

Follow the Molecule

The Gulf Natural Gas System · Grades 11–12 / First-Year College

Name _____ Date _____ Class _____

How to use this sheet. A companion to *Follow the Barrel*. Keep the interactive Gulf map open on the **natural gas** lens and use it to answer. The big question underneath every part: a gas molecule does not behave like a barrel of oil — watch how.

The map	Open the Gulf Fuel Flow Map full-screen and switch to the natural gas lens. It shows where gas comes from, the hub it flows through, and everyone who wants it.
Year slider	FY2000 → FY2026. Drag it to watch supply, pipelines, and the LNG docks appear and change through time.
Henry Hub	The Louisiana pricing/routing hub the gas flows through — the switchboard for the whole system. Its price is quoted in \$/MMBtu.
Hover cards	Hover any supply basin, the Waha card, a demand node, or an LNG dock to read the detail behind it.
Scenario	The Uri '21 button re-runs the Feb 2021 freeze — use it in Part 6.

Part 1 · Orient — where the gas comes from

Natural gas lens on, year at FY2024. Map the supply side and find the hub before anything moves.

1.1 Name the gas supply basins the map shows feeding the Gulf. Which one is labeled *associated*, and what does ‘associated gas’ mean?

1.2 Find **Henry Hub**. It is not a source or a customer — what job does it do in the system?

1.3 Scrub the slider FY2000 → FY2024 and watch the **offshore** gas node. What is happening to it over time, and what does that tell you about where US gas now comes from?

Part 2 · Big idea #1 — the gas that ignores its own price

The first way a molecule is not a barrel: some gas is produced whether anyone wants it or not. Hover the Permian gas node and open the Waha card.

2.1 Permian gas ‘comes up with the oil.’ If a driller is chasing oil, does the amount of associated gas they produce respond to the gas price? What problem does that create?

2.2 Open the **Waha** card. Permian gas prices at Waha went NEGATIVE from 2019 through much of 2024. Explain how a commodity’s price can fall below zero — and why producers flared (burned off) gas.

2.3 Compare Waha to Henry Hub — the same molecule is worth far less in the Permian than on the Gulf coast. In one sentence, why? (This gap is called the *basis*.)

Part 3 · Big idea #2 — who competes for the molecule?

The second way a molecule is not a barrel: a barrel basically goes to a refinery, but a gas molecule is competed for by many buyers at once. From Henry Hub, trace the demand side.

3.1 In a hard cold snap, homes (heating) and power plants (electricity) both demand gas at the same moment. Who typically gets priority, and why does that set up a risk for the power grid?

3.2 A molecule at Henry Hub can be burned locally OR liquefied and shipped overseas as LNG. How does having the LNG export option change the price a Texas power plant pays for gas?

Part 4 · Big idea #3 — gas as a thing, not a fire

The third way a molecule is not a barrel: much Gulf gas is never burned at all — it becomes a physical product. Hover the petrochem corridor and the Louisiana industry node.

4.1 The LA petrochemical corridor (ethylene crackers) and the Donaldsonville ammonia plants don't mainly *burn* their gas — they use it as raw material. Name two everyday products that begin as a Gulf gas molecule.

4.2 Why does this feedstock industry cluster on the Gulf coast specifically, rather than near the cities that buy the plastic and fertilizer?

4.3 Coupling to the barrel. The refineries also consume gas — for what two jobs, and roughly how much per barrel? (You met this on *Follow the Barrel*; state it in one line.)

Part 5 · Time travel — the great reversal

The gas twin of the barrel's export-ban story. Scrub FY2000 → FY2026 and watch the LNG docks on the coast.

5.1 Before about 2016, what were the Gulf's LNG terminals built to do? What are they doing after? Name the first export terminal the map shows.

5.2 What made the reversal possible? (Connect it to the shale story from *Follow the Barrel* in one sentence.)

5.3 Corpus Christi LNG is labeled 'Permian-fed.' Connect the dots: the same associated gas that was being *flared* at Waha (Part 2) now feeds an export dock. What changed to make that possible?

Part 6 · The freeze — Uri and 'it started here'

*Press the **Uri '21** scenario and watch the Permian gas node.*

6.1 The map points at the Permian gas node and says 'the grid failure started HERE.' What physically happened to the gas system in the Feb 2021 freeze?

6.2 The public story blamed 'frozen wind turbines.' Using the map, whose failure was the larger cause of the blackout?

6.3 Why is a gas system in a place that rarely freezes especially vulnerable to a cold snap like this?

Part 7 · Step back — the molecule behind modern life

You've followed this molecule to power plants, ships, and the petrochemical corridor. Before you judge the system, reason about what the molecule quietly holds up.

7.1 Connect two facts you may half-know: synthetic nitrogen fertilizer grows a large share of the world's food, and its hydrogen comes from natural gas; and the carbon skeleton of most plastics also starts as a gas or oil molecule. Reason it out — if the gas feeding the Louisiana ammonia and cracker plants stopped, name two everyday consequences most people would never trace back to a gas molecule, and say what that tells you about why this molecule matters beyond being a fuel.

Part 8 · Synthesize — defend a claim

Use evidence from at least two earlier parts. The argument is graded, not the side.

8.1 The Gulf turned a byproduct it once *flared* into a global export commodity. **Is the Gulf's pivot to LNG exports a net good or a net risk for the United States?** Weigh consumers and energy security, and defend your position with specific evidence from the map.

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