History of Oil and Natural Gas in Arkansas
Teacher Handout
Presentation Script

Frame 1: Introduction--Oil & Gas in Arkansas: A State of Energy

Frame 2: Millions of dollars of oil and gas are produced in Arkansas each and every day…so Arkansas really is an energy state.

Frame 3: The earliest natural gas find is reported to have been in Scott County near Fort Smith in 1887 during an effort to develop a commercial water well. The second recorded gas find was in 1889 (also in Scott County) by an oil driller. While no oil was found, this effort did provide large amounts of gas, with some wells producing as much as 5 million cubic feet of gas per day. Commercial development did not begin until 1902 when two gas wells were completed near Mansfield in Sebastian County by Choctaw Oil and Gas Company.

Gas was first discovered in southern Arkansas in April of 1920, when the Constantin Oil Company completed a gas well near El Dorado in Union County.)

The first Arkansas well that yielded "sufficient quantities of oil" was the Hunter No. 1 in April of 1920, in Ouachita County. But it was January 1921 when the Busey-Armstrong No. 1 well struck oil in the same field that marked the true beginning of commercial oil production in Arkansas.

Today Arkansas ranks as the 10th leading natural gas producing state and 20th among oil producing states.

There are currently 25 counties in Arkansas with oil or gas activity

Frame 4: You can see here the areas in the state that have oil and natural gas production. The northern counties are predominately gas producers and the southern counties produce oil.

(Ask the students to locate their county on the map to see if it is a producing county. Ask them to discuss possible ways the exploration, extraction and transportation of the petroleum product have impacted the economic and social conditions in these counties.)

Frame 5: As we discovered earlier, the first Arkansas Oil Well was the Hunter No. 1 in Ouachita County, but the first commercial well was in El Dorado Field in 1921.

With the discovery of oil, El Dorado grew from a city of 4,000 to 25,000 quickly with 22 trains a day running in and out of the city

The first well in El Dorado – the Busey No. 1 produced 15,000,000 to 35,000,000 cubic feet of natural gas and from 3,000-10,000 barrels of oil and water per day

1922 the Smackover Oil Field was discovered and started producing on July 1,

1922 and within 6 months, 1,000 wells were drilled.

By 1925, the Smackover field, covering more than 25,000 acres had become the largest oil producing site in the world. By 2016 the Smackover field had produced 606,627,681 barrels of oil.

The Magnolia field was discovered in 1938, and by 2016 had produced 173,099,821 barrels.

There are still an estimated 51 million barrels of oil still to be drilled in Arkansas

Frame 6: We noted previously that natural gas was first discovered in Arkansas in 1887 in Fort Smith, but its first commercial use began in 1902

The formation in Western Arkansas producing natural gas is part of the Arkoma Basin and wells are conventional--that is they are drilled straight down into sandstone formations that easily releases gas.

In 2005 drilling began in what is known as the Fayetteville Shale gas play. Unconventional wells, those in tighter formations of shale, were drilled using a combination of horizontal drilling and hydraulic fracturing to break up this hard, dense shale so that it would release the gas. This process became known to the public as "**fracking**. "

Between the Arkoma Basin, the Fayetteville Shale and the gas still being produced in southern Arkansas, the state produces 1 billion cubic feet of natural gas EVERY DAY
In 2013, production from the Fayetteville and Arkoma hit close to 1,200,000,000 MCF* for the year

(****MCF** is an abbreviation derived from the Roman numeral M for one thousand, put together with cubic feet (CF) to measure a quantity of natural gas. For example, a natural gas well that produces 400 **MCF** of gas per day operates with a daily production rate of 400,000 cubic feet.)*

When natural gas is retrieved, it can be considered wet or dry. Dry natural gas is at least 85% methane, but often more. Wet natural gas contains some methane, but also contains liquids such as ethane, propane or butane. The more methane natural gas contains, the dryer it is.

North Arkansas fields produce dry gas—while south Arkansas fields produce wet gas – gas with heavier fluid hydrocarbons

Frame 7: If you traveled around Arkansas where oil and gas deposits are being extracted you would see these two pieces of equipment. Workers in the industry have given these names that seem to fit their appearance. On the left is the pump jack. The upper mechanism is called a horsehead. Can you see how that name came to be? On the right is the pumping unit which is used when a natural gas well is completed and is what remains after the drilling equipment is removed. It is referred to as the Christmas tree.

Frame 8: Once oil is extracted, it must be moved to locations where it is processed. This involves a massive network that requires various transportation and storage technologies.

Oil is often produced in remote locations away from where it will be consumed; therefore, these transportation networks have been built to transport the crude oil to refineries where it is processed and to ship the refined products to where they will be consumed (like a gas station). Storage facilities are used to balance supply and demand of oil and refined products.

Oil is normally transported by one of four options:

The most commonly used form of oil transportation is oil **pipelines**. You see here the network of pipelines that crisscross the nation. Pipelines are typically used to move crude oil from the wellhead to gathering and processing facilities and from there to refineries and tanker loading facilities. Pipelines require significantly less energy to operate than trucks or rail and have a lower carbon footprint.

Oil shipment by **rail** has become a growing phenomenon as new oil reserves are identified across the globe. The relatively small capital costs and construction period make rail transport an ideal alternative to pipelines for long distance shipping. However speed, carbon emissions and accidents are some significant drawbacks to rail transport.

Trucks are the most limited oil transportation method in terms of storage capacity. However, trucks have the greatest flexibility in potential destinations. They are often the last step in the transport process, delivering oil and refined petroleum products to their intended storage destinations.

Where oil transport over land is not suitable, oil can be transported by **ship**. Compared to a pipeline, barges are cheaper by 20-35%, depending on the route. Tank barges traditionally carry petrochemicals and natural gas raw materials to chemical plants. The drawbacks are typically speed and environmental concerns.

Frame 9: Like oil, natural gas must be transported to different places to be processed, stored, and then finally delivered to the end consumer. Natural gas can be transported **on land via pipeline** or **on water via ship**.

Most of the world's natural gas is delivered by pipeline. Here you see the wide-ranging system in the United States. These huge networks of pipelines quickly deliver natural gas on land to major processing facilities and end consumers. The network includes three types of pipelines along the transportation route:

Gathering pipeline system includes low pressure small pipelines that transport raw natural gas from the wellhead to the processing plant.

Pipelines can be classified as **intrastate or interstate**. On the map the interstate system is shown in blue and the intrastate in red. ***(Here, ask students to define interstate and intrastate. Interstate is carried on between states; intrastate is within a state's boundaries)***. Their technical and operational characteristics are similar, and they both have the same goal: to transport natural gas from the processing plant to the centers of its consumption.

The **distribution pipeline system** has the purpose of delivering gas to the end-consumers.

Natural gas must be highly pressurized to move it along the pipeline. To ensure that the natural gas remains pressurized, compressor stations are placed in intervals along the pipeline. The natural gas enters the compressor station, where it is compressed by turbine, motor, or engine. Metering stations are also installed throughout the pipeline network to monitor for pressure, flow and leaks.

Where natural gas cannot be delivered on land, it can be liquefied and delivered by **ship**. Compared to gas pipelines, liquefied natural gas (LNG) shipping is preferred for international transport because, in a liquid form, natural gas takes up less volume, making it easier for shipment and storage. LNG infrastructure includes a gas pipeline leading to the seaside, gas liquefaction plant, storage facilities and an LNG terminal for shipment. After being liquified and transported to the area of demand, LNG is returned to gas form at regasification plants at the terminal. https://www.studentenergy.org/topics/natural-gas-transport

Frame 10: **Brine** is another name for salt water and is found throughout the world in varying concentrations in oceans, briny lakes, and inland seas, in salt beds and within subsurface geological formations.

When oil was discovered in south Arkansas in 1921, oil field brines were considered a worthless byproduct of drilling, and the oil producers had problems disposing of the salt water. Then, chemists from the Arkansas Geological Commission (now the Arkansas Geological Survey) discovered that the Smackover brines had high bromine content—seventy times greater than that of ocean water.

Bromine (chemical symbol Br) is a highly corrosive, reddish-brown, volatile element found in liquid form. Although there are many uses for bromine, nearly one-half of the bromine consumed annually is used in flame retardants. Other uses of bromine include insect and fungus sprays, anti-knock compounds for leaded gasoline, disinfectants, photographic preparations and chemicals, solvents, water-treatment compounds, dyes, insulating foam, hair-care products, and oil well–drilling fluids

Bromine production followed oil production in Union County in 1957 and has continued to be an important Arkansas resource. Since 2007, all US bromine production has been in south Arkansas, making the US the second largest producer in the world after Israel

Bromine production in Union and Columbia counties contributes significantly to bromine producers in south Arkansas, the Abermarle Corporation and Chemtura, through its subsidiary, Great Lakes Solutions. Together these companies produce almost 300,000 BBLS (barrels) annually

Resources:
https://encyclopediaofarkansas.net/entries/natural-gas-4251/
https://www.geology.arkansas.gov/energy/natural-gas-in-arkansas.html
https://encyclopediaofarkansas.net/entries/oil-industry-383/
http://geo.msu.edu/extra/geogmich/brine.html
https://encyclopediaofarkansas.net/entries/bromine-4514/
https://aoghs.org/petroleum-pioneers/arkansas-oil-and-gas-boom-towns/