

U.S. Oil and Natural Gas:

Providing Energy
Security and
Supporting
Our Quality of Life

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Key Takeaways



Oil and natural gas support our lives in countless ways.



Technology advancements – improving recovery and increasing production – have driven dramatic growth over the past 20 years.



The economic and security benefits of domestic energy supply growth are enormous.

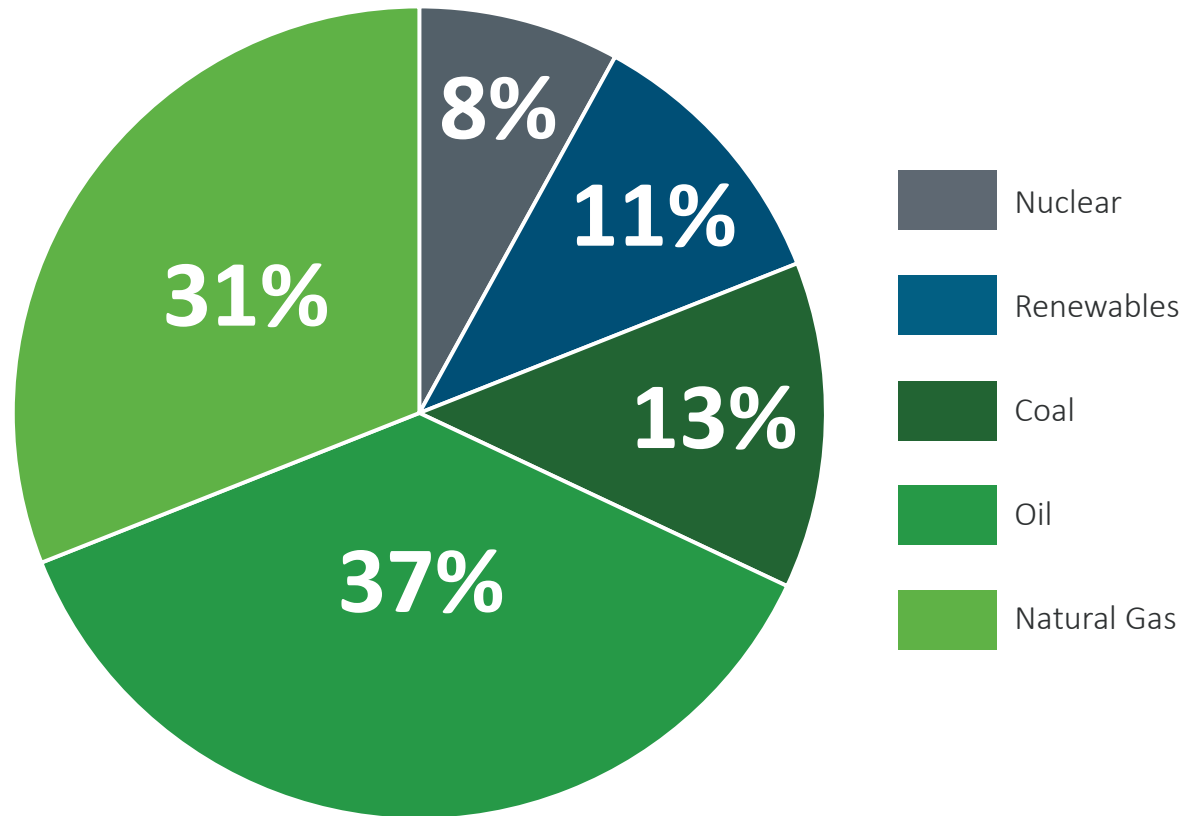


Innovation remains critical for the U.S. to maintain its leadership.

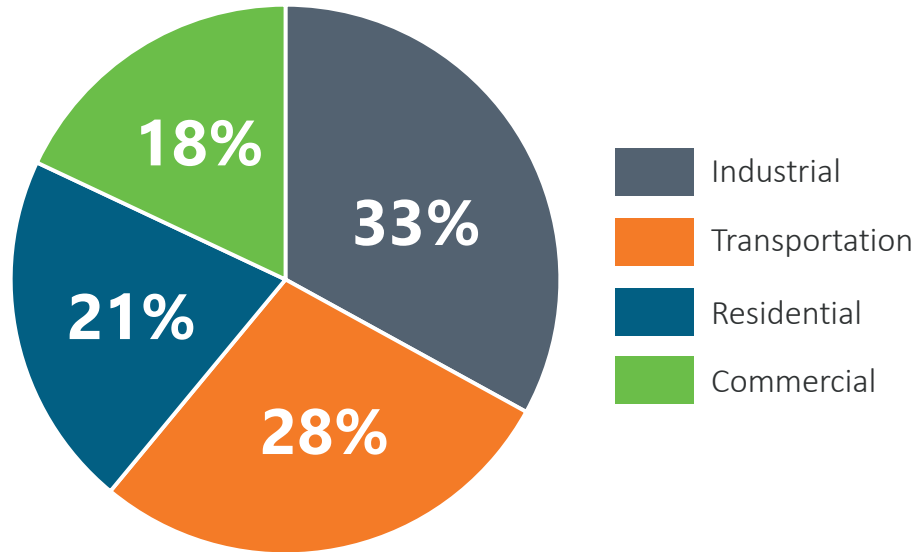
New DOE report on the benefits from an increased supply of domestic energy, the key advances that made it possible, and opportunities for the future.

Powers America's Economy

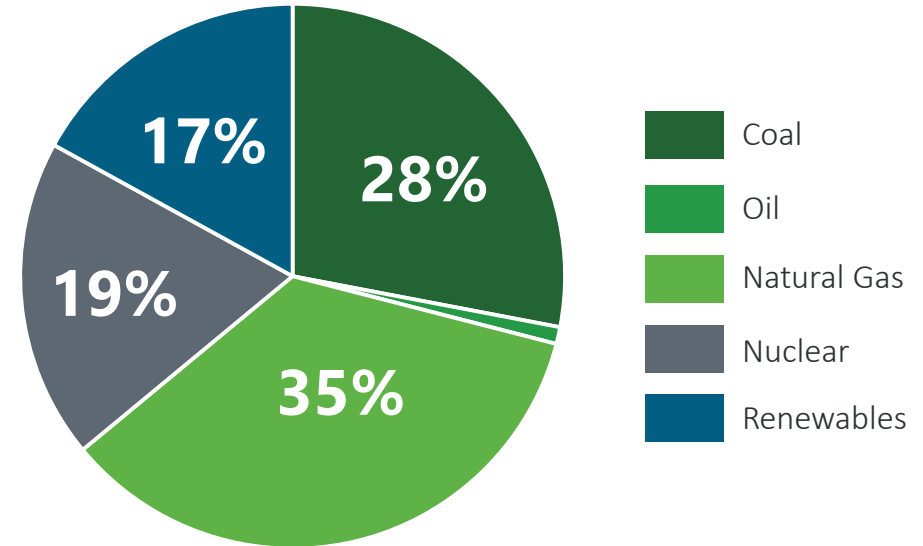
Nearly 70% of energy consumed in the U.S. comes from oil and natural gas products



Powers America's Economy



Four major economic sectors in the U.S. depend on energy from oil and natural gas relatively equally



More than a third of the nation's electricity is generated by burning natural gas

Powers America's Economy

Natural gas plays a critical role supporting increased use of wind and solar power



Flexible natural gas-fired power generation plants (left)
help ensure that wind power remains reliable (right)

Benefits Beyond Energy

Many common items are made of compounds derived from oil and natural gas



Benefits Beyond Energy

Oil and natural gas support industries and our lives in ways that are not always obvious



**Modern
Healthcare**



Agriculture



Automotive



**Home
Construction**



**Consumer
Products**

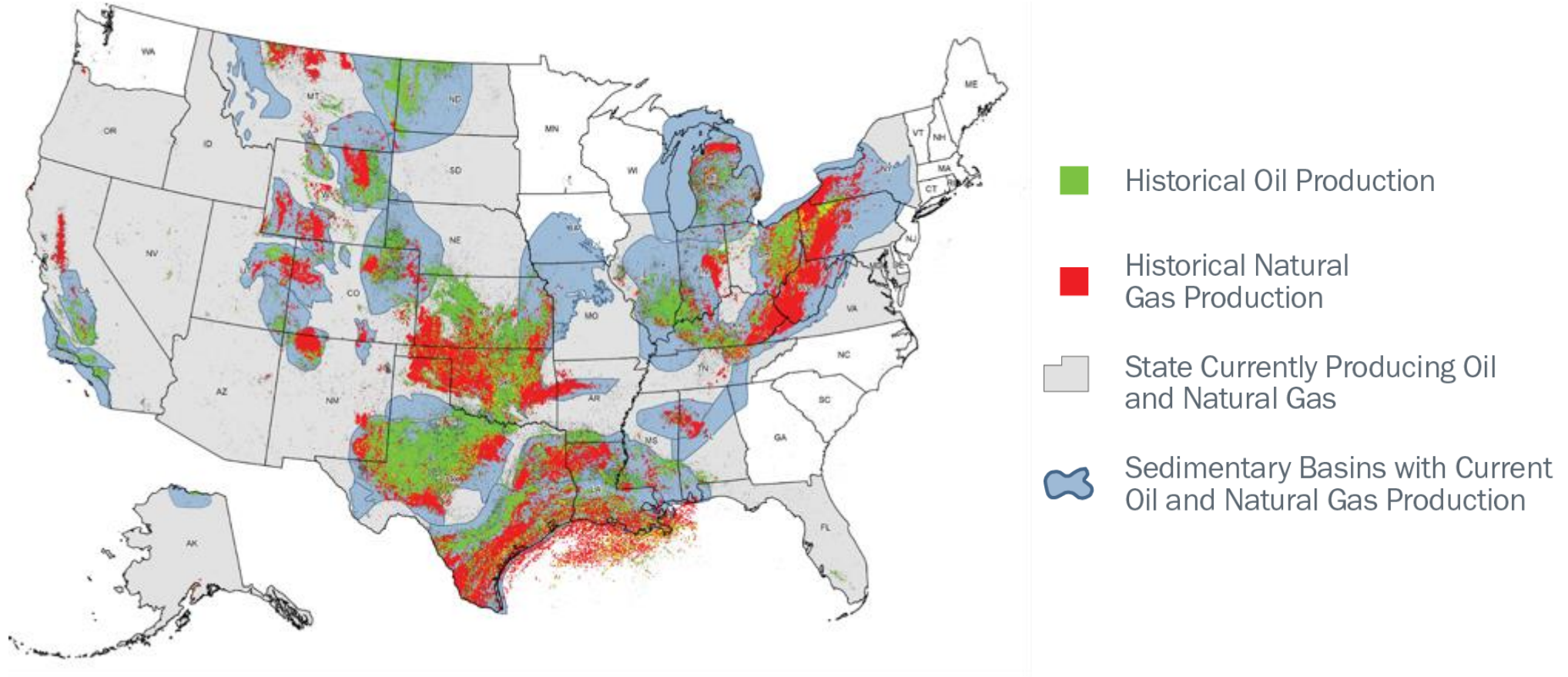


**Renewable
Energy**



Future Domestic Supply

Energy from the 34 states that produce oil and natural gas benefits all Americans



Technology Innovations

The U.S. has gone from fears of scarcity to a net exporter and world leader in oil and natural gas production



Shale oil and gas and new extraction methods foster development of unconventional resources



Artificial intelligence and machine learning for more efficient and cost-effective extraction and transportation



Floating platforms and subsea completions overcome the deepwater offshore barrier



Expanded use of CO₂-EOR and carbon dioxide storage in new geologic settings



Mitigating environmental impacts and improving safety of production operations

Case Study: The Barnett Shale Unlocked

Application of novel technology launched the “Shale Gas Revolution”

- Barnett Shale’s potential for gas production first recognized in 1990s
- Traditional technology led to uneconomic results
- Drilling wells to contact more of the shale and stimulate the reservoir volume was proposed and tested
- This technology combination led to rapid development of the Barnett during 2000s with peak production of 5.8 billion cubic feet per day in 2012
- Proven concepts were quickly exported to other deep, tight shale gas plays

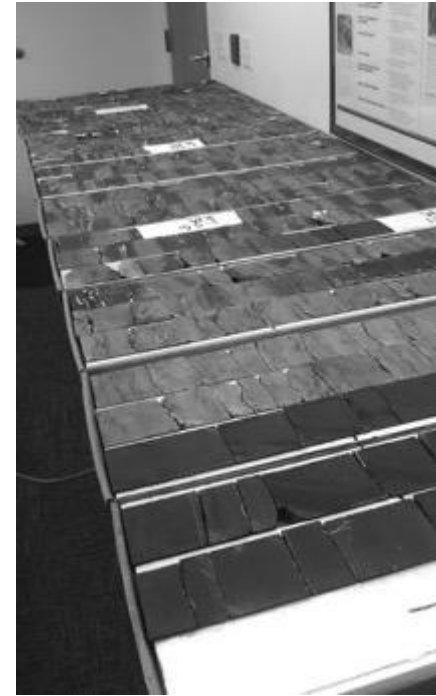


Above: The Mitchell Energy team in that made Barnett shale gas profitable. Image from “The History and Making of the Barnett Shale.”

Case Study: Shale Gas Technology Applied to Tight Oil

Scientific research combined with shale gas tech led to tight oil production growth

- Scientists believed the Bakken Shale of the Williston Basin contained large amounts of oil
- Prevailing view was the tight rock would not permit oil molecules to pass at economic rates
- Advanced diagnostics showed that flow was possible
- Application of horizontal drilling and multi-stage hydraulic fracturing developed for shale gas plays led to Bakken production growth in the 2000s
- Continuing advances in horizontal well drilling technology enabled economic development of tight oil plays elsewhere



Above: Slabbed Bakken Shale core

Case Study: Tension Leg Platform (TLP) Breaks Deepwater Barrier

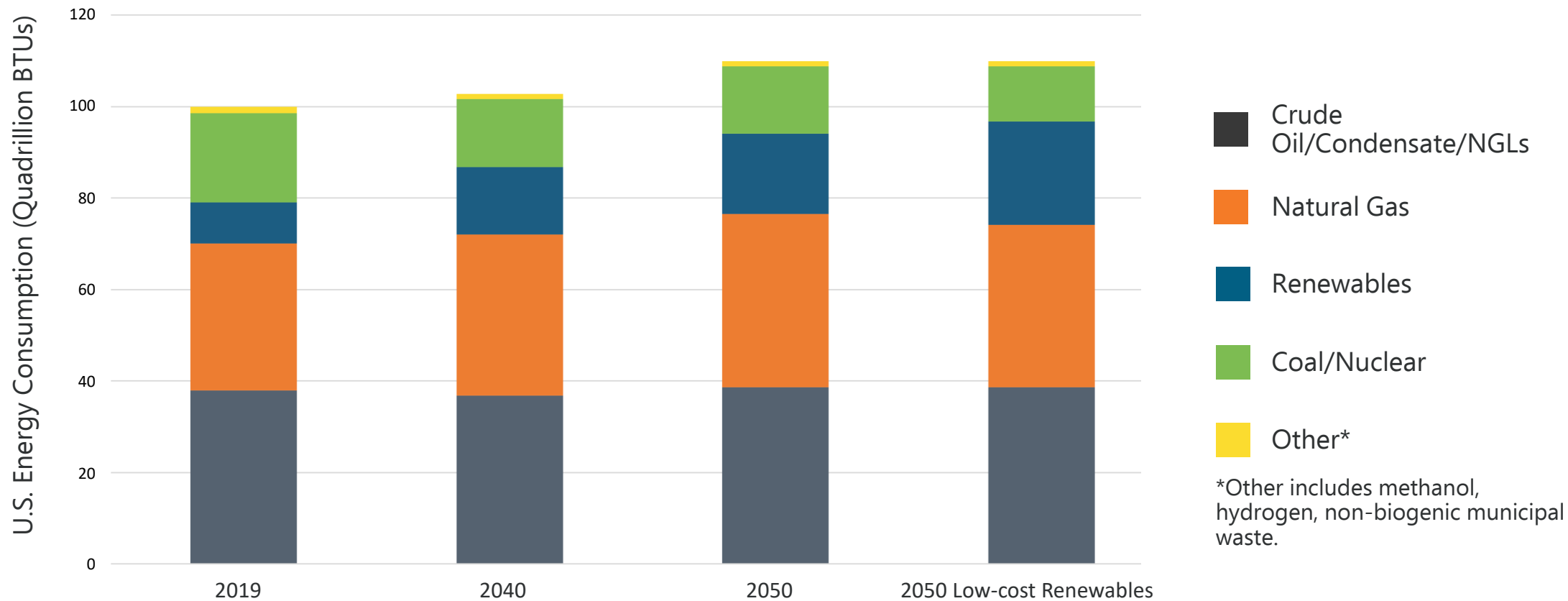
The TLP enabled development in water depths beyond fixed-to-seafloor platform limits

- Large volumes of oil and gas are known to exist in deeper water
- The water depth limit of fixed-platforms was reached in 1988
- Engineers conceived of a floating platform tethered to the seafloor with massive steel cables
- Shell's Auger platform installed in 2,860 feet of water in 1994 was the first in the Gulf of Mexico
- Today there are nine TLPs in the Gulf and entirely new ultra-deep water (7000 to 12,000 feet) structure designs are being developed



Future Opportunities

Oil and natural gas will remain key elements of our energy mix for decades



Future Opportunities

Technological innovation remains critical for our country to sustain the domestic energy supply that is so vital to our energy security and quality of life



Apply cost-effective novel drilling and completion approaches



Capture and utilize anthropogenic carbon dioxide for enhanced oil recovery



Lower onshore and offshore production costs through remote sensing, artificial intelligence and machine learning



Produce as-yet-undeveloped resources such as methane hydrates that could supply a lower-carbon energy source for generations

Domestic Production Benefits

Increased production of oil and natural gas benefits all Americans



- Energy security
- Consumer savings
- Revenues for state and local governments
- Well-paying jobs
- Net energy exporter
- Lower energy costs
- On demand power
- Revitalized U.S. manufacturing

Liquefied Natural Gas Exports

The strong growth of natural gas has led to a world-class domestic liquefied natural gas (LNG) export industry in the U.S.

Global Destinations of U.S. LNG Exports (2016-2019)

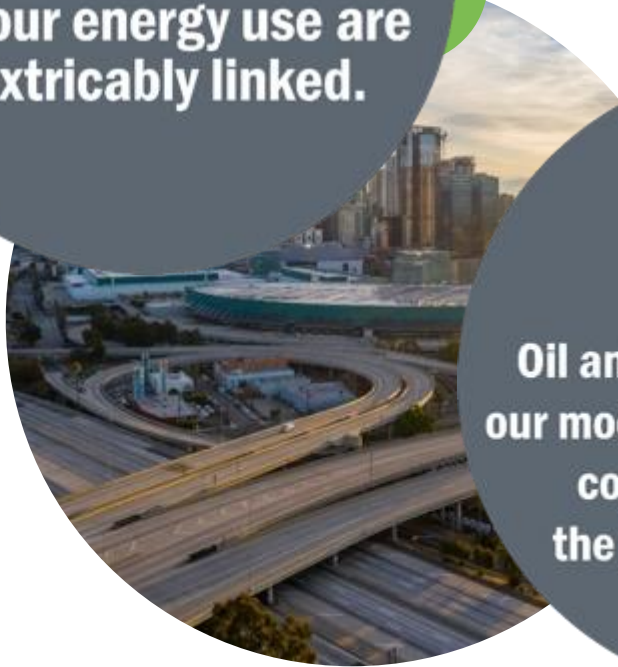


- LNG exports are expected to grow from 6 Bcfd at the end of 2019 to 12 Bcfd by the middle of this decade
- This would make the United States the largest global LNG exporter
- U.S. LNG exports expand the global availability of natural gas, driving down gas prices around the world and diversifying supplies
- U.S. LNG will also help to relieve energy and economic poverty around the world

Conclusions



**Our robust economy
and our energy use are
inextricably linked.**



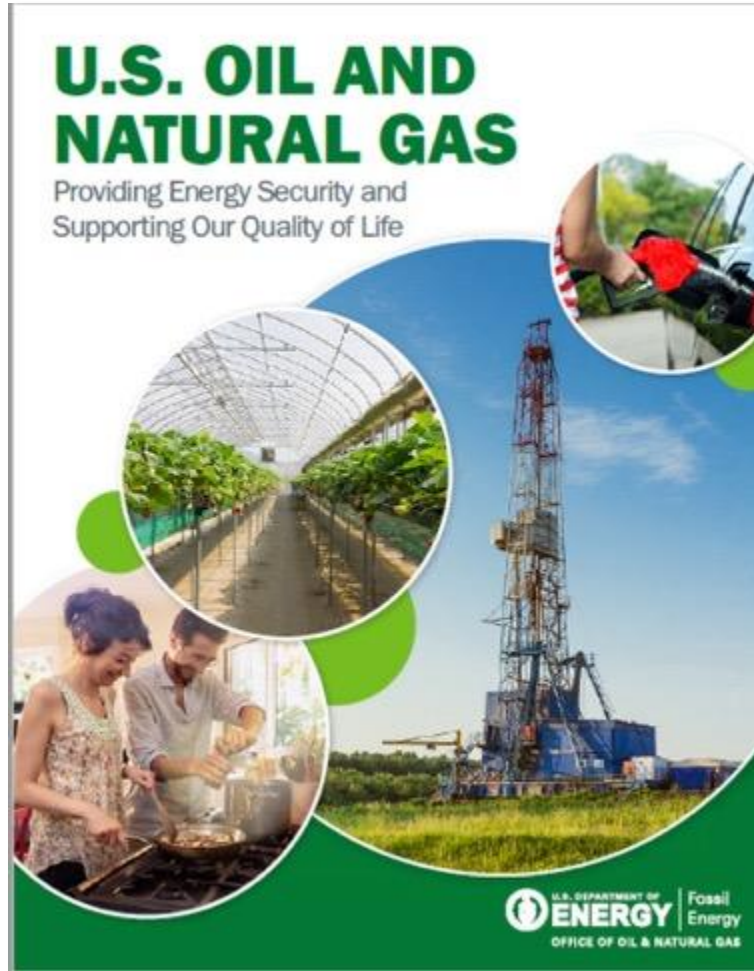
**Oil and natural gas sustain
our modern way of life and will
continue to do so for
the foreseeable future.**



**Continued production
of affordable supplies of
oil and natural gas is an essential
element of future progress
in our nation's economic
health and living standards.**



Questions?



- 70-page outreach document
- Graphically rich
- Designed for easy reading
- Illustrated glossary
- Companion 2-page summary