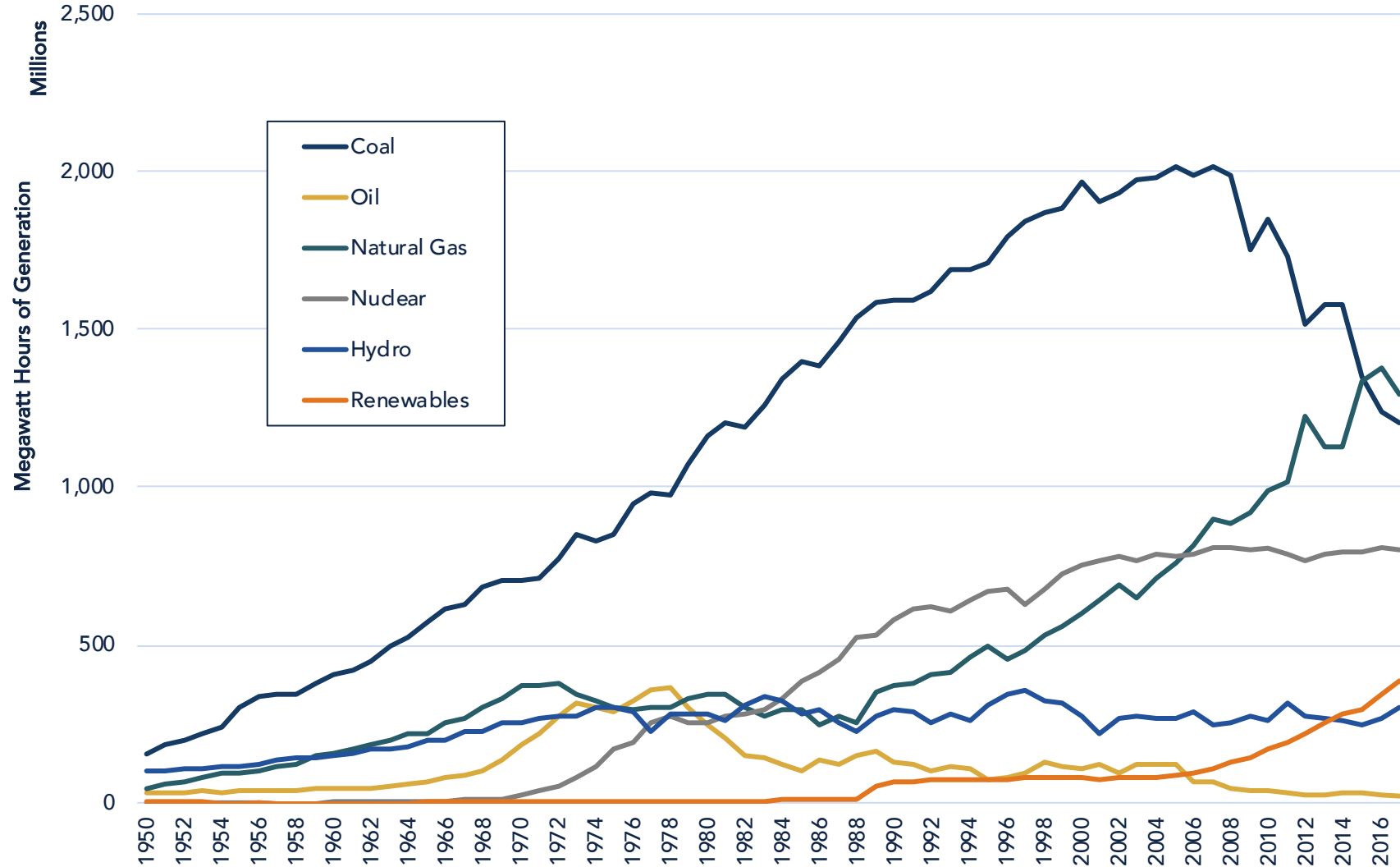
U.S. NET GENERATION BY MARKET SHARE, 1950-2017



Source: U.S. Energy Information Administration.

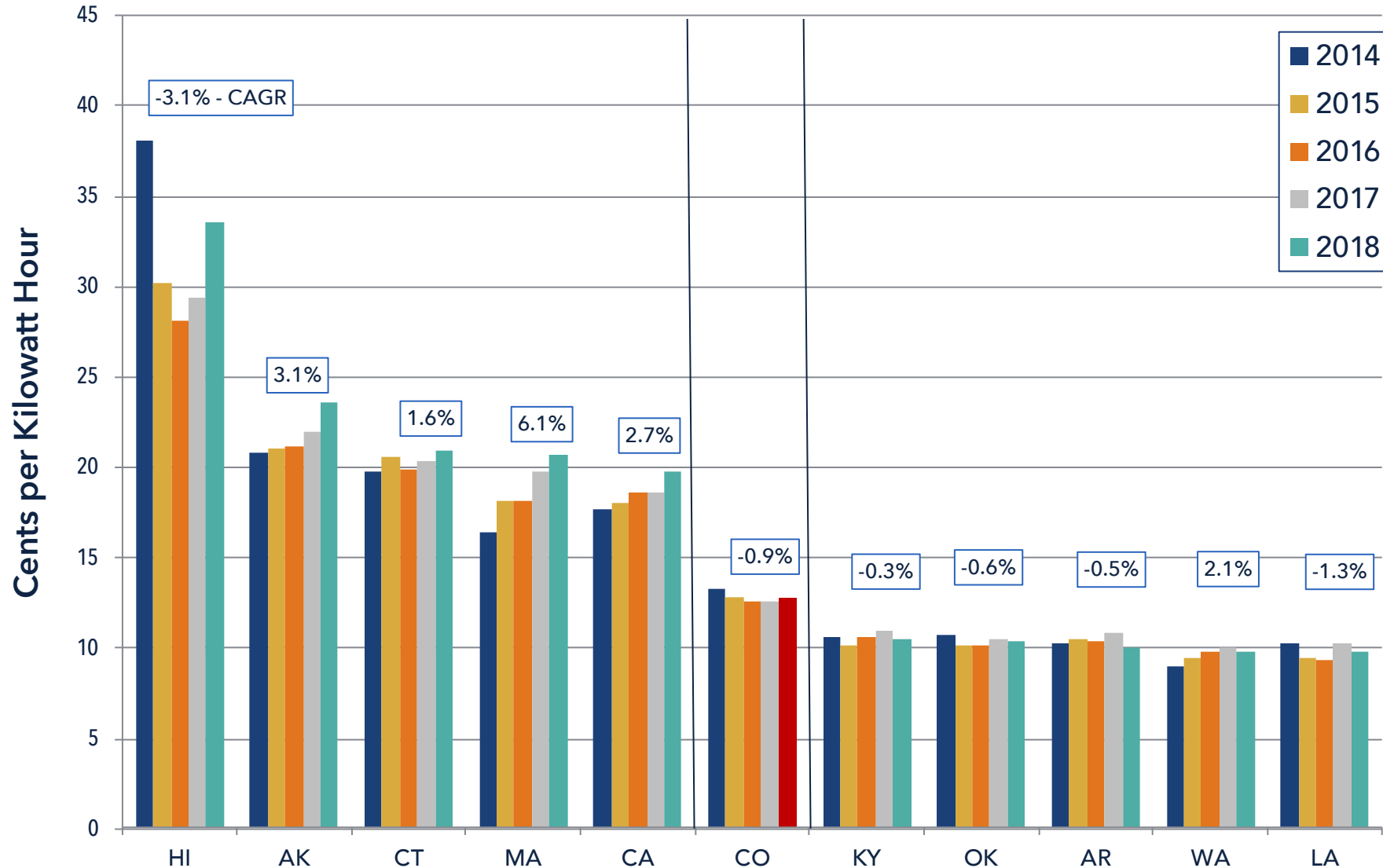


U.S. NET GENERATION BY RESOURCE, 1950-2017



AVE. RESIDENTIAL SUMMER RETAIL ELECTRIC PRICE, 2014-18

Top-5, Bottom-5; Colorado has the 24th-most expensive residential retail electricity price; the U.S. average price has increased at a 0.1 percent CAGR since 2014

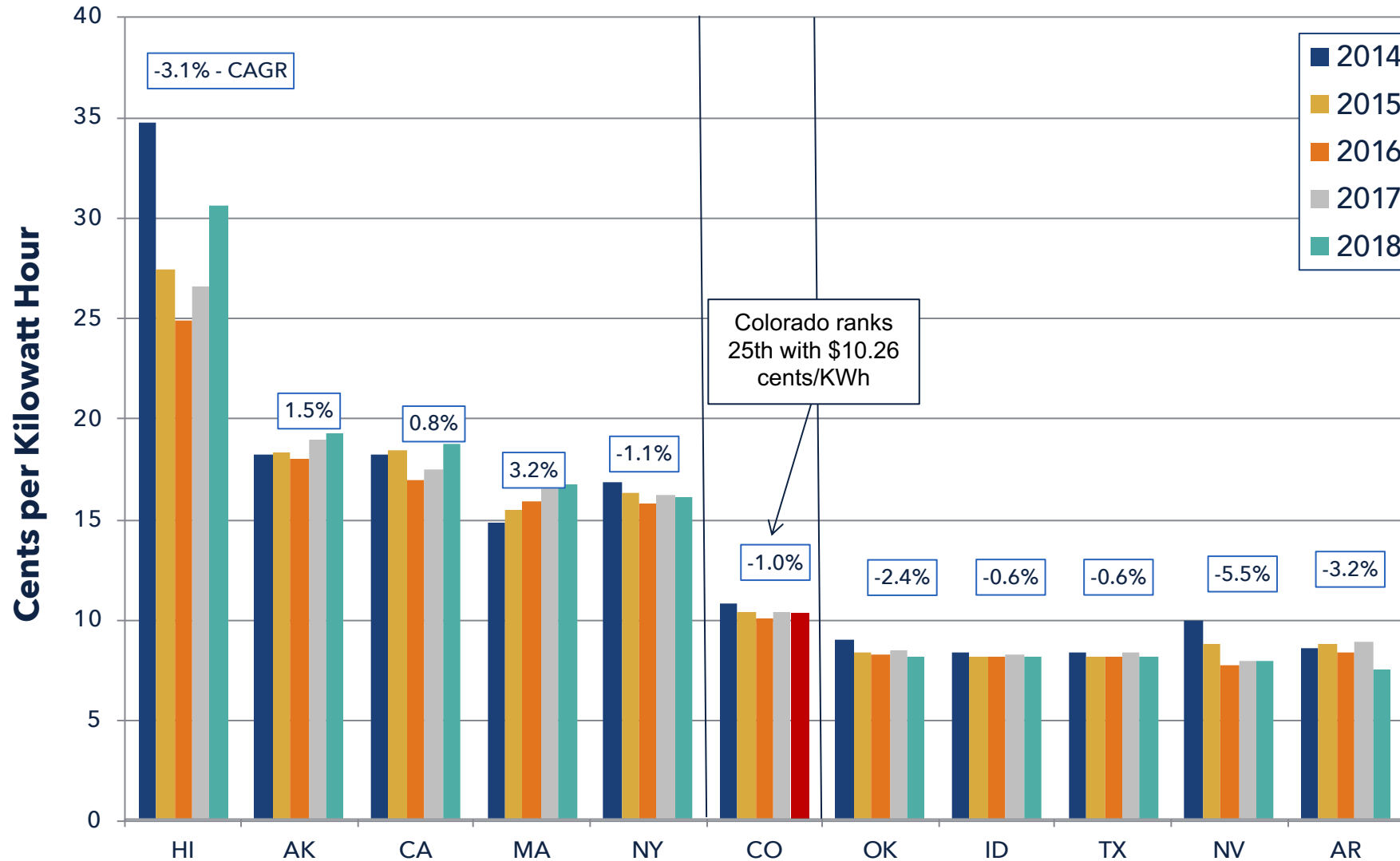


Source: U.S. Energy Information Administration.



AVERAGE COMMERCIAL SUMMER RETAIL ELECTRIC PRICE, 2014-18

Top-5, Bottom-5; Colorado has the 25th-most expensive commercial retail electricity price; the U.S. average price has decreased at a 0.5 percent CAGR since 2014

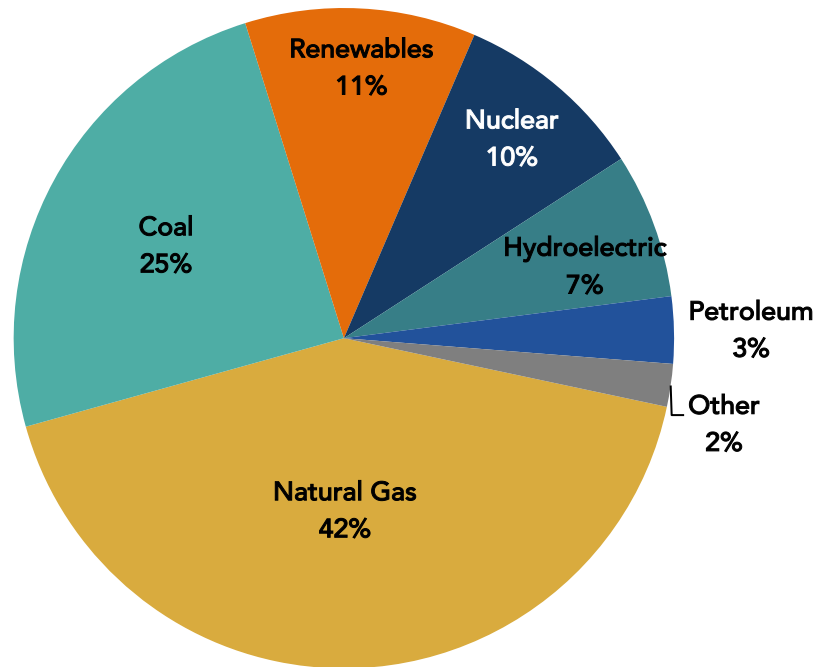


Source: U.S. Energy Information Administration.

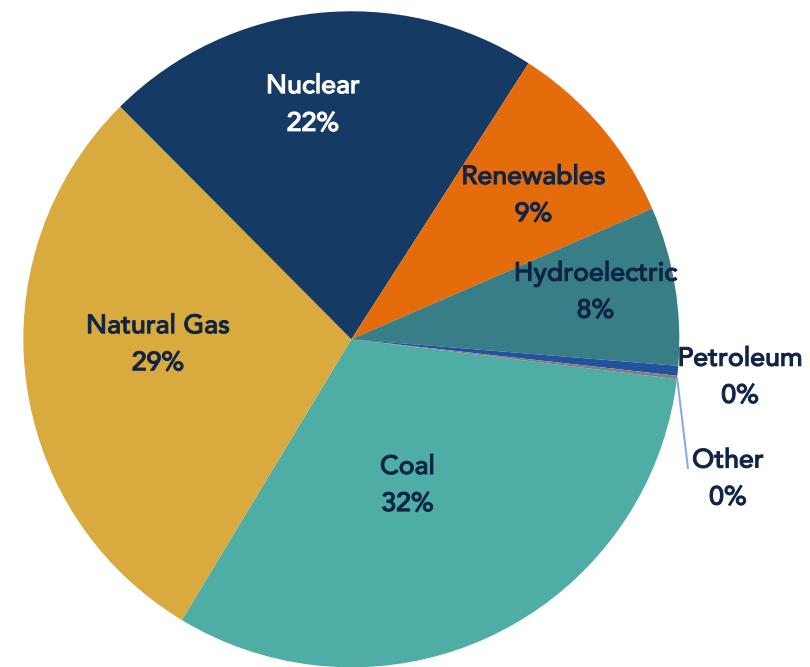


U.S. NAMEPLATE CAPACITY AND NET GENERATION, 2017

U.S. Operating Nameplate Capacity



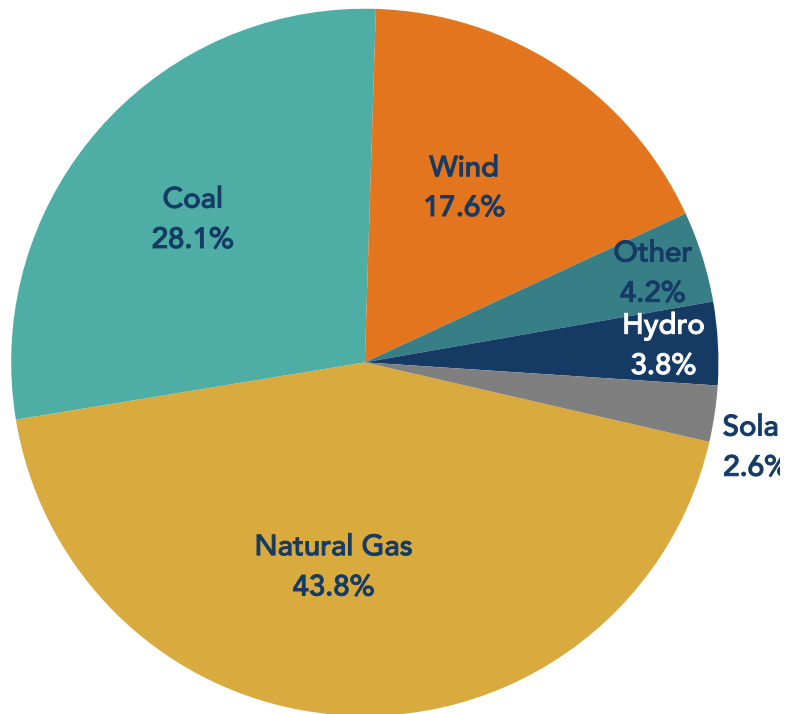
U.S. Net Generation by Resource



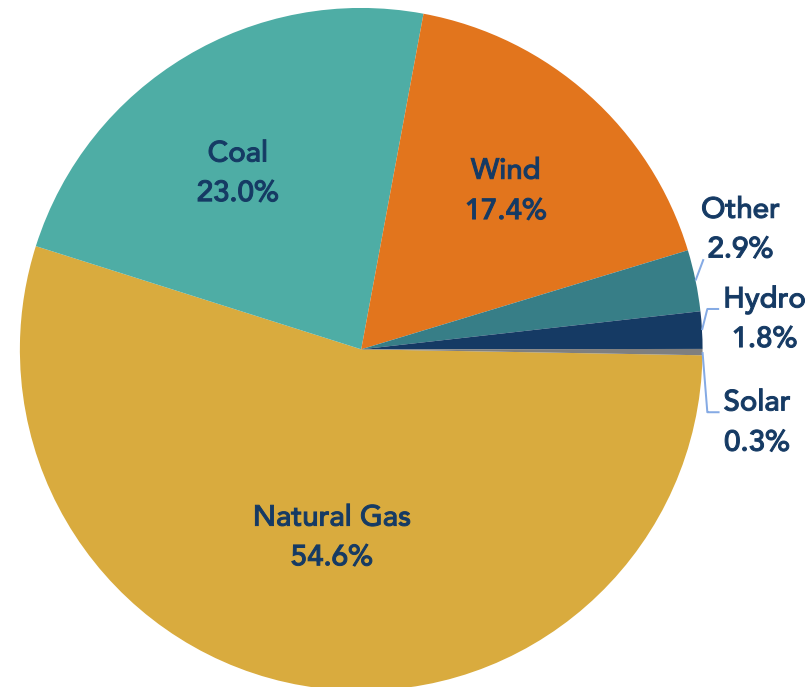
Source: U.S. Energy Information Administration.

COLORADO NAMEPLATE CAPACITY AND NET GENERATION, 2017

CO Operating Nameplate Capacity



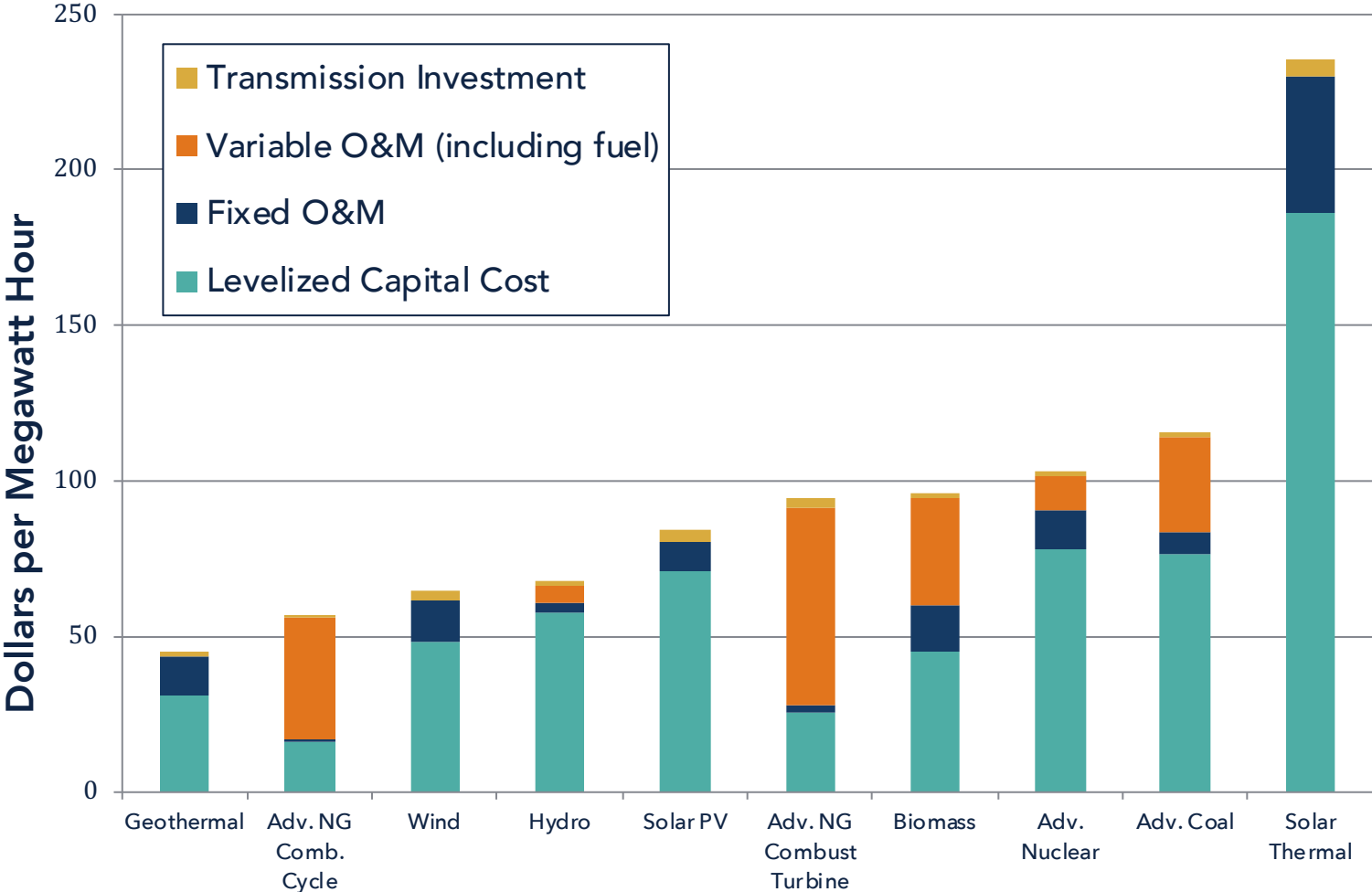
CO Net Generation by Resource



Source: U.S. Energy Information Administration.

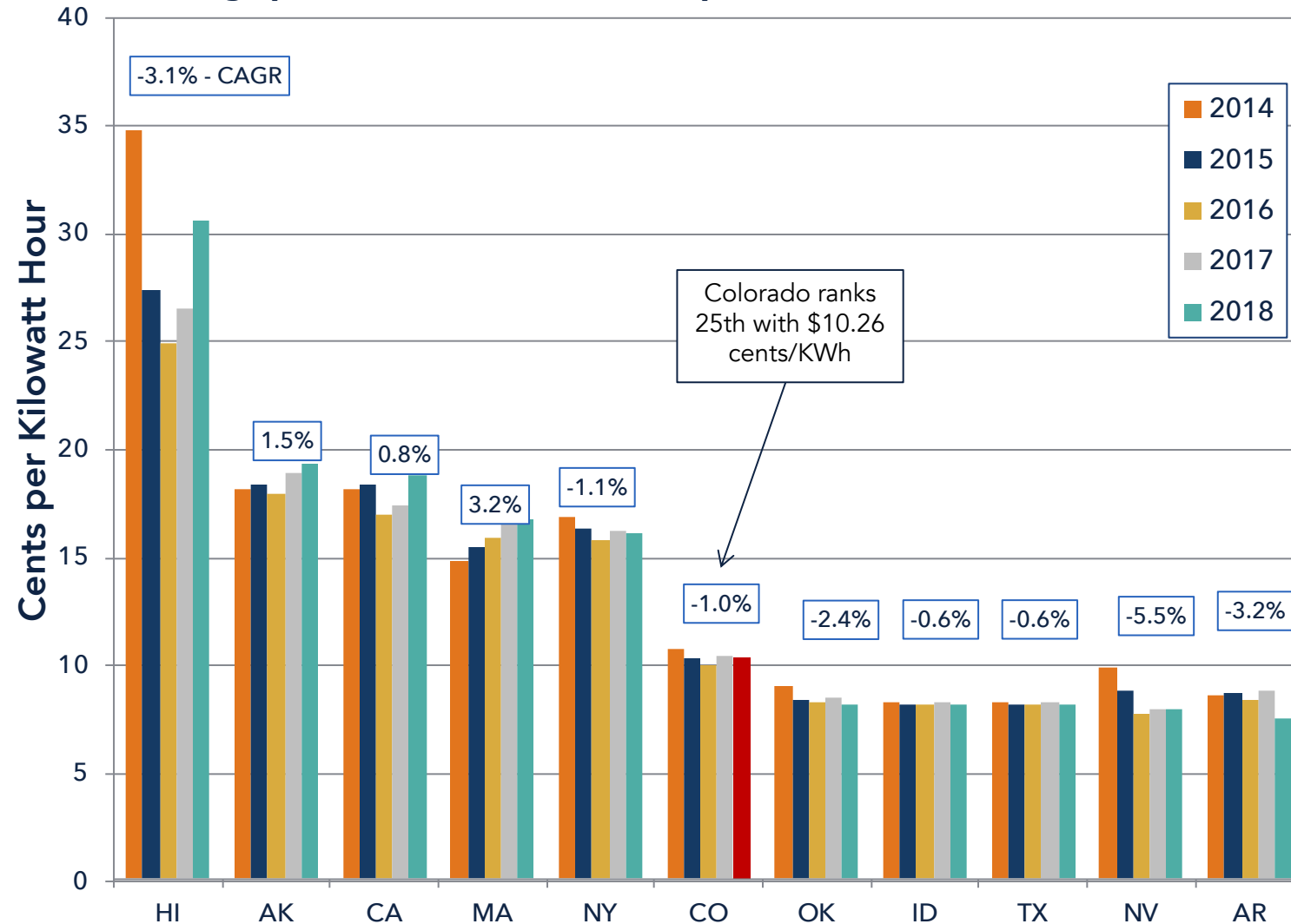
LEVELIZED COSTS FOR ELECTRIC GENERATION PLANTS

Levelized (unsubsidized) costs for wind and solar photovoltaics is comparable to other resources when assuming a plant start date of 2022

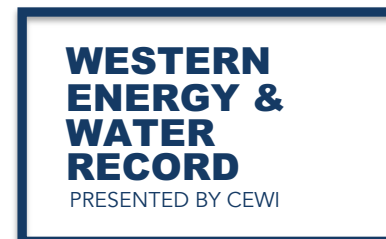


AVERAGE COMMERCIAL SUMMER RETAIL ELECTRIC PRICE, 2014-18

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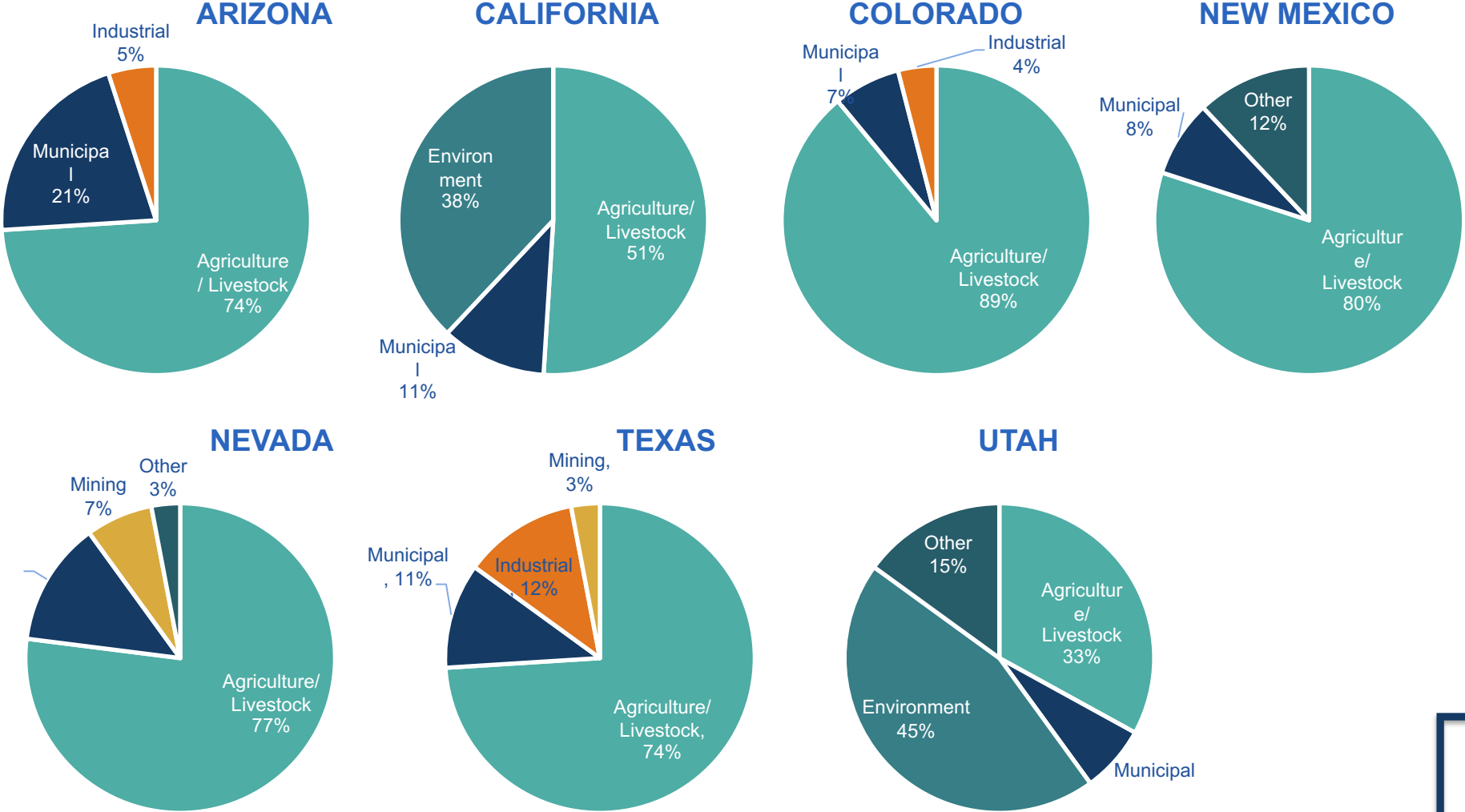


Source: U.S. Energy Information Administration.



WATER CONSUMPTION BY SECTOR IN THE WESTERN STATES

Agriculture uses the majority of water; methodologies vary widely, particularly inclusion of "environment" as consumptive use.

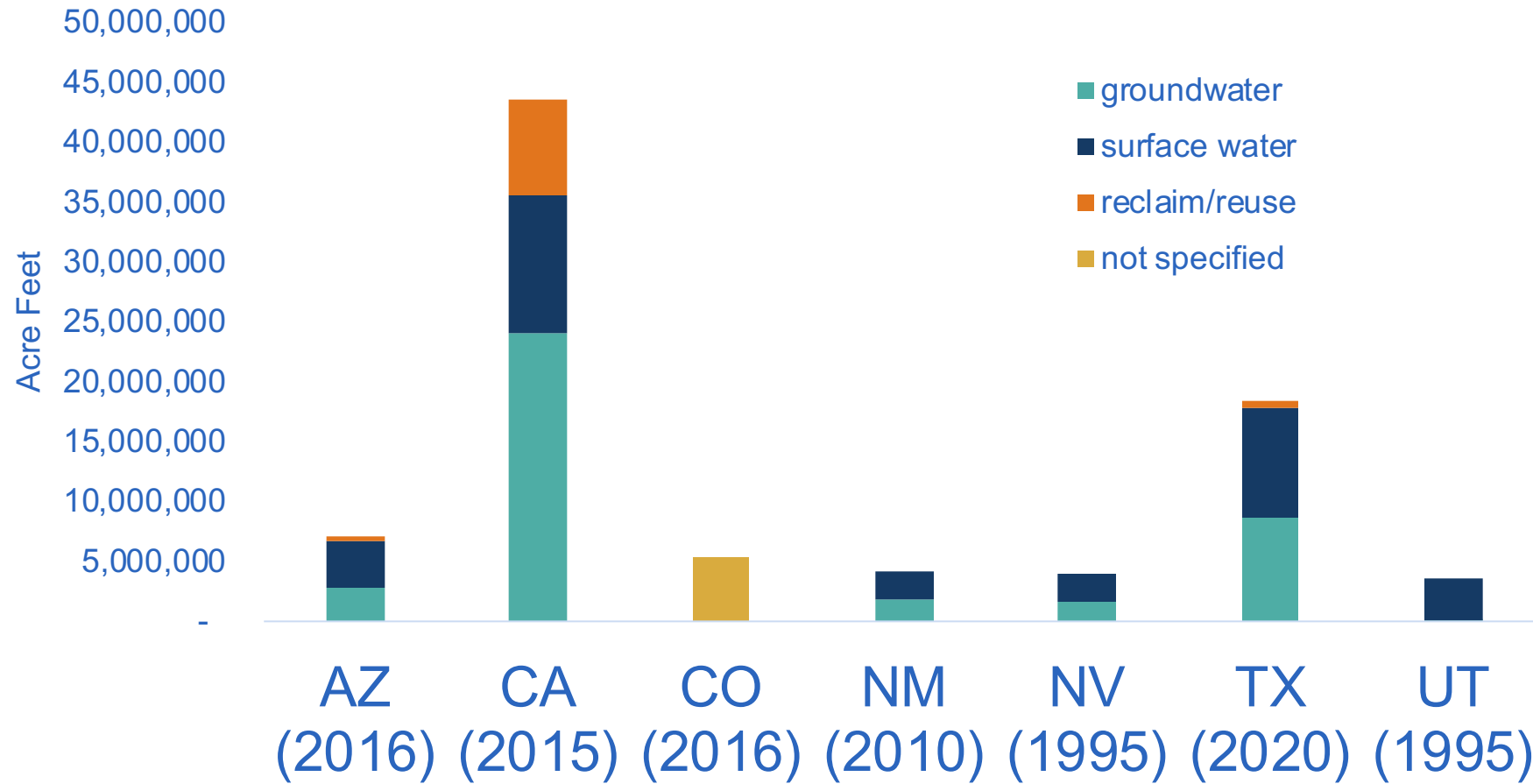


Source: Most recent water plans for each state, AZ has not released a state water plan but data comes from Dept. of Water Resources. Years vary from 1995-2016



WATER CONSUPTION IN WESTERN STATES WITH SOURCE DETAIL

Methodologies vary widely, several states have decades old reports

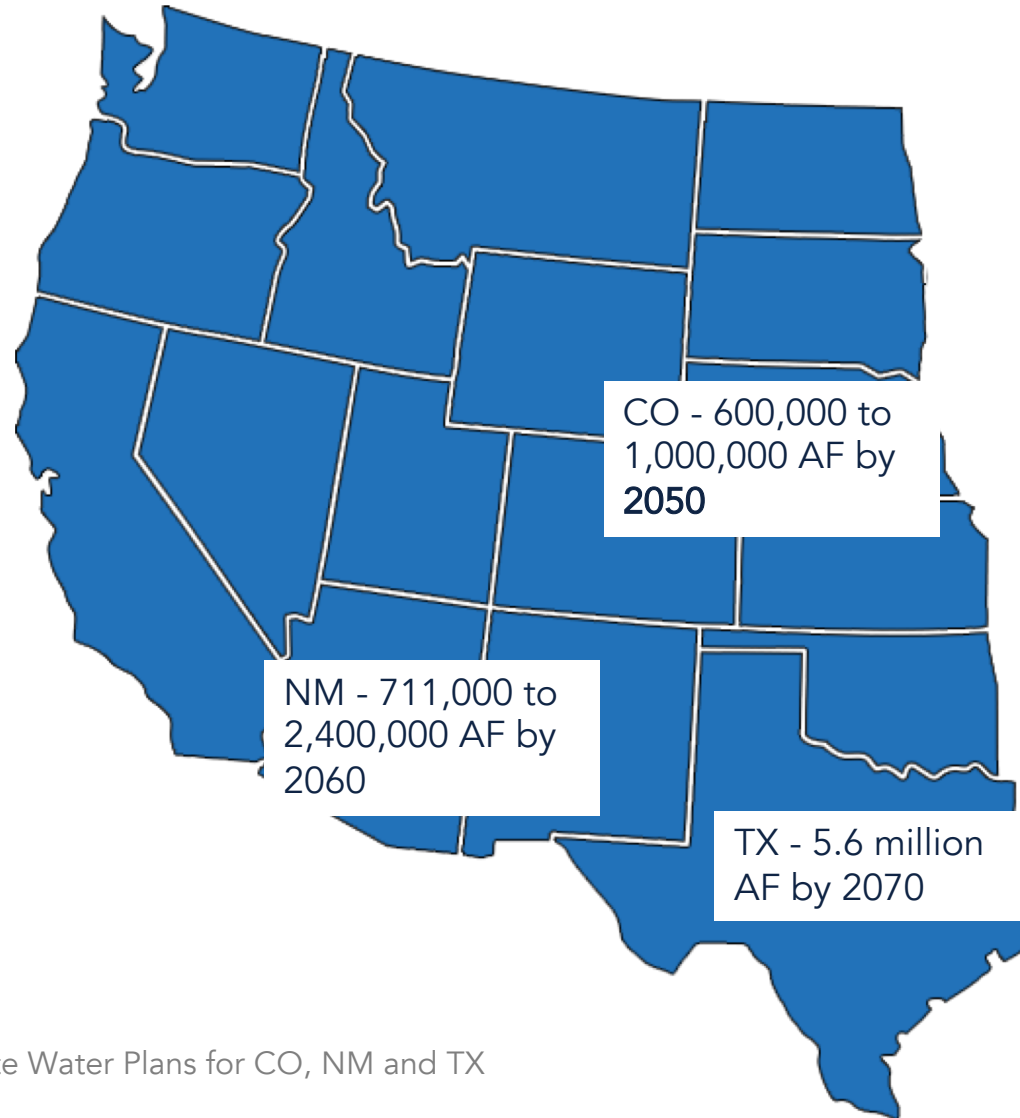


Source: Most recent water plans for each state, AZ has not released a state water plan but data comes from Dept. of Water Resources. Years vary from 1995-2016



PROJECTED WATER SHORTFALLS & STRATEGIES TO ADDRESS GAP

Methodologies vary widely, several states have decades old reports



Strategies to Reduce Gap in Supply & Demand

- Conservation
 - Municipal, particularly through changes in Land Use
 - Agricultural
 - Other
- Alternative Transfer Mechanisms (ATMs)
- Indirect Reuse
- Direct Potable Reuse
- Brackish Water Desalination
- New Reservoirs/Storage

Source: State Water Plans for CO, NM and TX



Contacts:

CHRIS HANSEN, PHD

DIRECTOR & CO-FOUNDER
COLORADO ENERGY & WATER INSTITUTE
CHANSEN@CEWI.ORG

LARRY HOLDREN

DIRECTOR & CO-FOUNDER
COLORADO ENERGY & WATER INSTITUTE
LHOLDREN@CEWI.ORG

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