Title: Forecast of Today’s Energy Industry

Presented By: Barry Worthington, Executive Director, USEA
U.S. primary energy consumption by energy source, 2018

- Total = 101.3 quadrillion British thermal units (Btu)
- Total = 11.5 quadrillion Btu

- **Petroleum**: 36%
- **Natural gas**: 31%
- **Coal**: 13%
- **Nuclear electric power**: 8%
- **Renewable energy**: 11%
- **Geothermal**: 2%
- **Solar**: 8%
- **Wind**: 22%
- **Biomass waste**: 4%
- **Biofuels**: 20%
- **Wood**: 20%
- **Hydroelectric**: 23%

Note: Sum of components may not equal 100% because of independent rounding.
Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2019, preliminary data
Global Energy Consumption

Global primary energy consumption by energy source (2010-2050)
quadrillion British thermal units

- History
- Projections

- Renewables
- Petroleum and other liquids
- Natural gas
- Coal
- Nuclear

U.S. Net Energy Imports & Exports

Net energy imports (Reference case)
quadrillion British thermal units

- 1990 - 2050
- Net imports
- Net exports
- Petroleum and other liquids
- Electricity
- Coal and coke
- Natural gas
Global Coal Consumption

Trend over 1990 - 2018

- Europe
- CIS
- North America
- Latin America
- Asia
- Pacific
- Africa
- Middle-East

Mt


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Global Coal Trade

» Coal trade around the world »

» How much coal?
- 100 Mt
- 50 Mt
- 10 Mt

» Top coal exporters
- Indonesia
- Australia
- Former Soviet Union
- North America
- Central and South America
- Africa
- Other exporters
- North Korea

Trade flows are illustrative and do not necessarily represent the locations of the ports and trade routes.

Mt = megatonnes of coal
Global Renewable Growth

Renewable electricity generation, including end-use (Reference case)
billion kilowatthours

2018

history projections

2010 2020 2030 2040 2050

solar PV

48%

wind

25%

geothermal

4%

hydroelectric

18%

other

5%

48%

37%

9%

39%

2%

13%

9%
Low Oil Price Environment

U.S. gasoline and crude oil prices

- Monthly retail regular gasoline
- Annual average gasoline
- Monthly Brent crude oil
- Annual average Brent

forecast

dollars per gallon

2017 2018 2019 2020 2021
U.S. Natural Gas (LNG) Exports

Natural gas trade (Reference case)
trillion cubic feet

2000 2010 2020 2030 2040 2050

2018

history projections

billion cubic feet per day

Liquefied Natural Gas exports

Pipeline exports to:
- Mexico
- Canada

Pipeline imports from:
- Canada

LNG imports
U.S. LNG Export Terminals

U.S. natural gas feedstock to LNG export facilities (Jan 2016–July 2019)
billion cubic feet per day

- Elba Island, Georgia (coming online in Q3 2019)
- Freeport, Texas
- Cameron, Louisiana
- Corpus Christi, Texas
- Cove Point, Maryland
- Sabine Pass, Louisiana

Source: U.S. Energy Information Administration, based on data from OPIS PointLogic Energy
Pending U.S. LNG Export Terminals

North American LNG Export Terminals
Proposed

UNITED STATES

PROPOSED TO FERC
Pending Applications:
4. Nikiski, AK: 2.63 Bcfd (Alaska Gasline) (CP17-178)
5. Coos Bay, OR: 1.08 Bcfd (Jordan Cove) (CP17-494)
7. Sabine Pass, LA: NA Bcfd (Sabine Pass Liquefaction) (CP19-11)
8. Cameron Parish, LA: 1.18 Bcfd (Commonwealth, LNG) (CP19-502)

Projects in Pre-filing:
A. LaFourche Parish, LA: 0.65 Bcfd (Port Fourchon LNG) (PF17-9)
B. Galveston Bay, TX: 1.2 Bcfd (Galveston Bay LNG) (PF18-7)
C. Plaquemines Parish, LA: 0.9 Bcfd (Pointe LNG) (PF19-8)
D. Plaquemines Parish, LA: 2.76 Bcfd (Delta LNG - Venture Global) (PF19-4)
E. Port Arthur, TX: 1.86 Bcfd Port Arthur LNG Trains 3 & 4 – Sempco (PF19-5)

CANADA
For Canadian LNG Import and Proposed Export Facilities:

https://www.nrcan.gc.ca/energy/natural-gas/5683

As of January 24, 2020
IMO Sulphur Regulations for Fuel

Five beneficial changes from IMO’s Sulphur Limit for ships’ fuel oil

- Cleaner air
  77% drop in overall sulphur oxide (SOx) emissions from ships – annual reduction of approximately 8.5 million metric tonnes of SOx

- Positive impacts on human health
  Premature deaths, cardiovascular, respiratory and pulmonary diseases will all be reduced

- Higher quality fuels
  The majority of ships will switch to higher quality, low sulphur fuel oil to meet the limit.

- Ship operators, owners + refineries have adapted
  Guidance issued by IMO and other stakeholders to enhance preparedness ahead of the entry into force of Sulphur 2020

- Changes for enforcement authorities
  Flag and port State control will be making sure ships are compliant.

Sulphur 2020
“For shipping companies, the three most viable options to reduce their sulphur exhaust to 0.5% are: switching to ultra-low sulphur fuel oil (ULSFO); fitting an exhaust scrubber (a device that washes the exhaust gasses) or a switch to Liquid Natural Gas (LNG).” – Hellenic Shipping News

"If you are conservative and say that ships are spending about $3m (£2.4m) per ship to install scrubbers, at 4,000 ships that's $12bn (£9.7bn) dollars of investment in a technology that enables ships to use the world’s dirtiest fossil fuel – heavy fuel oil.” – Business Insider
Gaze Into The Future

- Offshore Wind
- Robust Trade
- Oil and Natural Gas Storage
- Carbon Dioxide Imports
- Carbon Dioxide Offshore Storage
- Methane Hydrates
- Electrification of other transportation modes
- Increased global trade with new trade agreements
- Watch for more Anti-Fracking pressures
- Threat to continued pipeline construction, and all pipelines.
Concluding Remarks

- Imports Shrink
- Exports Expand
- Chaos Reigns
- Change has never been more rapid
- Shipping will attract attention of climate change concerns
- All energy transportation to be under attack