

Outlook for North American Natural Gas



For

LDC Natural Gas Forum

November 11, 2014 | Toronto, Ontario, Canada

By

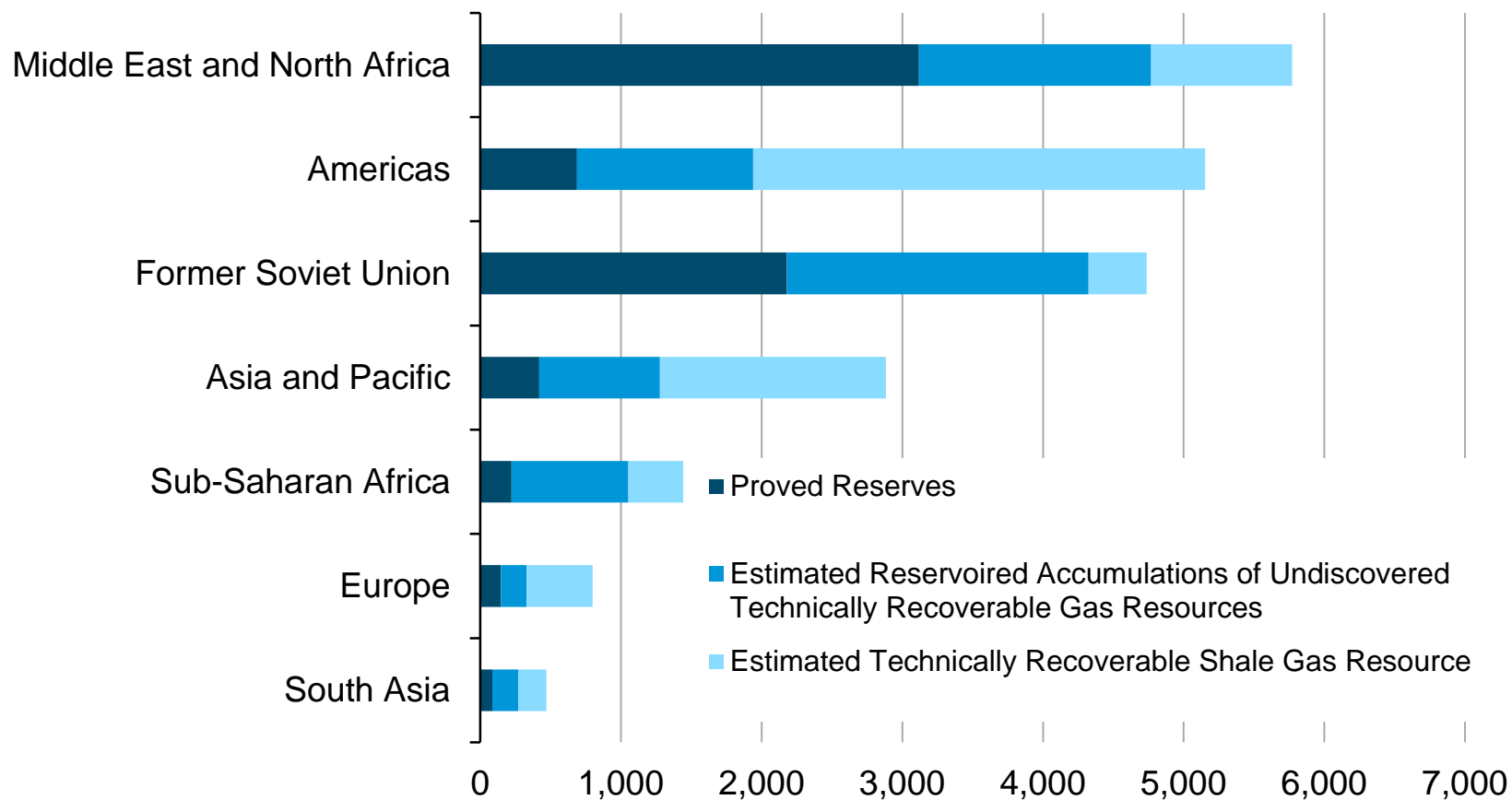
Adam Sieminski, Administrator

U.S. Energy Information Administration

The Americas are the second largest region in natural gas reserves and resources

regional natural gas reserves and resources, 2012

trillion cubic feet

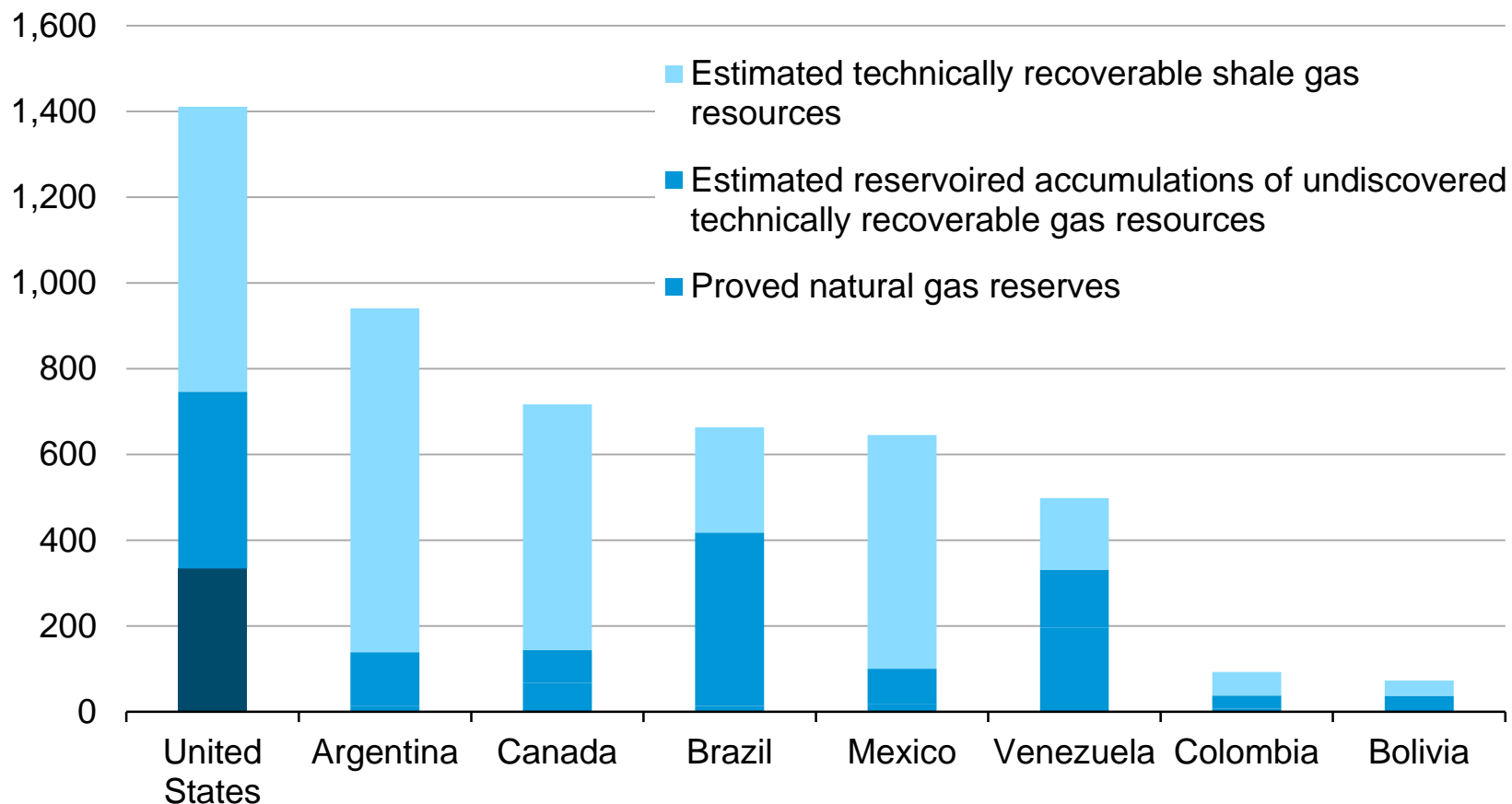


Source: U.S. Energy Information Administration, Oil and Gas Journal, U.S. Geological Survey, EIA/ARI World Shale Gas and Shale Oil Resource Assessment

The Americas hold an abundance of shale gas resources, undeveloped except in the U.S. and Canada

Americas natural gas reserves and resources, 2012

trillion cubic feet



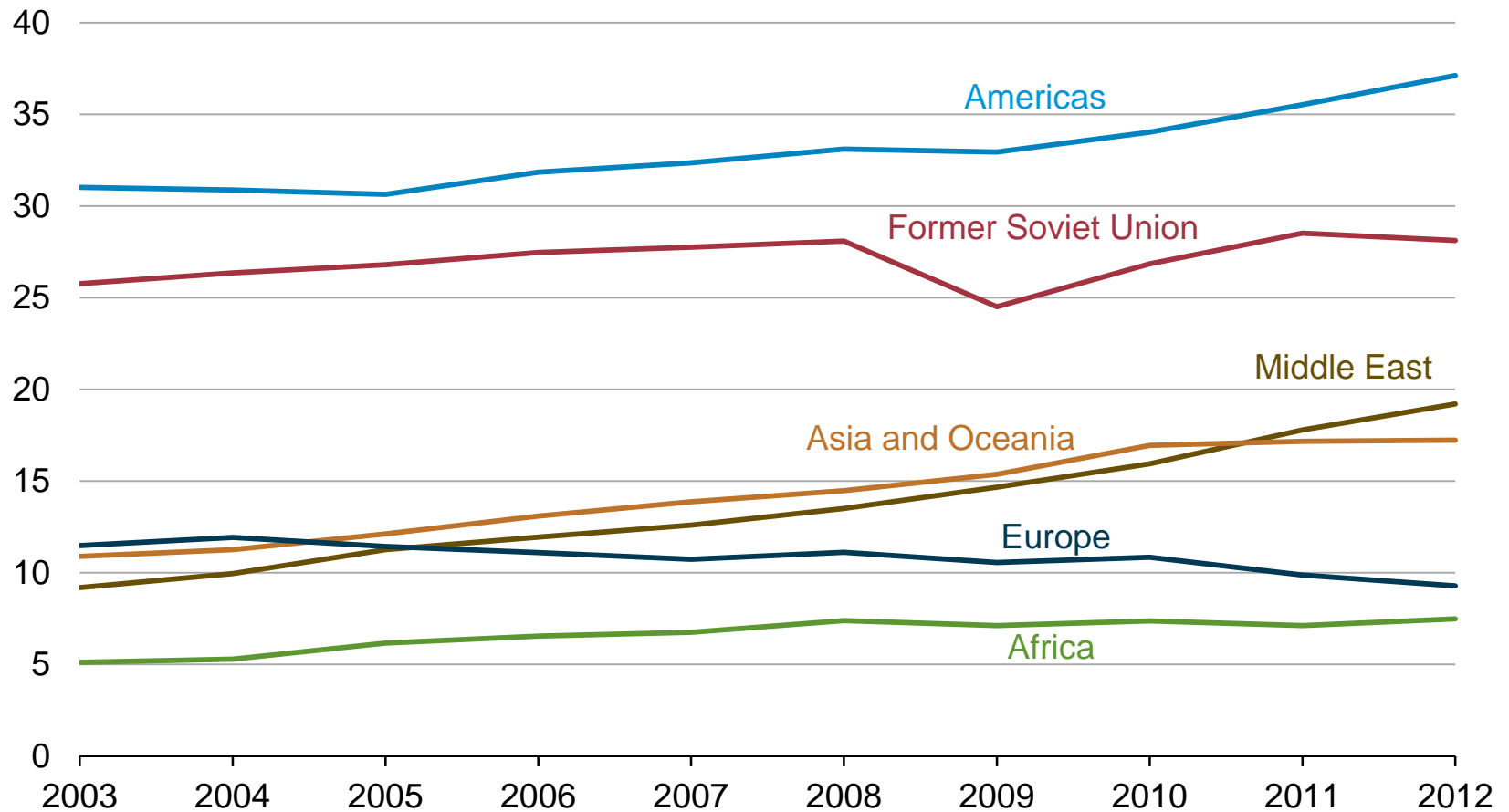
Source: U.S. Energy Information Administration, Oil and Gas Journal, U.S. Geological Survey, EIA/ARI World Shale Gas and Shale Oil Resource Assessment.

North American shale plays



Americas natural gas production is pulling away from other regions

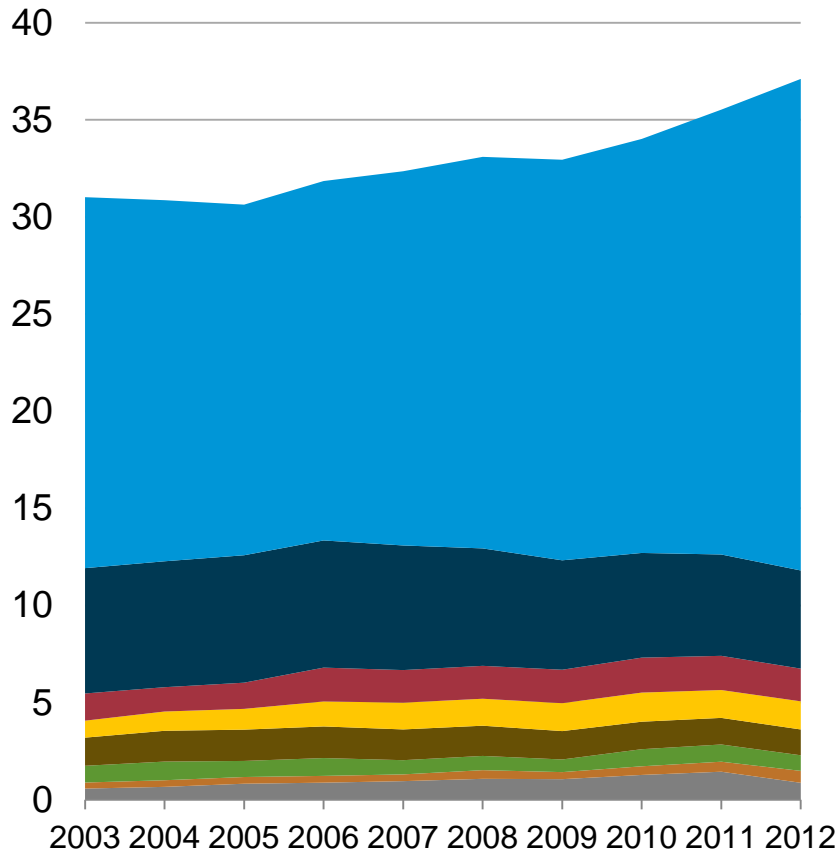
dry natural gas production by region
trillion cubic feet



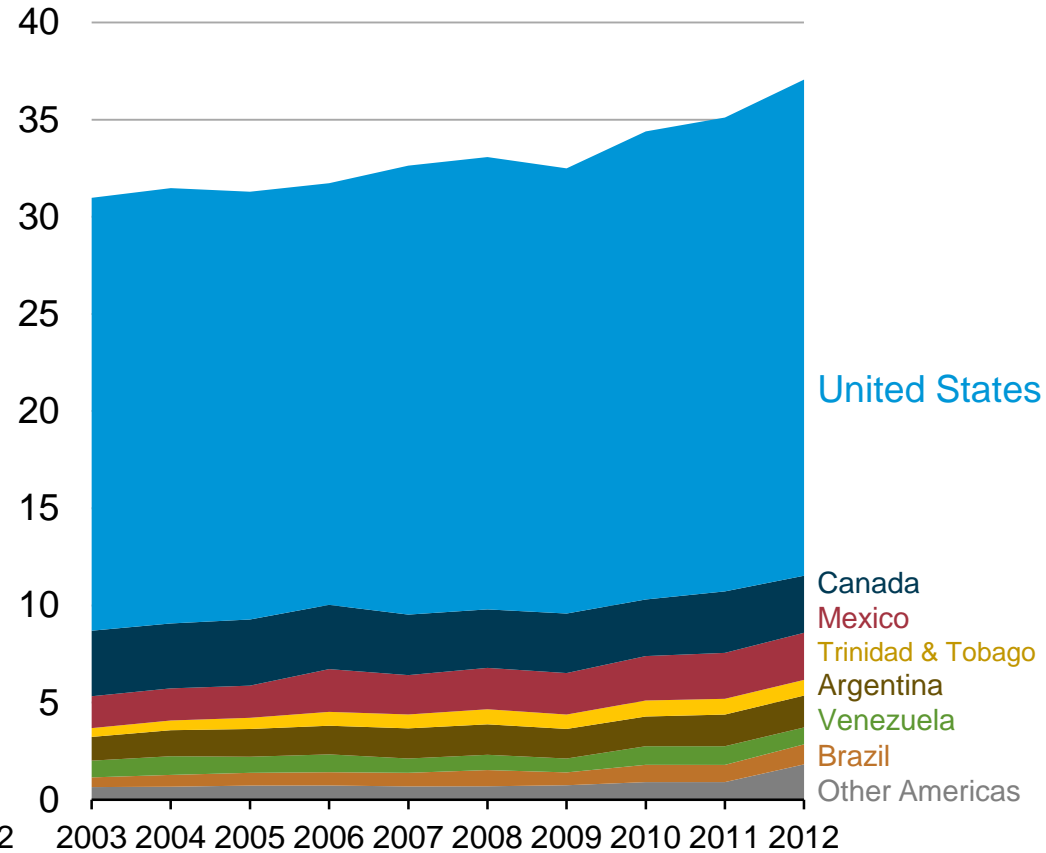
Source: EIA, International Energy Statistics

Total dry natural gas production in the Americas is outpacing consumption, largely driven by U.S. shale gas production

production of Americas dry natural gas
trillion cubic feet

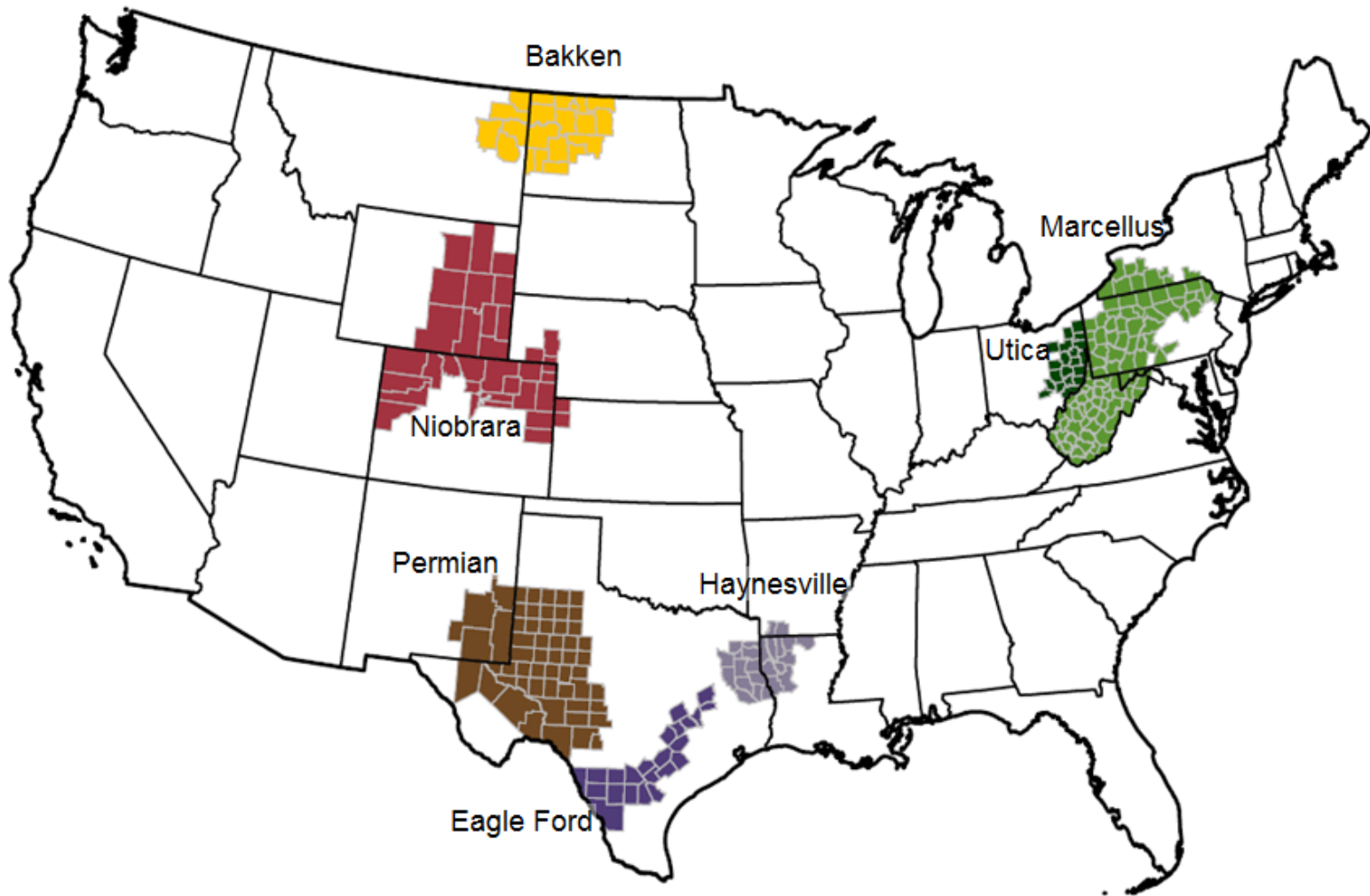


consumption of Americas dry natural gas
trillion cubic feet



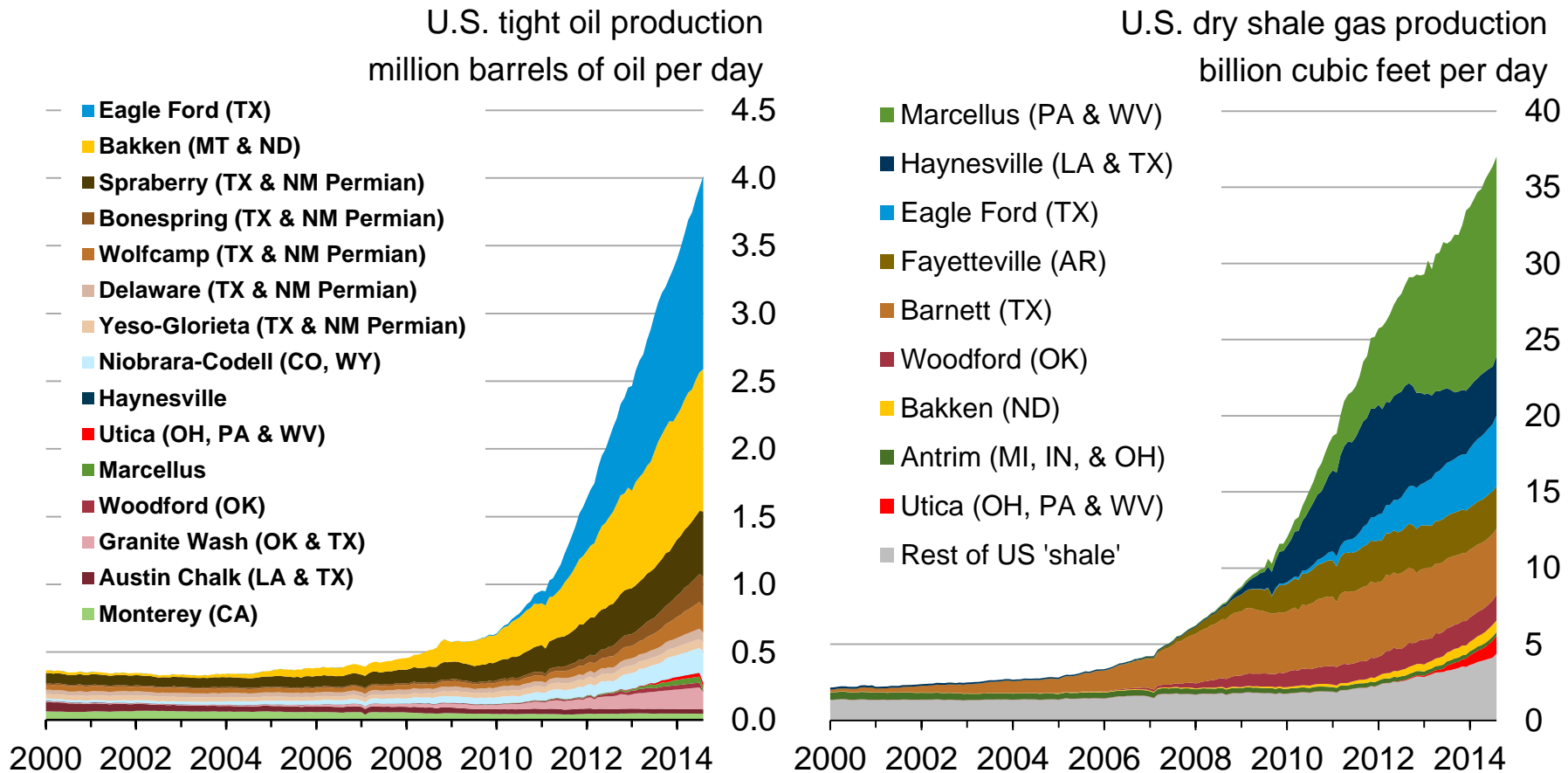
Source: EIA, International Energy Statistics

These seven regions accounted for 95% of U.S. oil production growth and all U.S. natural gas production growth from 2011-2013



Source: EIA, *Drilling Productivity Report*

The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources



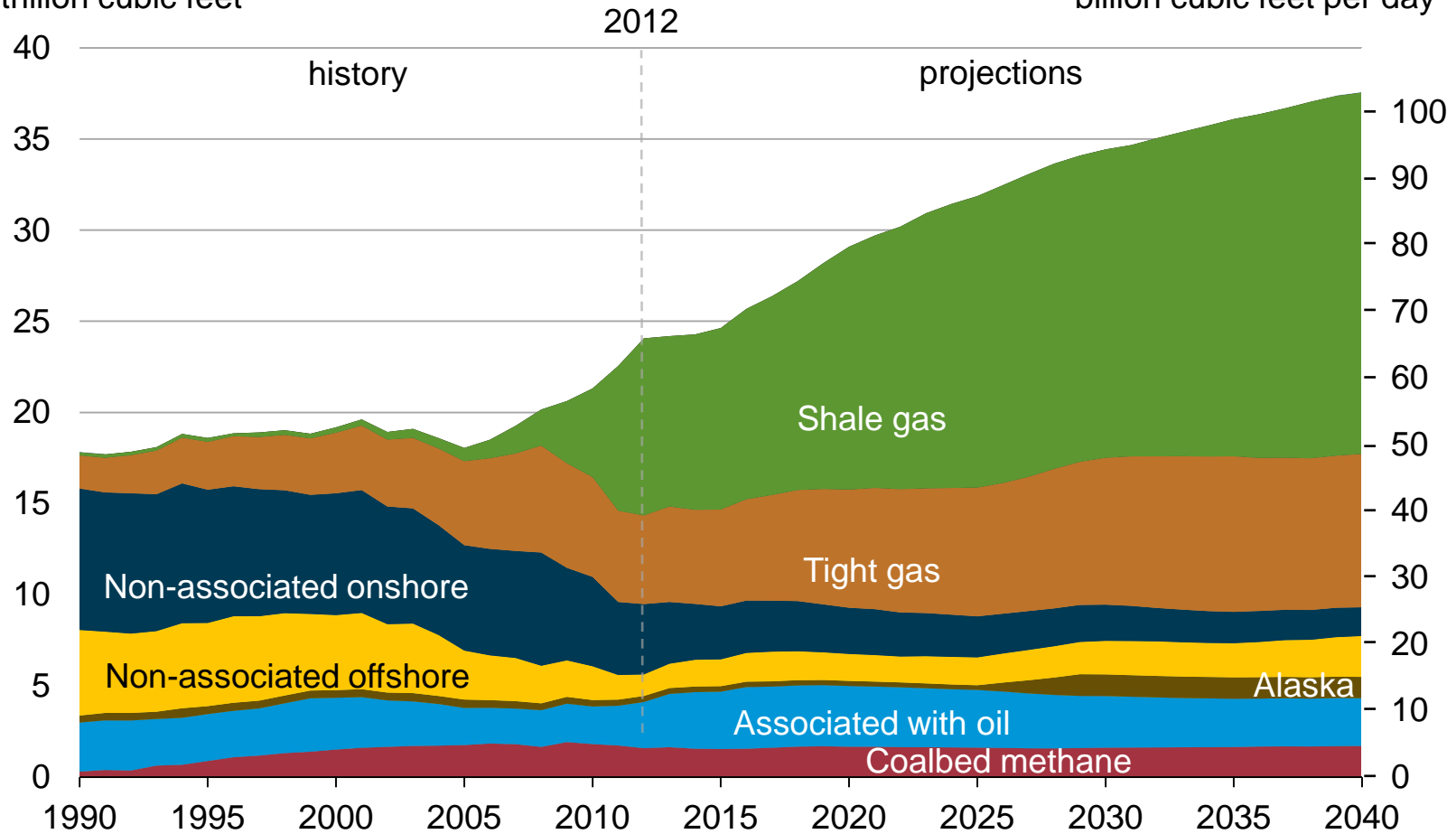
Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2014 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

U.S. shale gas leads growth in total gas production through 2040, when production exceeds 100 billion cubic feet per day

U.S. dry natural gas production

trillion cubic feet

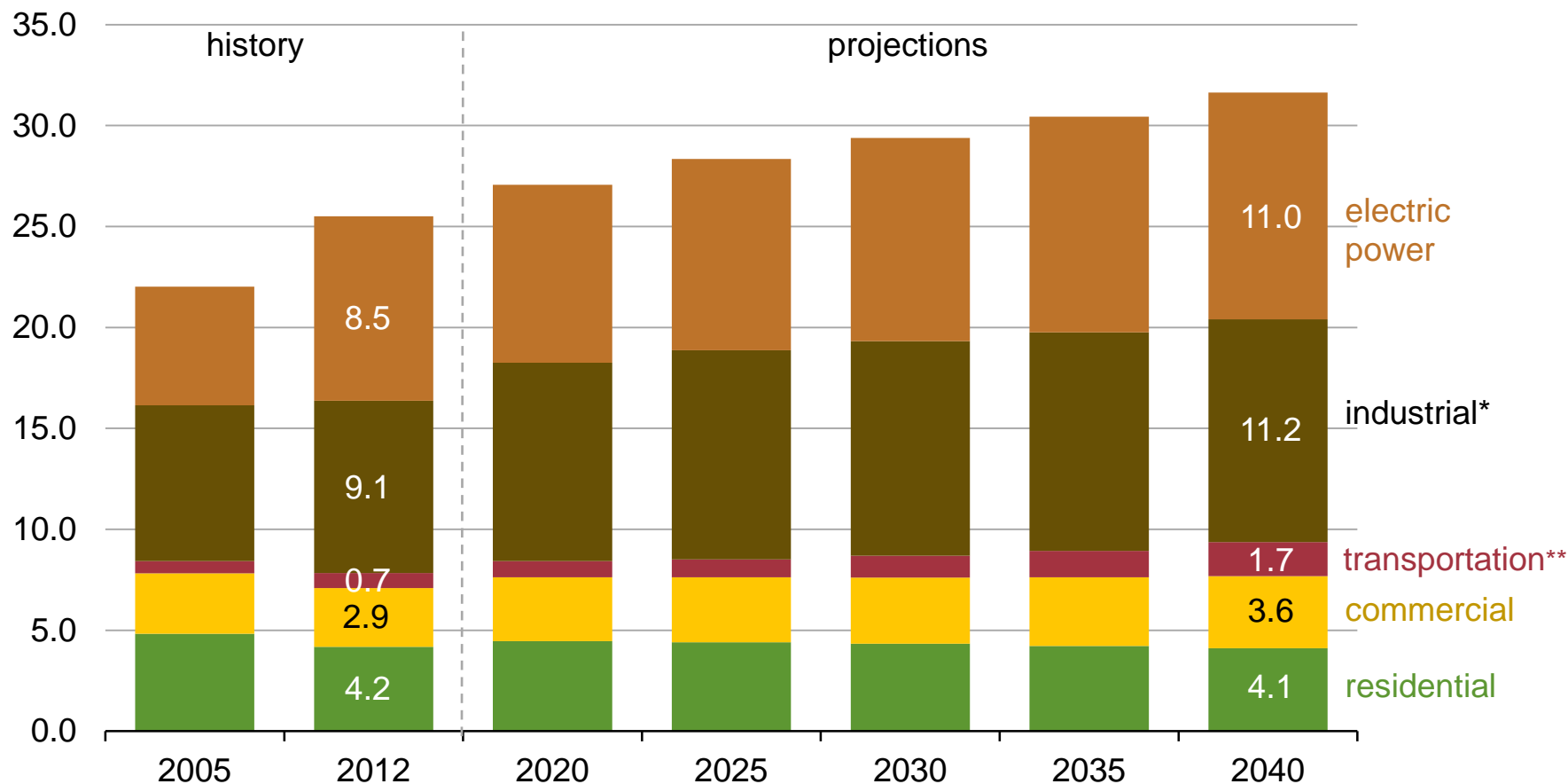
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2014, Reference case

Natural gas consumption growth is driven by electric power, industrial, and transportation use

U.S. dry gas consumption
trillion cubic feet



Source: EIA, Annual Energy Outlook 2014, Reference case

*Includes combined heat-and-power and lease and plant fuel

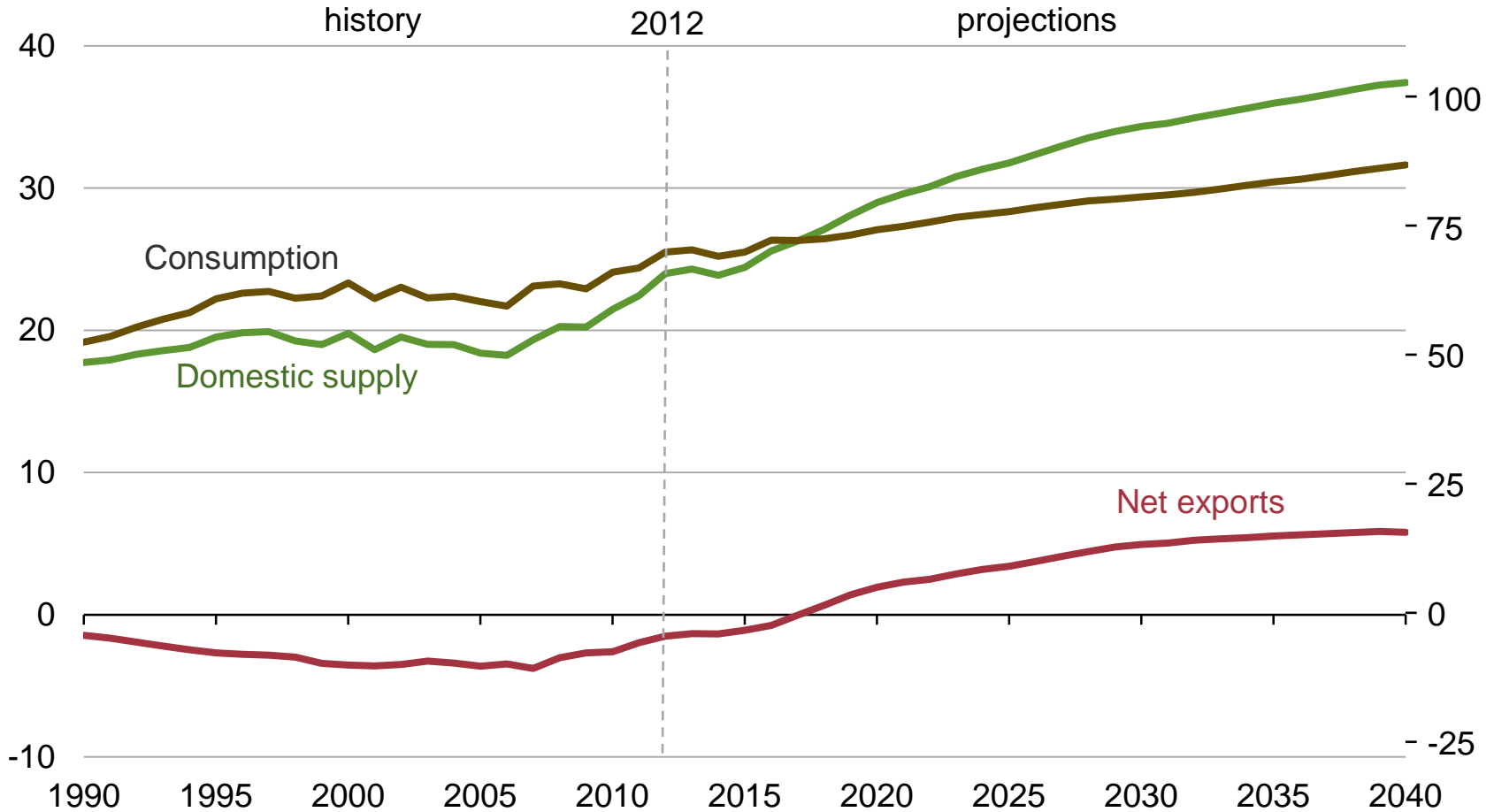
**Includes pipeline fuel

U.S. becomes a net exporter of natural gas in the near future

U.S. dry natural gas

trillion cubic feet per year

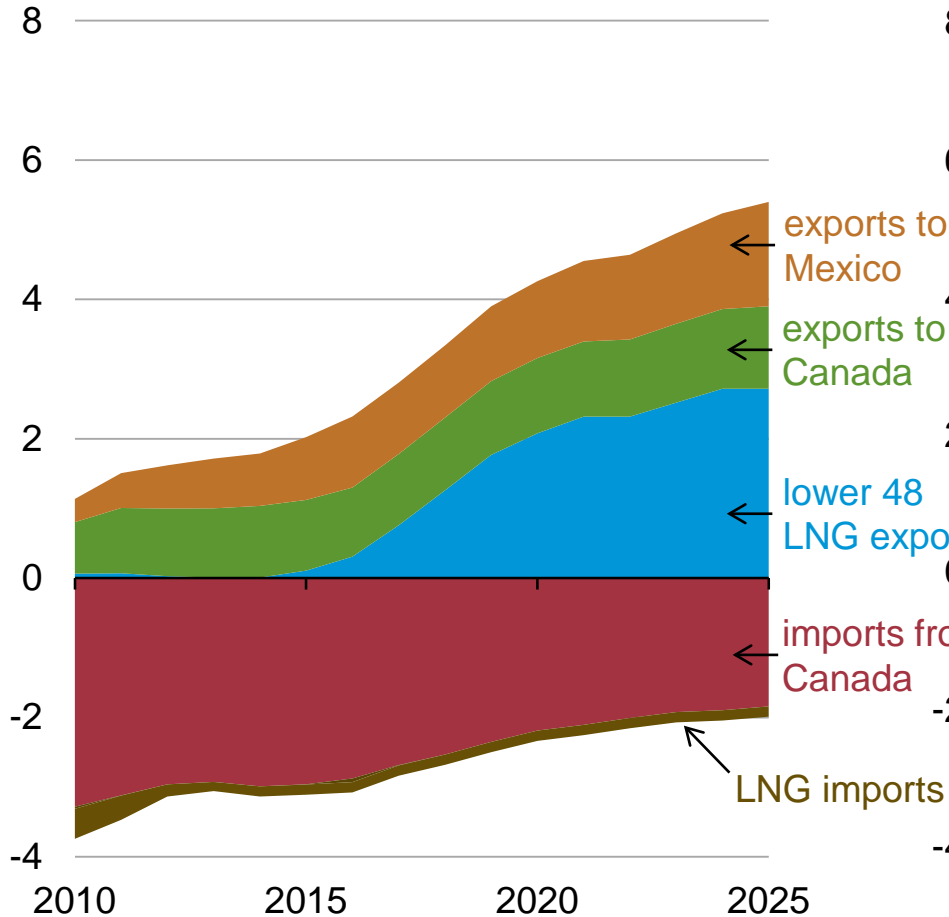
billion cubic feet per day



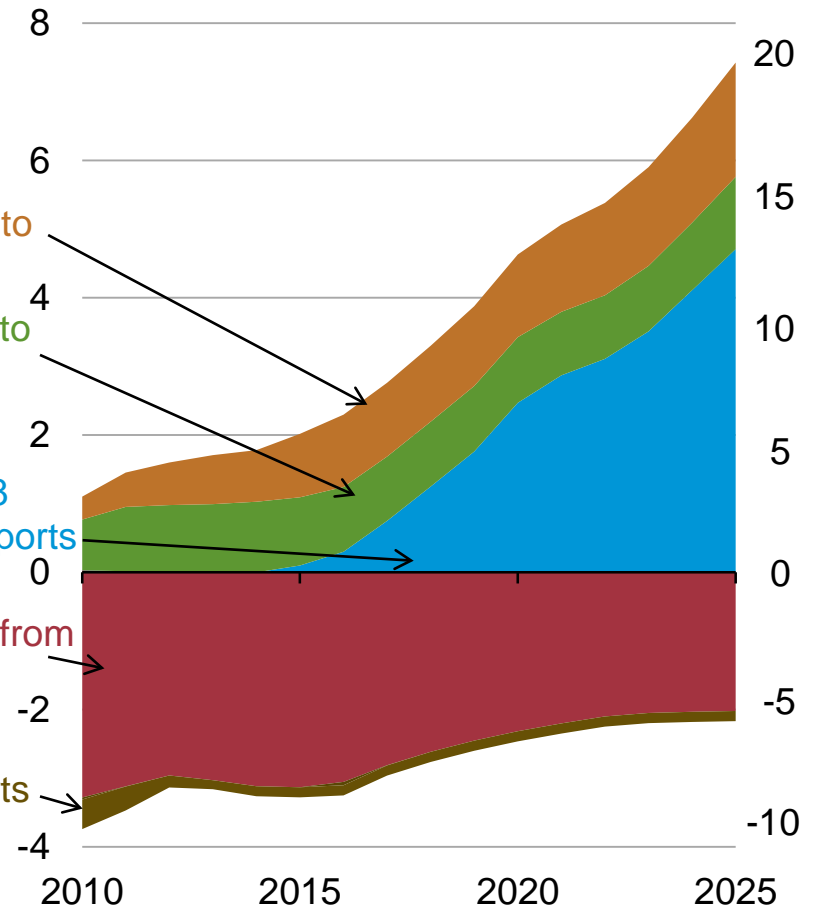
Source: EIA, Annual Energy Outlook 2014 Reference case

Projected U.S. natural gas trade depends on assumptions regarding resources and future technology advances

Reference case
trillion cubic feet per year



High Oil and Gas Resource case
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2014, Reference case and High Oil and Gas Resource case

Most liquefaction projects are in North America and will increase the region's total capacity 8-fold by 2019



Source: IHS EDIN

Note: Displays larger import/export facilities only

Liquefaction (bcf/d)

Country	Operating	Construction	Engineering
Peru	0.6		
Trinidad and Tobago	2.0		
Colombia		0.1	
United States		1.2	13.1
Brazil			0.4
Canada			3.3
Total	2.6	1.3	16.8

Regasification (bcf/d)

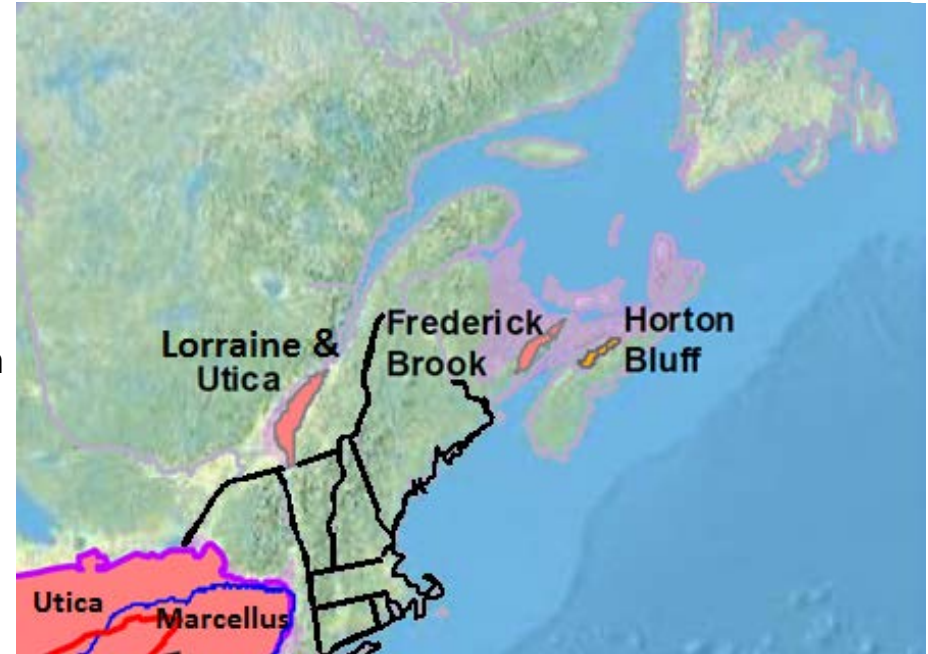
Country	Operating	Construction	Engineering
Argentina	0.9		
Brazil	1.2	0.8	
Canada	1.0		
Chile	0.6		
Dominican Republic	0.2		
Mexico	2.3		
Puerto Rico	0.4		
United States	10.2		
Total	16.8	0.8	0

Currently, the Panama Canal can accommodate only 9% of the world's LNG carrier fleet; after the expansion, it will be able to accommodate 88% of currently active carriers

- The Panama Canal and the Trans-Panama Pipeline are not currently used for significant volumes of petroleum trade and no LNG trade
- The Panama Canal expansion project will open the canal route to Aframax tankers and 80% of the current global LNG carrier fleet, resulting in increased regional petroleum and LNG trade
- By 2019, liquefaction capacity in the Americas is expected to increase eight-fold, with most of the projects in the United States
- EIA anticipates increased LNG trade between countries in the Americas, but traffic from the Americas to Asia (the largest LNG import market) through the Panama Canal will also increase

Shale gas in eastern Canada

- Of the four shale plays in Eastern Canada, two have been assessed by ARI
 - **Utica** in Quebec has 31.1 Tcf of technically recoverable resources
 - **Horton Bluff** in Nova Scotia has 3.4 Tcf of technically recoverable resources
- These shale resource volumes are not included in NEB's 2013 estimates
- Quebec enacted a hydraulic fracturing moratorium in 2012 pending further research
- New Brunswick permits hydraulic fracturing, but has imposed strict rules surrounding it
- Nova Scotia, similar to Quebec, will not permit hydraulic fracturing until the completion of a review, due mid-2014



Source: Advanced Resources International, "Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States"

LNG export projects in eastern Canada

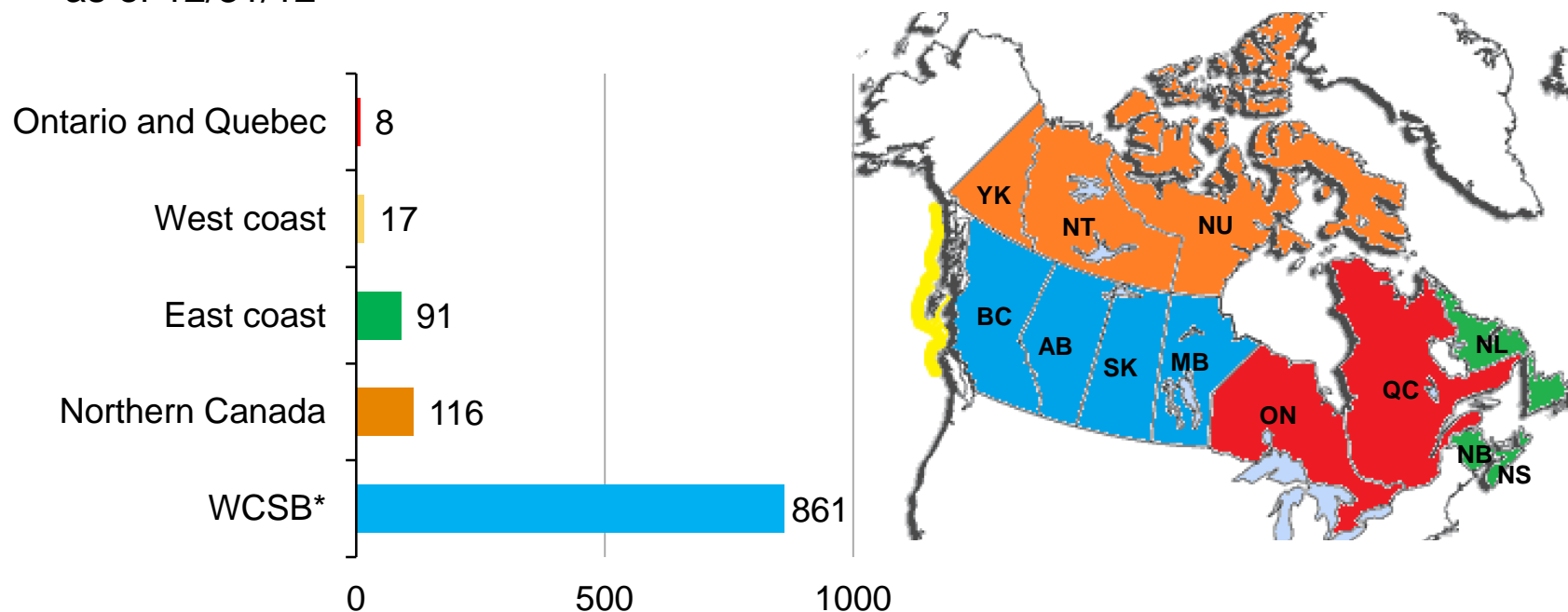
	Goldboro LNG Terminal	H-Energy LNG Terminal
Planned year in service	2019	2020
Liquefaction capacity	1.3 Bcf/d	0.6 Bcf/d
Storage capacity	14.6 Bcf	N/A
Contract	20 year supply deal with E. On AG	N/A
Supply sources	Marcellus, eastern Canada	N/A
NEB approval	Under review	N/A



Source: Company websites

Resources in eastern Canada are modest compared with the Canada national total

Canada marketable resources in trillion cubic feet as of 12/31/12



Note: WCSB stands for Western Canada Sedimentary Basin . All Territories are included under Northern Canada.
Source: National Energy Board, "Canada's Energy Future 2013"

Key Takeaways from Updated EIA Study of added LNG exports

Prices: Projected average natural gas prices at the producer level average 4% to 11% above the Reference case projection across export scenarios over 2015-40, while residential natural gas prices in the export scenarios average 2% to 5% above their base projection

Natural gas production: With the exception of one baseline/scenario pairing, higher natural gas production satisfies 60% to 80% of the increase in natural gas demand from LNG exports over 2015-40

Natural gas consumption: The electric power sector accounts for most of the decrease in delivered natural gas. The electric generation mix shifts towards other generation sources, including coal and renewables, with some decrease in total generation as electricity prices rise

CO₂ emissions: Higher coal use leads to higher carbon dioxide output

Expenditures: On average, from 2015 to 2040, natural gas bills paid by end-use consumers in the residential, commercial and industrial sectors combined increase 1% to 8% across pairings of export scenarios and baselines. Increases in electricity bills paid by end-use customers range from 0% to 3%

Economic gains: Changes in the level of GDP relative to baseline range from 0.05% to 0.17% and generally increase with the amount of added LNG exports required to fulfill an export scenario; EIA's NEMS model may understate the economic benefits

Areas of uncertainty in the outlook

- Oil and natural gas prices
- China's energy demand growth; particularly in transportation
- Increasing global trade of natural gas and hydrocarbon gas liquids in addition to oil
- Global development of tight oil and shale gas resources
- Policy decisions on crude oil exports and pipeline permits
- Impact of geopolitical tensions on energy supply
- Constraints on CO₂

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

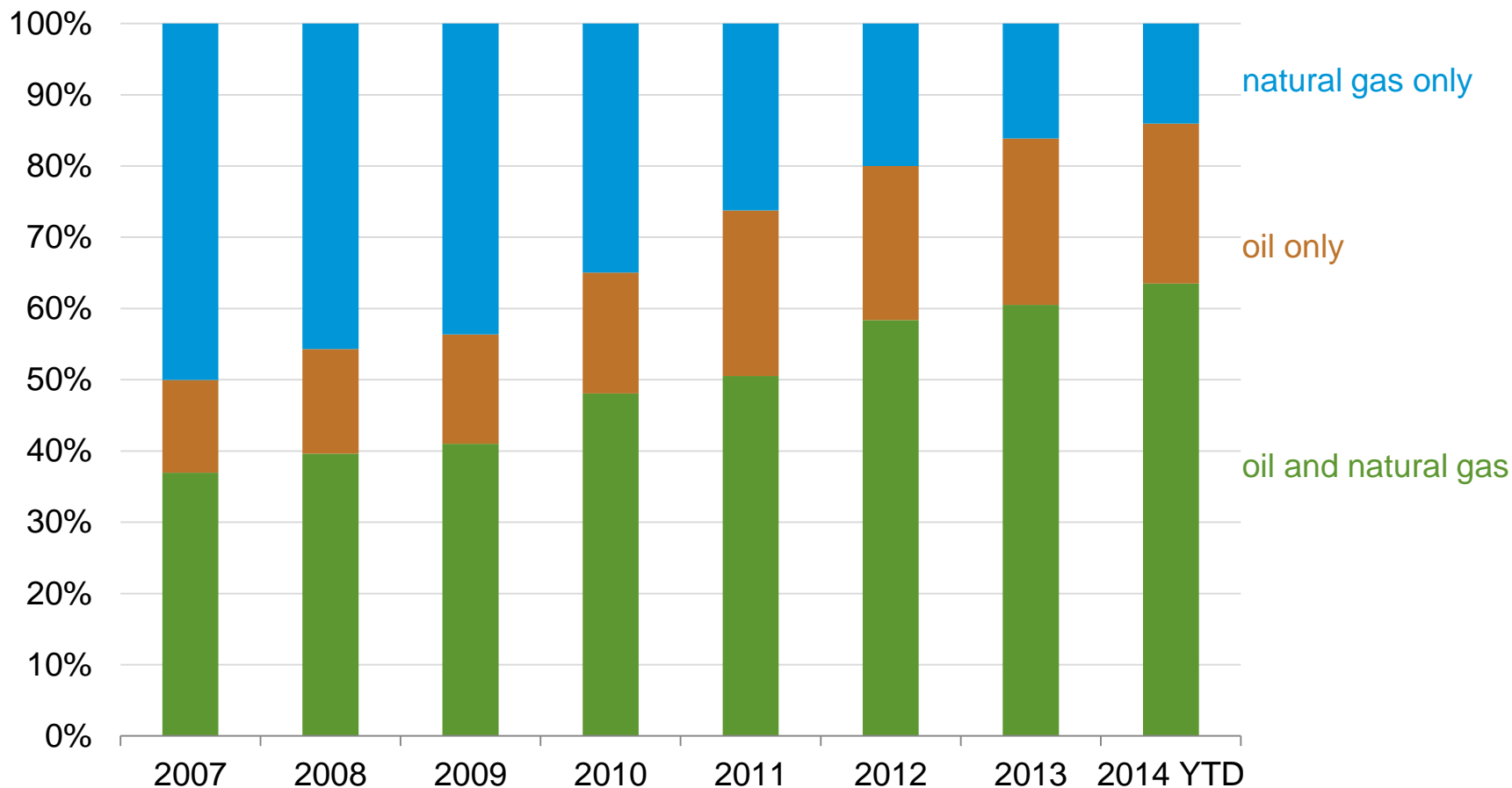
State Energy Portal | www.eia.gov/state

Drilling Productivity Report | www.eia.gov/petroleum/drilling/

Supplemental Slides

A larger share of new wells produce both oil and natural gas

Share of new wells by production type

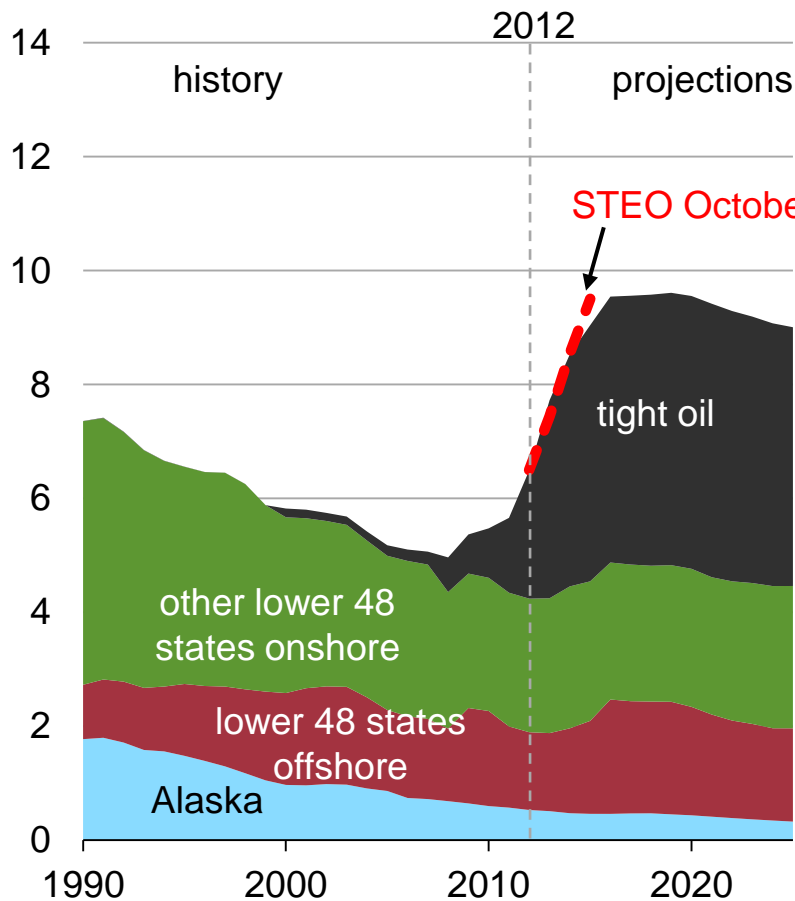


Note: 2014 figure represents averages from January to September 2014

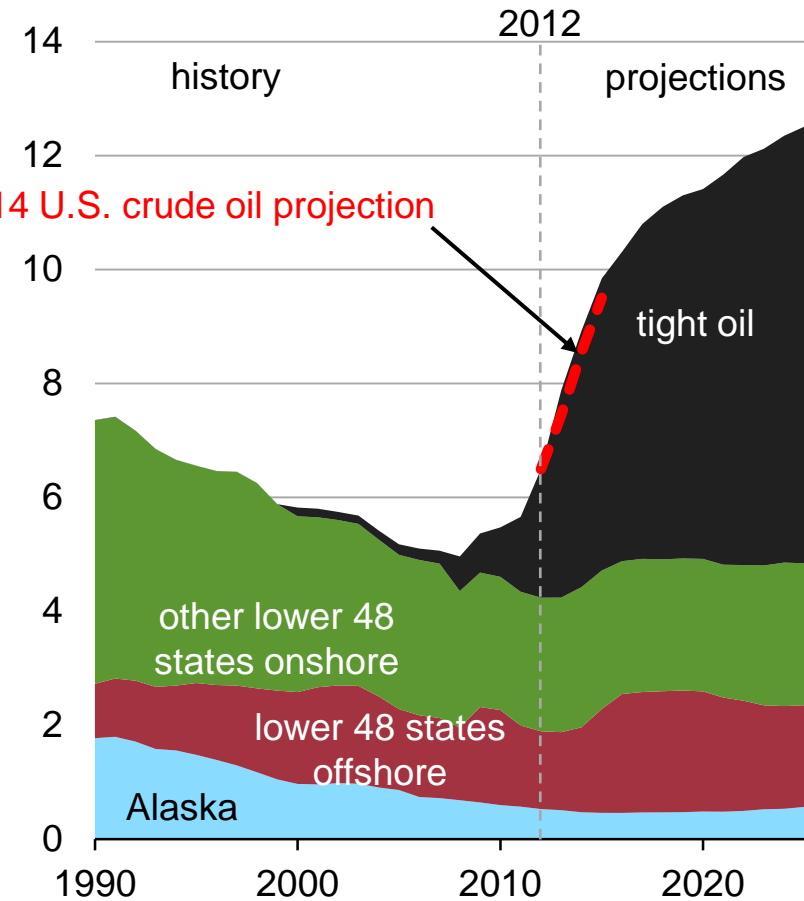
Source: EIA based on DrillingInfo

Resource and technology assumptions have major implications for projected U.S. crude oil production beyond the next few years

Reference case
million barrels per day



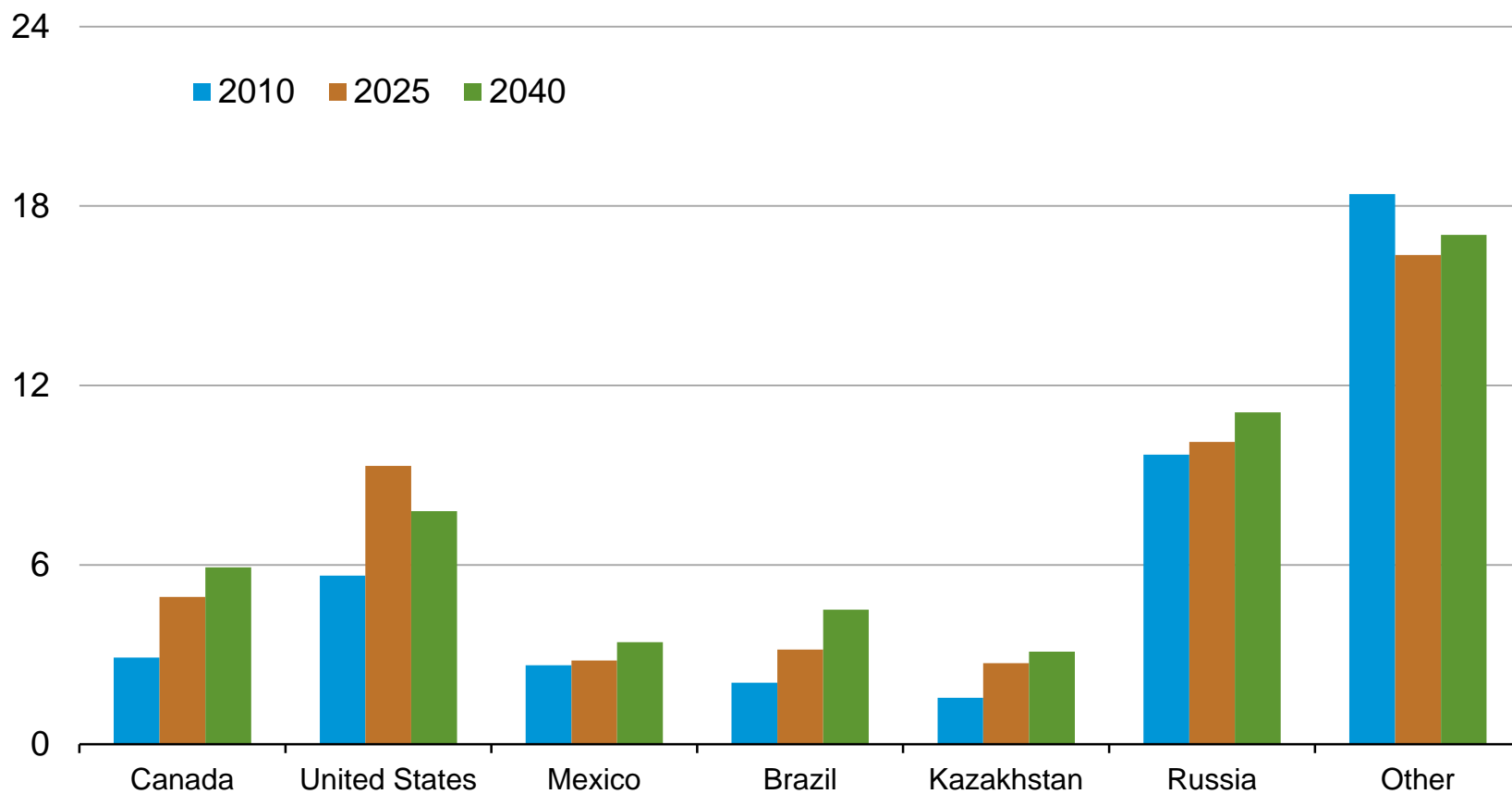
High Oil and Gas Resource case
million barrels per day



Source: EIA, Annual Energy Outlook 2014; Short Term Energy Outlook, October 2014

Most significant contributors to non-OPEC crude and lease condensate production: Canada, Brazil, U.S., Kazakhstan, Russia

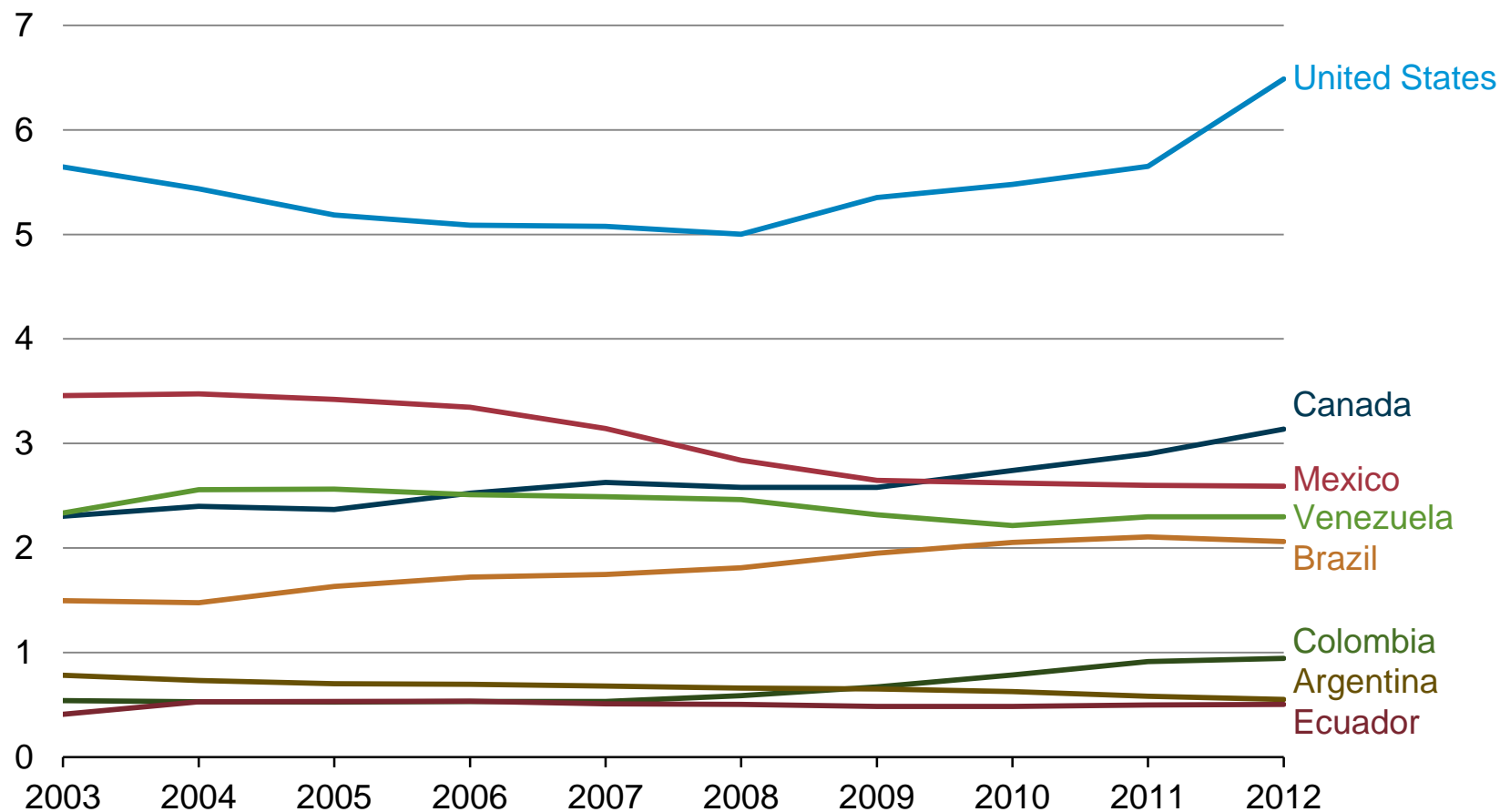
non-OPEC crude and lease condensate production, Reference case
million barrels per day



Source: EIA, International Energy Outlook 2014

In the Americas, recent gains in oil production are concentrated in countries with open investment structures

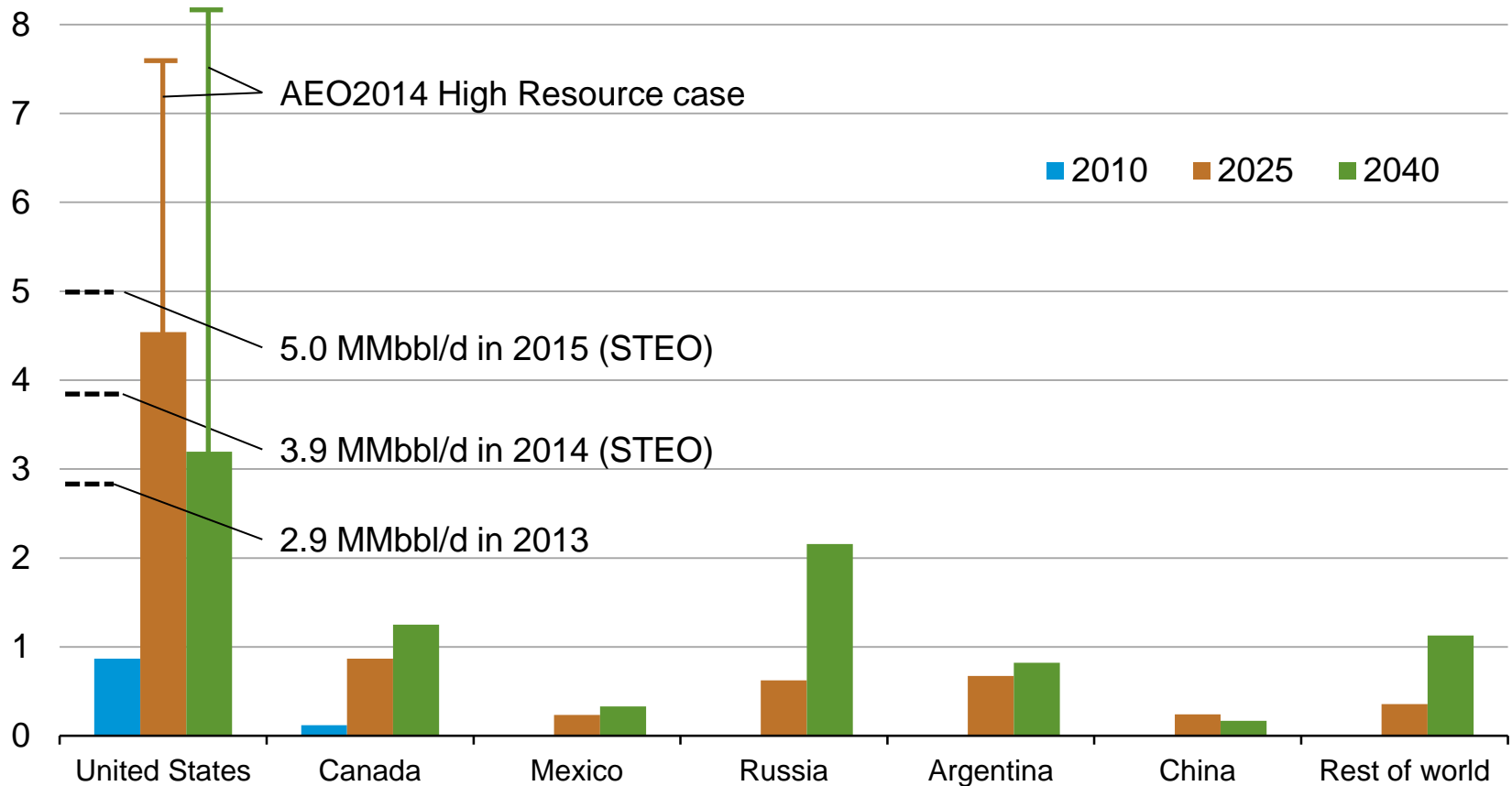
crude oil production by select Americas country
million barrels per day



Source: EIA, International Energy Statistics

Tight oil production will spread to nations outside of the United States and Canada over the projection

tight oil production, Reference case
million barrels per day



Source: EIA, International Energy Outlook 2014