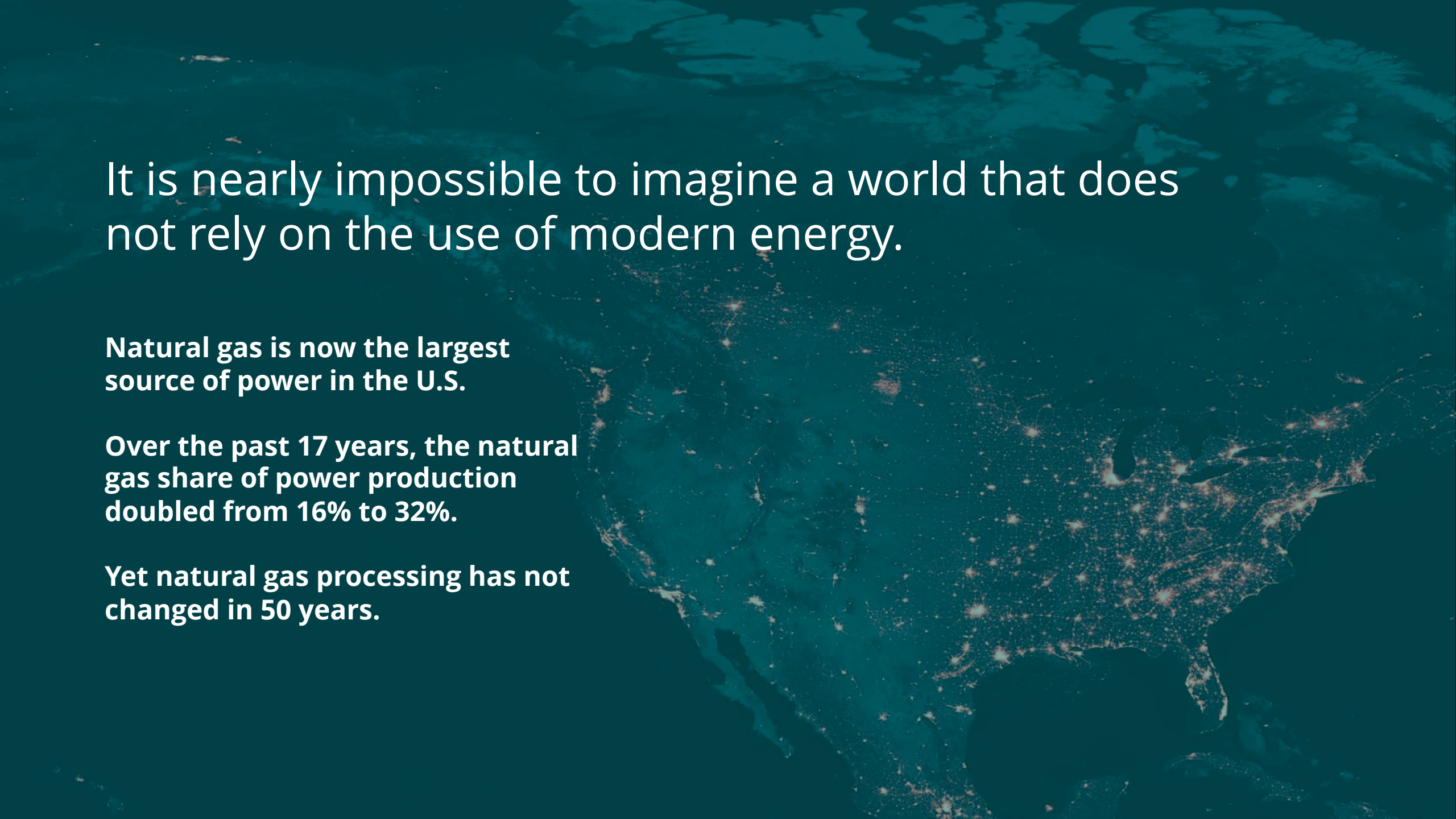


IONIZED ENERGY

REVOLUTIONARY HYDROCARBON GAS PROCESSING



It is nearly impossible to imagine a world that does not rely on the use of modern energy.

Natural gas is now the largest source of power in the U.S.

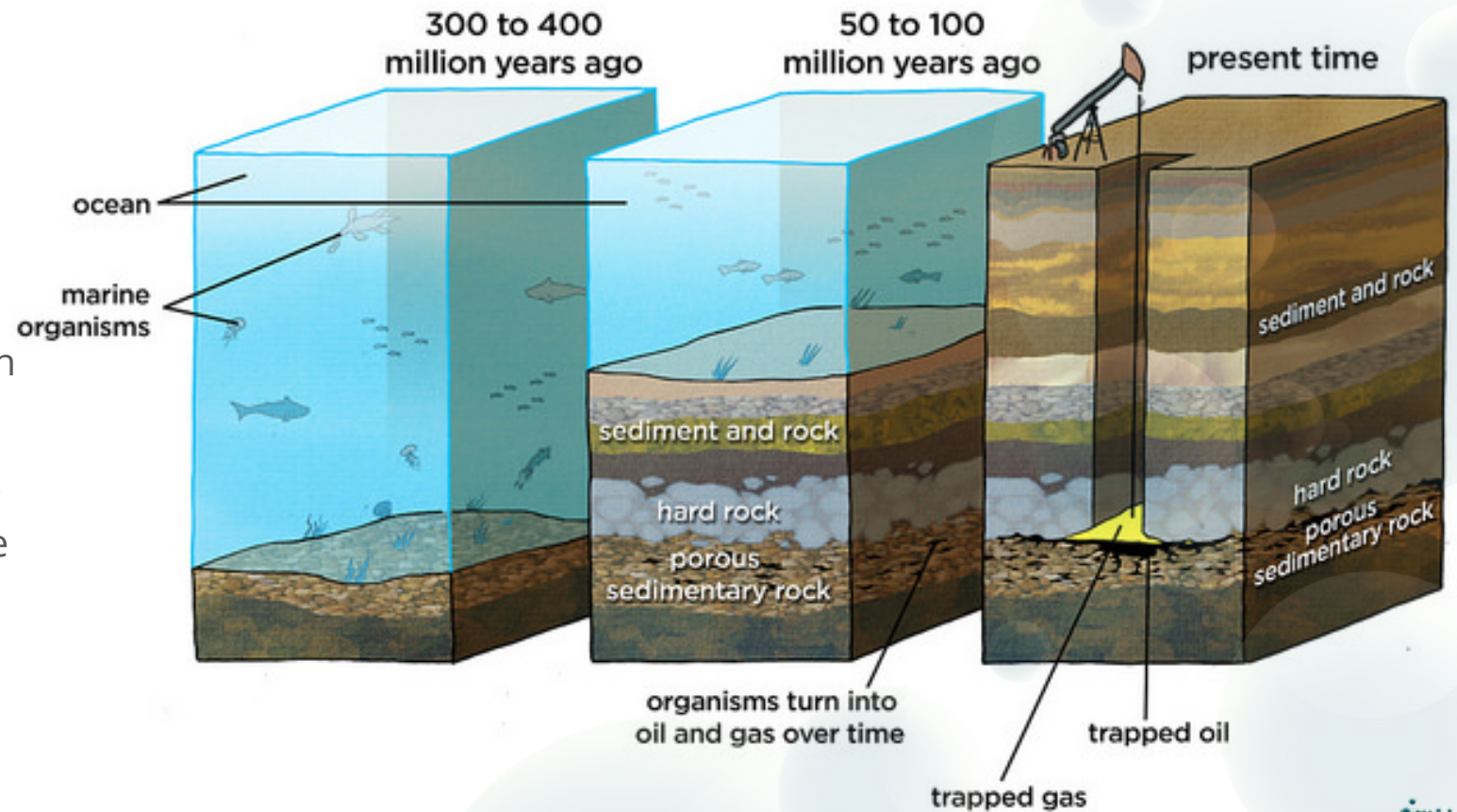
Over the past 17 years, the natural gas share of power production doubled from 16% to 32%.

Yet natural gas processing has not changed in 50 years.

WHAT IS NATURAL GAS?

Natural gas occurs deep beneath the earth's surface, consisting mainly of methane found from deep underground locations where the decay of organic matter has taken place for millions of years.

The search for natural gas begins with geologists who study the structure and processes of the earth. They locate the types of rock that are likely to contain natural gas deposits. Some of these areas are on land and some are offshore and deep under the ocean floor.



ENERGY SOURCES: A GLOSSARY

The United States uses and produces many different types and sources of energy, which can be grouped into general categories such as primary and secondary, renewable and nonrenewable, and fossil fuels.



PRIMARY

Coal, Crude Oil, Natural Gas
Nuclear

SECONDARY

Made from Primary Sources:
Electricity, Hydrogen

RENEWABLE

Biomass, Geothermal, Solar, Wind
Ocean thermal, Wave action, Tidal action

NONRENEWABLE

Crude Oil, Natural Gas, Coal,
Uranium

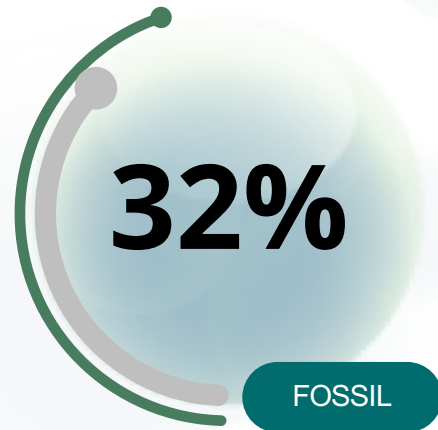
FOSSIL FUELS

Petroleum, Coal,
Natural Gas



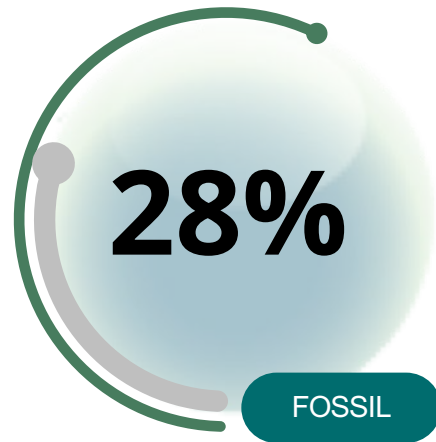
AMERICA'S ENERGY SOURCES BY THE NUMBERS

The three major fossil fuels—petroleum, natural gas, and coal—combined accounted for about 78% of the U.S. primary energy production in 2017



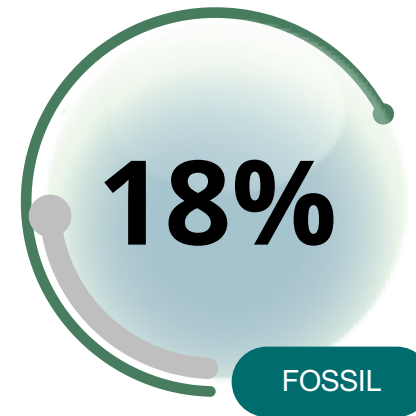
Natural Gas

Natural gas is now the largest source of power in the U.S. The United States used about 27 trillion cubic feet of natural gas in 2017 and 29% of total U.S. primary energy consumption.



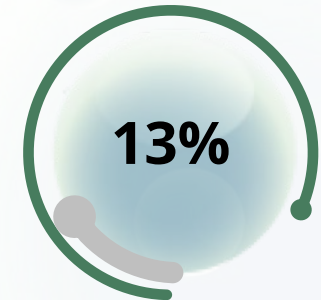
Petroleum

The United States is one of the largest crude oil producers. Gasoline is the most consumed petroleum product in the U.S. with motor gasoline equaling to about 47% of total U.S. petroleum consumption.

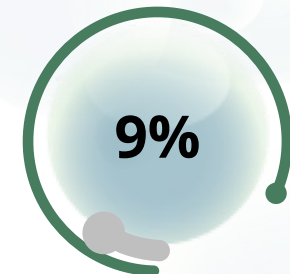


Coal

The electric power sector accounts for 92.7% of U.S. coal consumption (2017); coal was the source of about 30% of U.S. total electricity generation. Power plants make steam by burning coal, and the steam turns turbines to generate electricity.



Renewable



Nuclear

USE OF ENERGY IN THE UNITED STATES

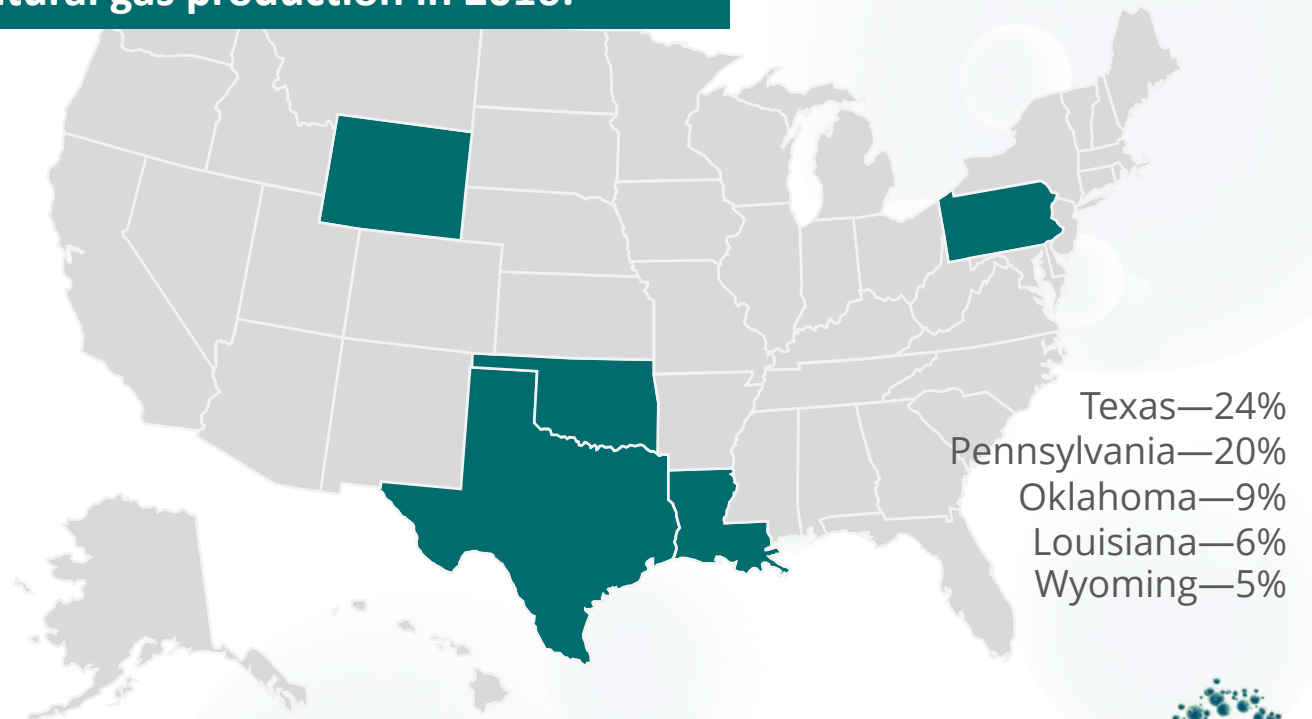
The United States now produces nearly all of the natural gas that it uses.

Natural gas production in 2017 was the second-largest amount after the record high-production in 2015.

More efficient and cost-effective drilling and production techniques have resulted in increased production of natural gas from shale and tight geologic formations.

The increase in production contributed to a decline in natural gas prices, which in turn has contributed to increases in natural gas use by the electric power and industrial sectors.

Five States Account for 65% of total U.S. dry natural gas production in 2016:



HOW WE USE ENERGY IN THE UNITED STATES

In 2017, the amount of energy produced in the United States was equal to about 87.5 quadrillion Btu, and this was equal to about 89.6% of U.S. energy consumption. The difference between the amount of total primary energy consumption and total primary energy production was mainly the energy content of net imports of crude oil. Shares of total primary energy consumption in 2017 were:



38%

Electric
power



29%

Transportation



22%

Industrial



6%

Residential



4%

Commercial

Domestic energy production is equal to about 90% of U.S. energy consumption in 2017.

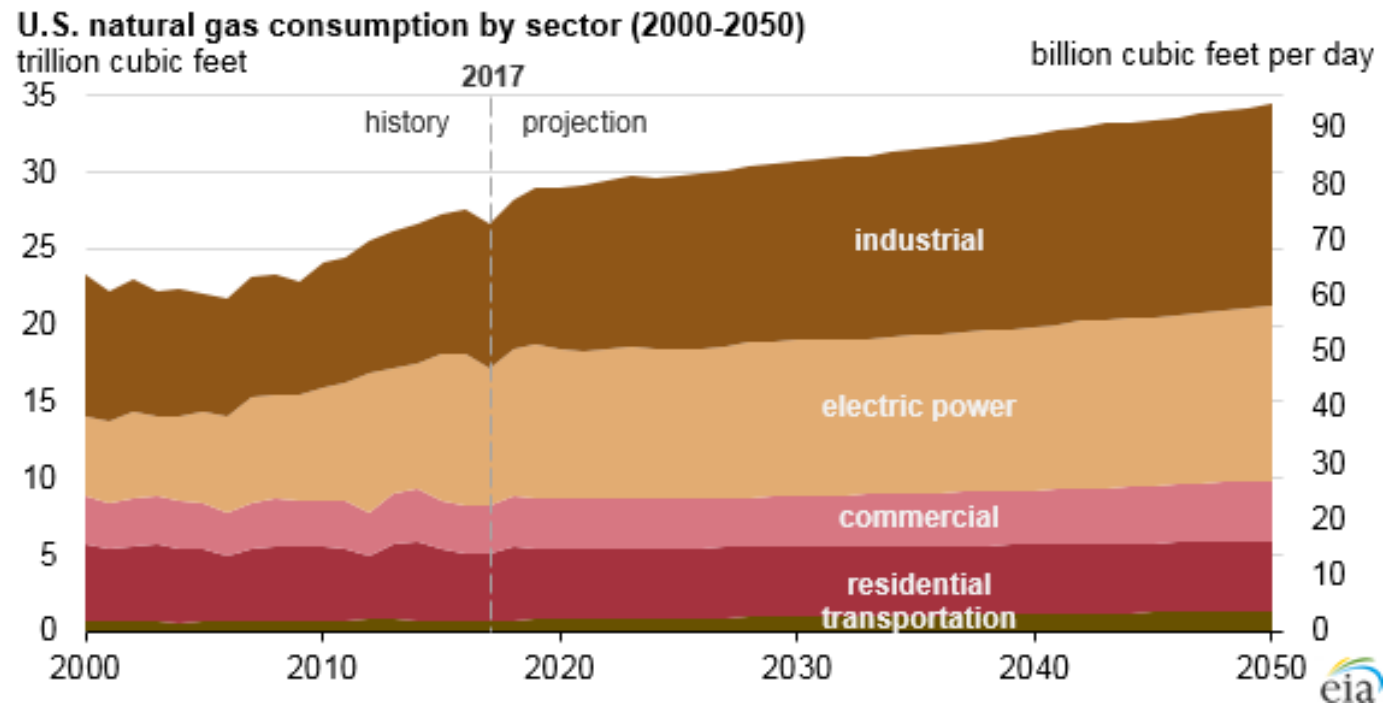
Source: U.S. Energy Information Admin



NATURAL GAS PRODUCTION & CONSUMPTION INCREASES

EIA's *Annual Energy Outlook 2018* (AEO2018) projects that U.S. dry natural gas production will increase through 2050 across a wide variety of alternative assumptions about the future. In the Reference case, production grows 59% from 2017 to 2050, starting at 73.6 billion cubic feet per day (Bcf/d) in 2017 and reaching 118 Bcf/d in 2050.

Meanwhile, demand for natural gas has skyrocketed in China.



Source: U.S. Energy Information Administration



NATURAL GAS: THE BRIDGE TO A RENEWABLE FUTURE

More efficient and cost-effective drilling and production techniques have resulted in increased production of natural gas from shale and tight geologic formations.

The increase in production contributed to a decline in natural gas prices, which in turn has contributed to increases in natural gas use by the electric power and industrial sectors.

The most optimistic outlook is that renewables can supply one-third of the global energy mix by 2040, so oil and gas must play a part.





CHALLENGES

WITH NATURAL GAS PROCESSING

WHEN NATURAL GAS IS EXTRACTED FROM THE EARTH...

...it is dirty, unusable, and contaminated with naturally occurring hydrogen sulfide (H₂S) and carbon dioxide (CO₂). It must be processed and cleaned. Traditional purification of natural gas is environmentally toxic, inefficient and costly.



THE DIRTY BUSINESS OF CONTAMINANT REMOVAL

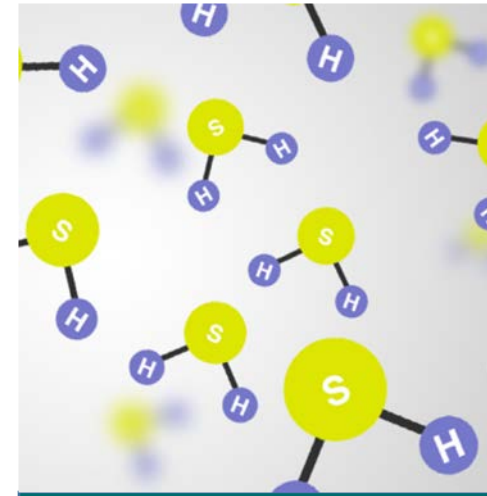
What must be removed...



Natural Gas Liquids (NGLs):
Ethane, propane, butane, isobutane, pentane (marketable)



Water:
Causes corrosion



Hydrogen Sulfide (H₂S):
Acid Gas - corrosive and highly toxic



Non-combustible gases like CO₂ and Nitrogen
(marketable)

NATURAL GAS MUST BE CLEANED AND PROCESSED



COSTLY
ENVIRONMENTALLY TENUOUS
INEFFICIENT

CONTAMINANTS

All natural gas has contaminants such as H₂S and CO₂; excessive levels make it “sour gas”. Other contaminants include non-combustible gases like Nitrogen, water, and other hydrocarbon components like NGLs. These all must be removed.

BOTTLENECKS

The cleaning process itself is plagued with bottlenecks.

CORROSION

Hydrogen Sulfide is an acid gas that is corrosive and highly toxic.

SCALABILITY

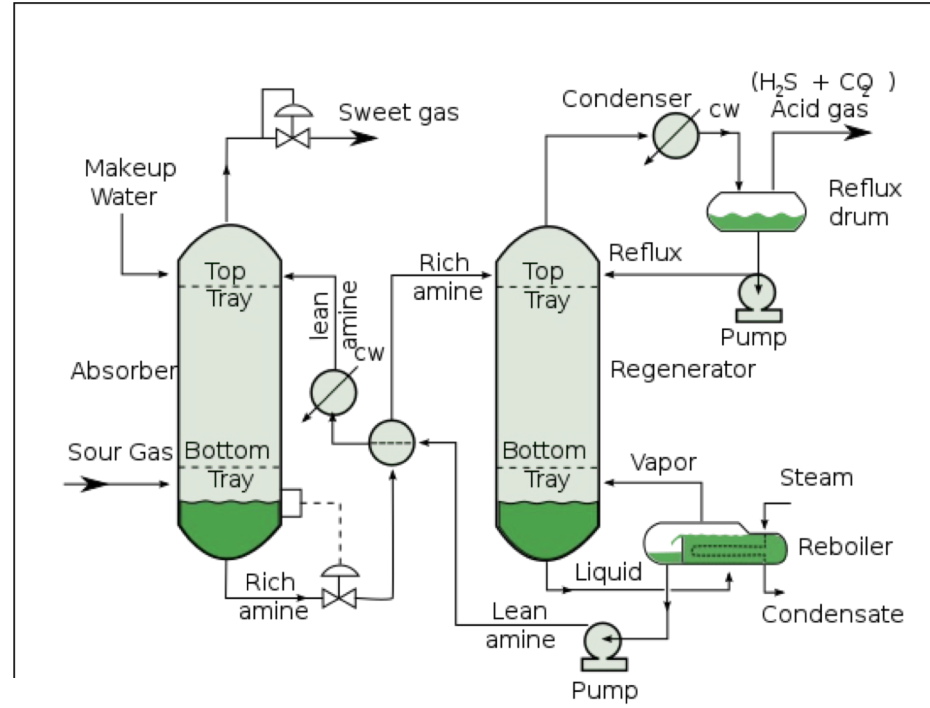
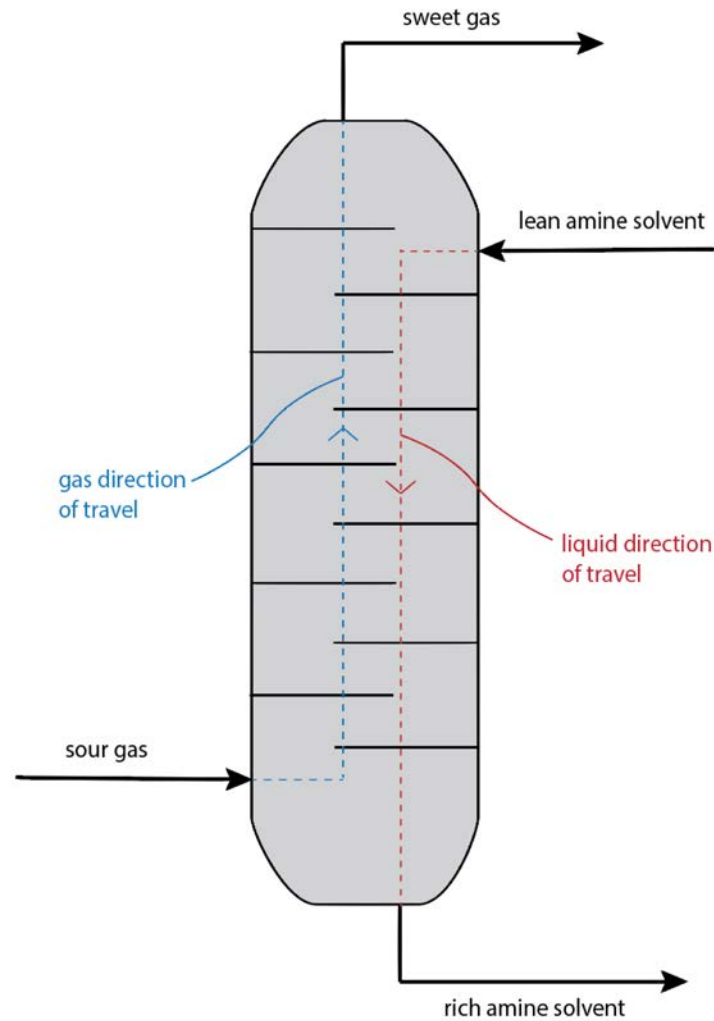
Traditional chemical reaction processes are troubled with scalability issues with volume of processing.

SLOW

Throttled down production due to reservoir time of chemistry involved.



PROBLEMS WITH NATURAL GAS PROCESSING



CHEMICAL REACTION PROCESSES

Sour Gas + Amine Chemical = "Gas Sweetening"

Sour Gas (natural gas containing acid gas) is subjected to a stream of amines. The amines absorb the acid gas leaving "Sweet Gas" behind.





AMINES HAVE PROVEN TO BE THE BEST TO PROCESS FOR CO₂ AND H₂S REMOVAL

However:

Amine degradation, hydrocarbon saturation, heat stable salts (HSS) formation, corrosion, limited loading capacity, cost to regenerate, and amine losses **ALL RENDER THE PROCESS IMPERFECT AND EXPENSIVE.**



An aerial night view of Earth, showing city lights and a teal overlay. The text is centered over the image.

HYDROL-SOD

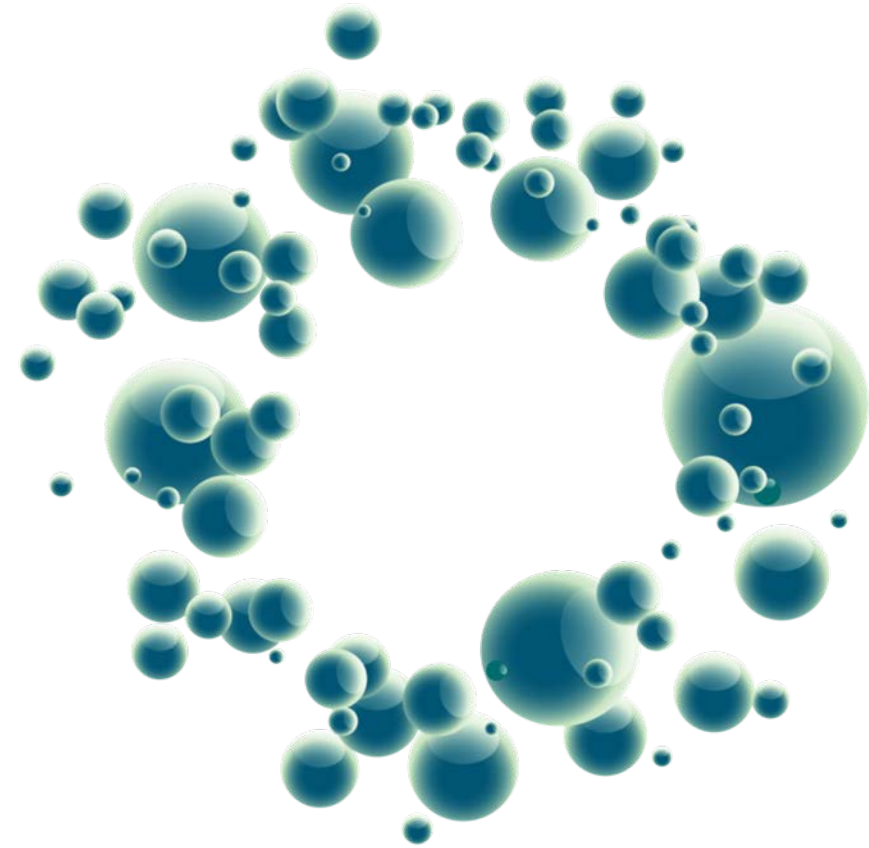
ZERO-IMPACT HYDROCARBON PROCESSING

HYDROL-SOD

OUR SOLUTION: HYDROL-SOD ZERO-IMPACT HYDROCARBON PROCESSING

Ionized Energy's Hydrol-Sod will provide an effective, efficient and eco-friendly product for natural gas processing.

Hydrol-Sod cleans natural gas beyond 98% purity.
The result is an effective, efficient, and eco-friendly product for Natural Gas purification. Through patented, zero-impact hydrocarbon processing, Hydrol-Sod significantly reduces harmful emissions, eliminates hazardous processing conditions, and increases profit margins.



PATENT SUMMARY

Through proprietary nano-technology, our product, in the form of a liquid additive, can clean/sweeten Natural Gas of CO₂ and/or H₂S using existing extraction methods and purification infrastructure. More efficient, ecofriendly, environmentally safe and biodegradable, our product replaces costly and often toxic chemicals.

Publication number: US8475757 B2

Application number: US 12/657,939

Publication date: Jul 2, 2013

Also published as: US20100256347, WO2011092538A1

UNDERLYING PATENT: US 8475757 B2

Agents for carbon dioxide capture, agents for amine stabilization and methods of making agents for carbon dioxide capture and amine stabilization.



HYDROL-SOD

TAKING GAS PROCESSING FROM THE PROPELLER AGE TO THE JET AGE

Hydrol-Sod is a propriety chemical that uses existing amine processes and infrastructure to produce pure gas, without toxic or hazardous byproducts, while measurably lowering operating costs.

PREVENTS
OXIDATION

100%
BIODEGRADABLE

PREVENTS
CORROSION

NO
HYDROCARBON
SATURATION

STABILIZES GAS

ELECTRON
EFFICIENT
ENVIRONMENT



HYDROL-SOD

Deployed in the form of a liquid additive, Hydrol-Sod unlocks the value of otherwise worthless sour gas wells – leveraging existing infrastructure and no changes in process.

Gas treated with Hydrol-Sod is superior to regular “sweet” gas.



Renders worthless liability wells into assets – unlocking the potential value of a sour well.



The use of Hydrol-Sod will result in lower operating costs compared to working a regular / sweet well.



HYDROL-SOD

UNMATCHED VALUE PROPOSITION

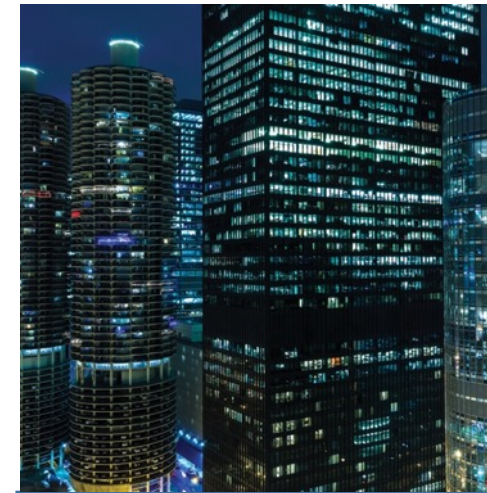
Hyrdol-Sod has the proven and unequal capability to remove more contaminants at much lower cost than ANY existing purification method while also totally preventing oxidation and allowing for increased throughput by lowering reservoir time.



+40%
Cost Savings in
Processing



+25%
Increased Revenue



+35%
Profitability
Improvements



ENVIORNMENTALLY GREEN 100% BIODEGRADABLE

Hydrol-Sod delivers significant reductions in harmful emissions during the operation of gas-fired reciprocating plants. It also reduces the need for ancillary chemicals, preventing corrosion, and rendering the end-to-end process measurably more efficient. The resulting gas has an increased BTU value and can be marketed at a premium. It does not degrade and is, without encountering most inherent issues, readily stored, compressed, and liquefied.



**HYDROL-SOD CAN BE APPLIED TO ALL PHASES:
UPSTREAM, MIDSTREAM AND DOWNSTREAM IN THE
EXTRACTION, PROCESSING, AND TRANSPORTATION OF
NATURAL GAS AND LNG**





Hydrol-Sod turns liability (sour gas) wells into assets (producing wells). Abandoned / capped sour gas wells are well-documented and available for pennies on the dollar. The product allows unlocking the potential value of a sour gas well.

UPSTREAM:

Upstream is commonly known as the exploration and production phase.

Our product makes worthless sour gas wells (wells too sour for conventional cleaning methods) accessible. Sour gas cleaned with our product results in a premium quality natural gas.

10 SOUR WELLS FOR THE PRICE OF 1 REGULAR WELL

The product makes otherwise worthless natural gas readily marketable.

Our product cleans natural gas beyond 90% purity. The resulting gas has an increased BTU value and is marketed at a premium. It does not corrode, degrade and is readily stored / compressed / liquefied.



DOWNSTREAM: LIQUEFIED NATURAL GAS LARGE AMINE PLANTS & PIPELINES

For the LNG, the product halts all corrosion and significantly reduces operating (replacement) costs. The product prevents oxidation. Under pressure, natural gas is subject to friction, which creates moisture. Water will become acidic – our product completely prevents this, with our product, water will not oxidize. In the presence of our product, water will not hydrolyze towards caustic / acidic (high PH / OH negative).

Drag in pipes is measurably reduced - product pumps cheaper / faster / in higher quantity. The reaction (in the pipe) atmosphere will be electron efficient (oxidation is electron deficient). The product will raise the BTU rating of LNG treated.

HYDROL-SOD



PRODUCT CAPABILITIES

**Hydrol-Sod
cleans natural
gas beyond
98% purity.**

No acid formation
or amine loss.

Massive reduction in
harmful emissions.

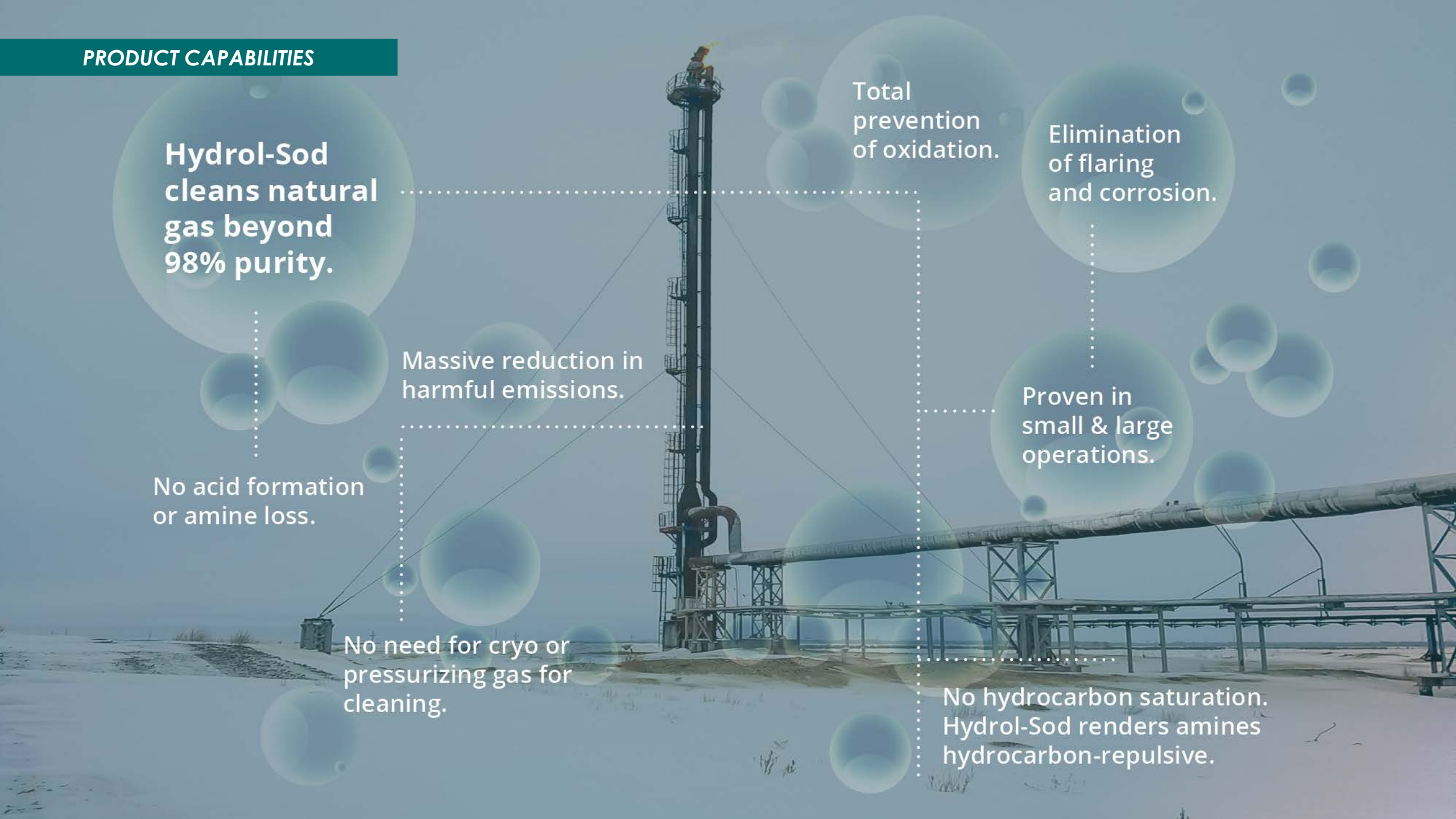
No need for cryo or
pressurizing gas for
cleaning.

Total
prevention
of oxidation.

Elimination
of flaring
and corrosion.

Proven in
small & large
operations.

No hydrocarbon saturation.
Hydrol-Sod renders amines
hydrocarbon-repulsive.



An aerial night view of Earth, showing the Western Hemisphere with city lights glowing against the dark background of the planet. The text is overlaid on this image.

FINANCIALS

INVESTMENT SUMMARY
USE OF FUNDS
PRO FORMA

INVESTMENT SUMMARY



MIN: \$1.5MM
MAX: \$10MM

Use of Funds:

- Well acquisition
- Operations
- Product Deployment

PHASES 1-3 ROLLOUT

Total

	\$	10,000,000	Amount	Line Item	Purpose
Phase 1	\$	1,500,000		Total for Phase 1	Minimum Objective: 1 Natural Gas well (1 MCF) treated with the product
	\$		350,000	HR	2 FT employees - contract workers are covered under Operations
	\$		500,000	Research & Development	Well specs will need analysing so to allow product calibration
	\$		30,000	Legal	Well-rights, Mineral-rights, liability clauses
	\$		60,000	Insurance	Liability, Key-man
	\$		60,000	Raw Materials	To make the product
	\$		500,000	Operations	Covers production and product deployment
Phase 2	\$	4,250,000		Total for Phase 2	Miniumum Objective: 1 Midstream gas processor (30 to 60 MCF) treated with the product
	\$		1,500,000	Build out in-house lab	
	\$		1,500,000	Build out production	
	\$		500,000	Operations	Ongoing production and product deployment
	\$		500,000	Research & Development	Gas specs will analysing so to allow product calibration
	\$		250,000	Raw Materials	
Phase 3	\$	4,250,000		Total for Phase 3	Minimum Objective: 1 LNG facility using the product
	\$		2,250,000	Build out production	
	\$		500,000	Operations	Ongoing production and product deployment
	\$		500,000	Research & Development	Gas specs will analysing so to allow product calibration
	\$		500,000	Raw Materials	
	\$		500,000	Test LNG facility	



Projections	1 Well / 1 Month (& Year)	Average Month Year 1 - Target State	Year 1	Average Month Year 2	Average Month Year 3	Average Month Year 4	Average Month Year 5	Average Month Year 6
Operational / Producing Wells Portfolio	1	10	10	50	250	450	650	850
Production / Well (MMBTU) [Portfolio]	311,100	311,100	311,100	311,100	311,100	311,100	311,100	311,100
Henry Hub Spot Price	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00
\$ production per Well / Month	\$ 622,200	\$ 622,200	\$ 622,200	\$ 622,200	\$ 622,200	\$ 622,200	\$ 622,200	\$ 622,200
\$ production Portfolio / Month	\$ 622,200	\$ 6,222,000	\$ 74,664,000	\$ 31,110,000	\$ 155,550,000	\$ 279,990,000	\$ 404,430,000	\$ 528,870,000
Subtotal Sales	\$ 622,200	\$ 6,222,000	\$ 74,664,000	\$ 31,110,000	\$ 155,550,000	\$ 279,990,000	\$ 404,430,000	\$ 528,870,000
Operational Expense	\$ 12,444	\$ 124,440	\$ 1,493,280	\$ 622,200	\$ 3,111,000	\$ 5,599,800	\$ 8,088,600	\$ 10,577,400
Third Party Well Operator Contract Royalty Estimate	2%	2%	2%	2%	2%	2%	2%	2%
Product Cost	\$ 124,440	\$ 1,244,400	\$ 14,932,800	\$ 6,222,000	\$ 31,110,000	\$ 55,998,000	\$ 80,886,000	\$ 105,774,000
Product Licensing Estimate	20%	20%	20%	20%	20%	20%	20%	20%
Mineral Rights	\$ 31,110	\$ 311,100	\$ 3,733,200	\$ 1,555,500	\$ 7,777,500	\$ 13,999,500	\$ 20,221,500	\$ 26,443,500
License Fee to Land Owner Estimate	5%	5%	5%	5%	5%	5%	5%	5%
Information Technology	\$ 250	\$ 25,000	\$ 300,000	\$ 125,000	\$ 625,000	\$ 1,125,000	\$ 1,625,000	\$ 2,125,000
Security	\$ 1,500	\$ 15,000	\$ 180,000	\$ 75,000	\$ 375,000	\$ 675,000	\$ 975,000	\$ 1,275,000
Maintenance & Repair Expense (Estimate)	\$ 4,000	\$ 40,000	\$ 480,000	\$ 200,000	\$ 1,000,000	\$ 1,800,000	\$ 2,600,000	\$ 3,400,000
Subtotal Production Expense	\$ 173,744	\$ 1,759,940	\$ 21,119,280	\$ 8,799,700	\$ 43,998,500	\$ 79,197,300	\$ 114,396,100	\$ 149,594,900
Labor & Expenses	\$ 41,667	\$ 104,167	\$ 1,250,000	\$ 104,167	\$ 208,333	\$ 312,500	\$ 312,500	\$ 3,750,000
Number of full-time Employees	2	5	5	5	10	15	15	15
Legal	\$ 500	\$ 15,000	\$ 180,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Accounting	\$ 500	\$ 12,000	\$ 144,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
Administrative	\$ 500	\$ 5,000	\$ 60,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Travel	\$ 1,500	\$ 65,000	\$ 780,000	\$ 65,000	\$ 65,000	\$ 65,000	\$ 65,000	\$ 65,000
Insurance	\$ 1,000	\$ 10,000	\$ 120,000	\$ 125,000	\$ 625,000	\$ 1,125,000	\$ 1,625,000	\$ 25,500,000
Subtotal SG&A Expense	\$ 45,667	\$ 211,167	\$ 2,534,000	\$ 326,167	\$ 930,333	\$ 1,534,500	\$ 2,034,500	\$ 29,347,000
Total Cost Summarized	\$ 219,411	\$ 1,971,107	\$ 23,653,280	\$ 9,125,867	\$ 44,928,833	\$ 80,731,800	\$ 116,430,600	\$ 178,941,900
EBITDA (Monthly)	\$ 402,789	\$ 4,250,893	\$ 51,010,720	\$ 21,984,133	\$ 110,621,167	\$ 199,258,200	\$ 287,999,400	\$ 349,928,100
Depreciation @ 5%	\$ 20,139	\$ 212,545	\$ 2,550,536	\$ 3,297,620	\$ 16,593,175	\$ 29,888,730	\$ 43,199,910	\$ 52,489,215
EBIT (Monthly)	\$ 382,650	\$ 4,038,349	\$ 48,460,184	\$ 18,686,513	\$ 94,027,992	\$ 169,369,470	\$ 244,799,490	\$ 297,438,885
Taxes - estimated @ 34%	\$ 130,101	\$ 1,373,039	\$ 16,476,463	\$ 6,353,415	\$ 31,969,517	\$ 57,585,620	\$ 83,231,827	\$ 101,129,221
EBIA (Monthly)	\$ 252,549	\$ 2,665,310	\$ 31,983,721	\$ 12,333,099	\$ 62,058,475	\$ 111,783,850	\$ 161,567,663	\$ 196,309,664
<i>EBIA Annualized</i>	<i>\$ 3,030,587</i>	<i>\$ 31,983,721</i>	<i>\$</i>	<i>\$ 147,997,186</i>	<i>\$ 744,701,694</i>	<i>\$ 1,341,406,202</i>	<i>\$ 1,938,811,961</i>	<i>\$ 2,355,715,969</i>

Capital Invested	\$	10,000,000
@	\$	2.00 per MMBtu
@		10 wells
Hurdle Rate	10%	
	Capital	Present Value
0	\$ (10,000,000)	\$ (10,000,000)
1	\$ 10,000,000	\$ 9,090,909
2	\$ 10,000,000	\$ 8,264,463
3	\$ 10,000,000	\$ 7,513,148
4	\$ 10,000,000	\$ 6,830,135
5	\$ 10,000,000	\$ 6,209,213
	\$ 40,000,000	\$ 27,907,868
	\$	\$ 15,370,789

SUM 27,907,868
NPR 15,370,789
IRR 96.59%
ROI 300%

note: Excel NPR incl. year 0 delta



Investment Summary

Contingent Convertible (CoCo) Terms

Ask: \$10M
Min: \$1.5M

3 Draws

- Draw 1: \$1.5M
- Draw 2: \$4.25M (within 6 months)
- Draw3: \$4.25M (within 12 months)

Target Return

Invested Principal: \$10M
Target Total Return: \$30M
Target Net Return: \$20M

Time Span: 3 – 5 years

7% Company Ownership thereafter

Key Contingencies

Investor Principal returned is the primary objective to any other non-operational financial obligations

Investor Target Net Return is the secondary objective to any other non-operational financial obligations

No early repayment penalty

Target returns can be lump sum or spread over the 3 – 5 year time span

Failure to meet CoCo terms within 5-year term results in 15% Company Ownership





THE TEAM

KEY LEADERSHIP &
ADVISORY TEAM

IONIZED LEADERSHIP

Helmut DeGraff Mayer

Mikhail Geller

TEAM AND ADVISORS

Stephen Shatto

Peter McCallion

Clea Chang

Jonathan Chang

CONTACT

Helmut DeGraff Mayer

Managing Partner, Ionized Energy

hdmayer@ionizedenergygroup.com

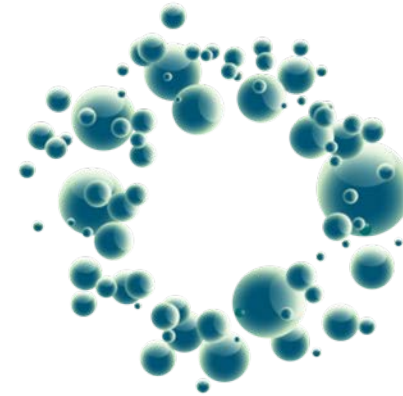
+1.917.657.0750

Jonathan Chang

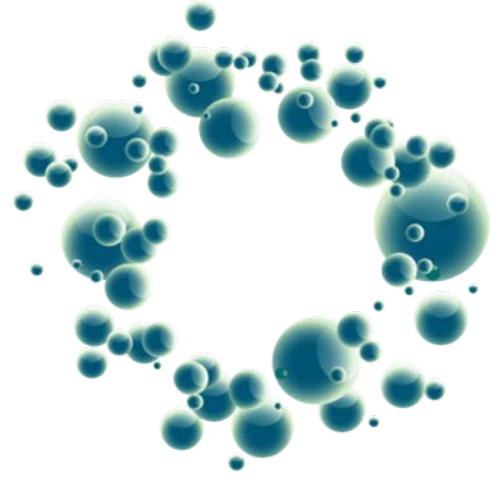
Sartorian Ventures

jchang@sartorianventures.com

+1.646.727.0234



IONIZED ENERGY



IONIZED ENERGY

REVOLUTIONARY HYDROCARBON GAS PROCESSING