Natural Gas TODAY

For Municipal Gas Systems

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Inside This Issue…

AN INTRODUCTION TO RENEWABLE NATURAL GAS (RNG)

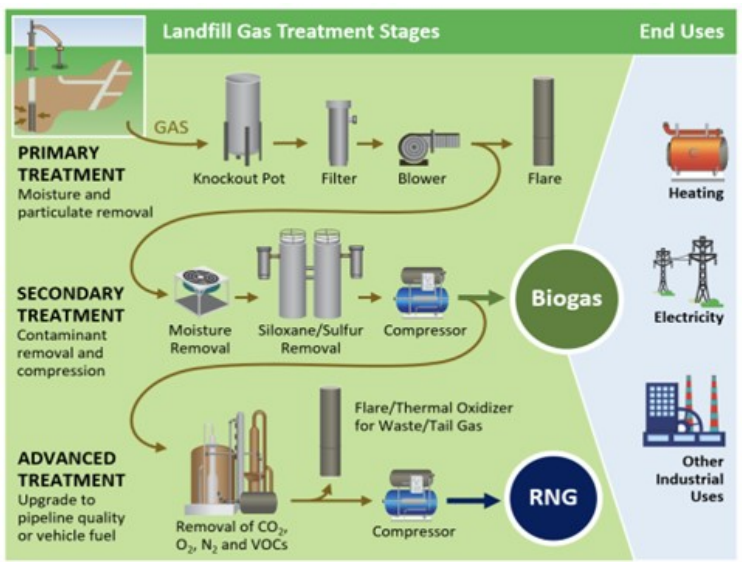
WHAT IS RNG?

RNG is a pipeline-quality gas that is fully interchangeable with conventional natural gas. It is a biogas, the gaseous product created from the decomposition of organic matter, that can be utilized across many applications for organizations to improve their sustainability efforts and reduce their greenhouse gas (GHG) emissions.

RNG can be produced from numerous sources such as municipal solid waste landfills, digesters at water resource recovery facilities, livestock farms, food production facilities and organic waste management operations. According to the RNG Coalition, there are 250 operational RNG facilities across North American, with nearly 240 more planned or under construction. Today, landfill RNG produces 69% of the total RNG supply.

HOW IS RNG PRODUCED?

To begin converting biogas, also referred to as biomethane, to RNG, the biogas is captured and purified. Treatment includes removing moisture, carbon dioxide and trace level contaminants such as siloxanes, volatile organic compounds (VOCs) and hydrogen sulfide. Nitrogen and oxygen content are also reduced during this process. Once upgraded, the gas contains a methane content of 90% or greater. When RNG is injected into a natural gas pipeline, it typically has a methane content between 96% and 98%.



WHAT ARE APPLICATIONS FOR RNG?

When RNG is produced, it is either injected into a natural gas pipeline or used locally, for example at onsite vehicle fueling stations. Since RNG can leverage existing infrastructure and is so chemically similar to natural gas, RNG is a seamless alternative that can be used either for thermal applications, to generate electricity, as a bio-product feedstock or as a vehicle fuel.

Natural gas powers more than 175,00 vehicles in the United States. When biogas is processed to a higher purity standard, the RNG can be used as a transportation fuel in the form of liquefied natural gas (LNG) or compressed natural gas (CNG). In addition to the tremendous environmental benefits, using RNG as a transportation fuel also offers economic benefits. RNG qualifies as an advanced biofuel under the Renewable Fuel standard and generates D3 Renewable Identification Numbers (RINs), and environmental attribute that can be marketed to obligated parties.

WHAT ARE THE BENEFITS OF RNG?

RNG provides many benefits, environmentally and economically. For organizations looking to achieve reduced and net-zero emissions, RNG has significantly lower Carbon Intensity scores compared to diesel and can yield GHG emissions reductions of up to 75%. Additionally, replacing traditional diesel or gasoline with RNG significantly reduces emissions of nitrogen oxides and particulate matter, and contains zero to very low levels of ethane, propane, butane, pentane, or other hydrocarbons. By capturing and transitioning the methane produced at landfills or anaerobic digestion facilities, leveraging RNG mitigates global climate change in the near-term.

HOW TO BEGIN USING RNG

Although RNG production has been accelerating, it is being outpaced by the demand for it. Individuals are putting more emphasis on being environmentally conscious consumers, companies are increasing their focus on ESG initiatives and numerous states are proposing and passing legislation requiring increased use of renewable energy. RNG is an effective pathway for companies to reduce emissions. Since RNG utilizes existing infrastructure and technology, it is a turnkey energy solution.

EXTENDED RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY AND LANDFALL STRIKE PROBABILITY FOR 2022

We have increased our forecast and now call for a well above-average Atlantic basin hurricane season in 2022. We anticipate that either cool neutral ENSO or weak La Niña conditions will predominate over the next several months. Sea surface temperatures averaged across portions of the tropical Atlantic are above normal, while most of the subtropical and mid-latitude eastern North Atlantic is much warmer than normal. We anticipate an above-normal probability for major hurricanes making landfall along the continental United States coastline an in the Caribbean.

Atlantic Basin Seasonal Hurricane Forecast for 2022

Forecast Parameter and 1991-2022 Average (in parentheses)	Issue date 7 April 2022	Issue date 2 June 2022
Named Storms (14.4)	19	20
Named Storm Days (69.4)	90	95
Hurricanes (7.2)	9	10
Hurricane Days (27.0)	35	40
Major Hurricanes (3.2)	4	5
Major Hurricane Days (7.4)	9	11
Accumulated Cyclone Energy Index (123)	160	180
Net Tropical Cyclone activity (135%)	170	195

Probabilities For At Least One Major (Category 3-4-5) Hurricane Landfall On Each of the Following Coastal areas:

1. Entire continental U.S. coastline-76% (average for last century is 52%)
2. U.S. East Coast including Peninsula Florida-51% (average for last century is 31%)
3. Gulf Coast from the Florida Panhandle westward to Brownsville–50% (average for last century is 30%)

Probability For At Least One Major (Category 3-4-5) Hurricane Tracking Into The Caribbean

1. 65% (average for last century is 42%).

ABSTRACT

Information obtained through May 2022 indicates that the 2022 Atlantic

Continued on page 3.

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RETURN SERVICE REQUESTED

Politics and Policy Reducing Gasoline Prices Instead of Combating Climate Change

"The difference is that was then, this is now." -S.E. Hinton

For years, Joe Biden, first as candidate, then as president, along with House Democrats, argued for drastic measures to combat climate change, including reduced production and use of fossil fuels.

For decades, the United States has imposed economic sanctions on Venezuela to combat socialist leaders who promote discord outside Venezuela's borders and stifle democracy within. However, as gasoline prices climbed to historic levels, the Biden administration and House Democrats felt political pressure, leading them to admonish oil companies to invest and produce more to increase supplies and reduce pump prices.

After halting imports of Russian oil in protest of Ukraine, the administration even explored importing oil from Venezuela. Surreal? You bet. How we got here is described below, along with a handy reference - the average monthly nationwide price per gallon of gasoline (published by the Energy Information Administration) expressed in bold - to put each act or event in perspective.

That Was Then: Biden and House Democrats Combat Climate Change

In July 2019, prior to a Democratic primary debate, CNN's Dana Bash asked: "Would there be any place for fossil fuels, including coal and fracking, in a Biden administration?" Candidate Biden responded: "No. We would work it out; we would make sure it's eliminated and no more subsidies for either of those. No more fossil fuels." ($2.83)

A couple months later, Biden grabbed the hands of a supporter, leaned into her, and said: "Kiddo, I want you to just take a look. I want you to look in my eyes. I guarantee you, I guarantee you we're going to end fossil fuels." ($2.68)

Later, standing alongside Senator Bernie Sanders during a Democratic presidential debate in March 2020, candidate Biden said: "No more subsidies for the fossil fuel industry. NO more drilling on federal land. No more drilling including offshore. No more ability for the oil industry to continue to drill. Period. End." ($2.32)

After he became the Democratic nominee, Biden's campaign website explained that his administration would initiate a "government-wide effort" to combat climate change: "Biden will use every tool of American foreign policy to push the rest of the world….. We can no longer separate trade policy from our climate objectives." ($2.20)

On his first day in office, in a single executive order, President Biden revoked the Presidential Permit authorizing the Keystone XL pipeline and suspended oil and gas leases in the Arctic Refuge. ($2.40)

Biden claimed the order was necessary "to confront the existential threat of climate change." Within days, the Department of Interior (DOI) "paused" new oil and gas leasing on public land and offshore water to review existing leasing and permitting practices "related to fossil fuel development" on the properties. In June 2021, DOI identified "defects" in the decision supporting the leases and suspended all activities under the leasing program. ($3.16) Litigation ensued, a federal judge stayed the "pause," and recently, limited, more expensive lease opportunities were noticed.

In October 2021, before Biden left for Glasgow to address the United Nations' climate change summit, the House of Representatives' Committee on Oversight and Reform brought in the executives of "Big Oil," where Representative Katie Porter (D-Calif.) castigated them for investing too much in fossil fuels and not enough in renewable energy. ($3.38) In November, the House passed Biden's Build Back Better, which included (among other things) key components of the Green New Deal. ($3.49)

That Was Then: Sanctions Ban All Venezuelan Crude Exports

In 2004, President George W. Bush first sanctioned Venezuela for working with Colombia rebels to flood the U.S. with cocaine. ($1.91) Those sanctions continued in place during the next U.S. administration (Barack Obama) and Venezuelan administration (Nicolas Maduro). In 2015, Obama imposed additional sanctions for human rights abuses, corruption and antidemocratic actions. ($2.54)

In August 2017, to stop Maduro from profiting from crude sales, the Trump administration froze all Venezuelan government assets in the U.S. and allowed the Treasury Department to sanction anyone aiding Maduro. ($2.49) Before leaving office, Trump slapped sanctions on three individuals, businesses and ships - all for assisting Maduro to evade the ban on crude sales. ($2.42)

The Biden administration left the sanctions in place, although enforcement has been half-hearted at best. That said, during his Senate confirmation hearings, Secretary of State, Antony Blinken emphasized: "We need an effective policy that can restore Venezuela to democracy, starting with free and fair elections," a reference to Mauro's "stealing" the 2018 election from Juan Guaido. ($2.42) Since then, U.S. support for Guaido was affirmed in a June 2021 letter from Biden to Guaido $3.15) and by a January 2022, State Department press release. ($3.49)

This Is Now: Combating High Gasoline Prices

While gas prices steadily increased, the secret hope of some environmentalists - that expensive gas would slow the use of cars and reduce pollution - was making economists and politicians nervous. This, in December, Secretary of Energy Granholm told the National Petroleum Council that she did not want to fight with them, urged the oil companies to increase production, and promised not to ban oil exports. ($3.40) In January, the Bureau of Land Management allowed oil and gas drilling on half of the National Petroleum Reserve in Alaska. ($3.41)

In March, the House Energy and Commerce Committee Chairman, Frank Pallone (D-N.J.) invited the executives of major oil companies to testify before the committee and urged them to invest new fossil fuel production "to increase short-term supply." ($4.32) At the April hearing, Pallone called out the industry for "refusing to increase production…." ($4.21)

This Is Now: Biden Raids Emergency Stockpiles

In November 2021, with inflation raging, pump prices soaring, and House Democrats sensing losses in the midterm elections, Biden tried to tame gas prices by announcing the largest release of oil from the Strategic Petroleum Reserve (SPR), a limited resource maintained for emergencies. ($3.49)

In February, Russia invaded Ukraine. Biden responded with some sanctions, but not on the energy sector, fearing a further increase in pump prices. ($3.61) A stiffer response was needed, and in March, Biden banned Russian oil imports. ($4.32)

With pump prices already high, Biden sought another supply source. The State Department asked Saudi Arabia to increase production and address the death of journalist Jamal Kashoggi. The Saudis declined both request. Next, Biden sent emissaries to Caracas to explore purchases of oil from Venezuela in exchange for easing sanctions and Maduro's making

Continued on page 3.

EXTENDED RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY, continued from page 1.

hurricane season will have activity well above the 1991-2020 average. We have increased our forecast from early April and now estimate that 2022 will have 10 hurricanes (average is 7.2), 20 named storms (average is 14.4), 95 named storm days (average is 69.4), 40 hurricane days (average is 27.0), 5 major (Category 3-4-5) hurricanes (average is 3.2) and 11 major hurricanes (average is 7.4). The probability of U.S. major hurricane landfall is estimated to be about 145 percent of the long-period average. We expect Atlantic basin Accumulated Cyclone Energy (ACE) and Net Tropical Cyclone (NTC) activity in 2022 to also be approximately 145 percent of their long-term averages.

The tropical Pacific currently has weak La Niña conditions, but we do anticipate some anomalous warming in the tropical Pacific in the next few weeks given a current relaxation of the trade winds across the eastern and central tropical Pacific. We currently are expecting either cool neutral ENSO or weak La Niña conditions for the peak of the Atlantic hurricane season from August-October. The odds of an El Niño appear quite unlikely over the next few months. El Niño typically reduces Atlantic hurricane activity through increase in vertical wind shear.

The tropical Atlantic has anomalously warmed over the past several weeks and now has above-normal sea surface temperatures. The eastern part of the subtropical Atlantic and mid-latitude Atlantic are much warmer than normal. A warmer eastern subtropical and mid-latitude Atlantic in the late spring typically correlates with a weaker subtropical high that then leads to anomalous warming of the tropical Atlantic by the peak of the Atlantic hurricane season.

Reducing Gasoline Prices Instead of Combating Climate Change, continued from page 2.

progress toward restoring a democratic government. Biden's initiative - rebuffed by Maduro, criticized by Guaido, and rebuked by both Democrats and Republicans - fizzled.

Staring at already high pump prices, Biden played his last card, the SPR. In March, for the second time, Biden announced the largest-ever release of oil from SPR, one million additional barrels on the market per day on average for the next six months, which coincidentally would extend up to the national mid-term elections. ($4.32) When Biden took office, the SPR held approximately 640 million barrels, on April 1 only 564 million barrels, and after the latest sale is complete, only 384.6 million barrels.

811 Crisis, continued from page 4.

problems that were making excavation dangerous," Wagner says. "One of the findings was the huge amount of inefficiency, contributing to $61 billion in waste. When you look at what that means with the new infrastructure bill, if the 811 system were fixed, we could build a lot more infrastructure."

Anyone who is involved with excavation is affected by this study, Wagner says. However, the Infrastructure Protection Coalition isn't interested in pointing fingers, but rather finding solutions. "We're not singling out any one stakeholder," he says. "It's a shared responsibility."

Wagner adds that fixing the problems with 811 will take a joint effort. "When we brought to light the flaws in the 811 system, we found that the flaws were multi-tiered," Wagner says. "There are flaws in the process and flaws in the law, so it's going to take a combination of things to fix it. The reason we got involved in the study is because the system is badly broken. This time last year, we had tens of thousands of unfulfilled locate tickets. The companies found in some cases that it was less expensive to pay the fine than it was to do the locate."

Now that results of the study have been published, Wagner says all of the stakeholders involved have to continue sharing the information and seeking support to fix the problem.

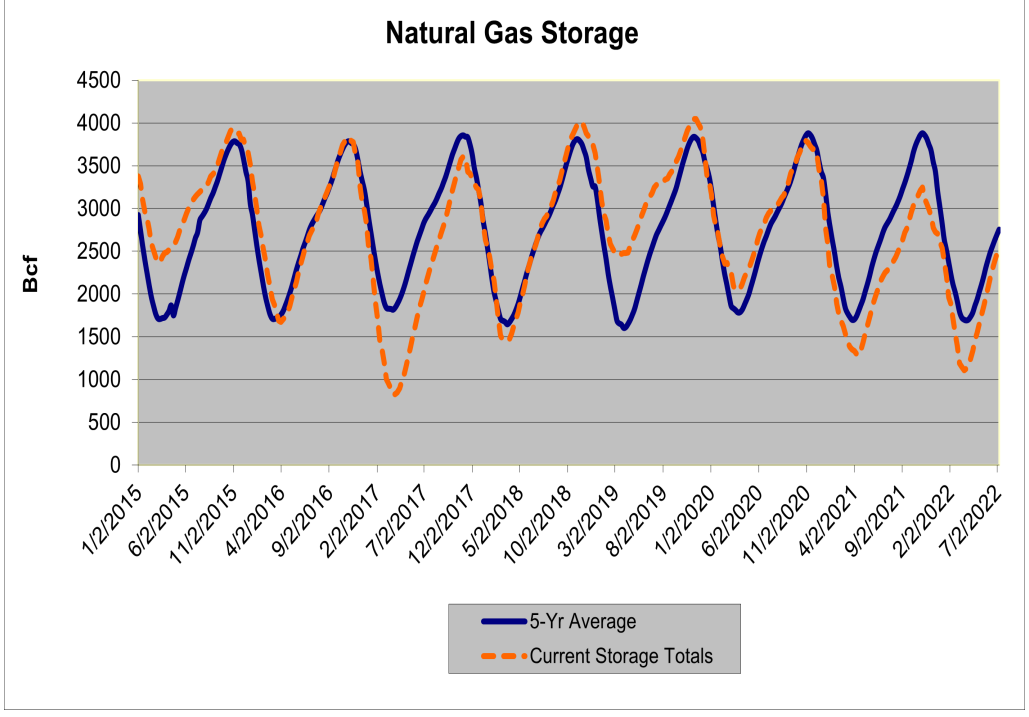
"The big thing is we have to go out and present the study," he says. "In the poor performing states listed in the study, we need champions who will help fix the laws or improve the processes. That's the only thing we can do. We don't want to just point out the flaws. We want to effect change."

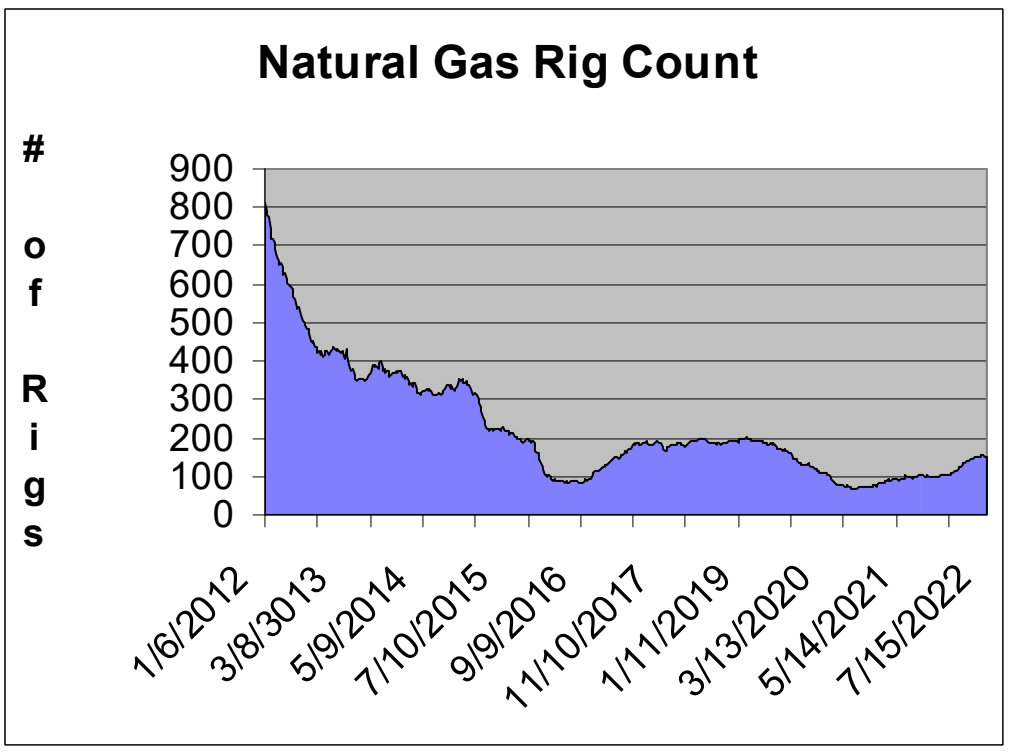
Wagner notes that there were some people who were upset about the report. "They don't want to be told that their kid is ugly, but they're not paying attention to the fact that we're saying our own kid is ugly too," he says. "There are a lot of reasons why a utility is damaged. We just want to make sure less of that happens."

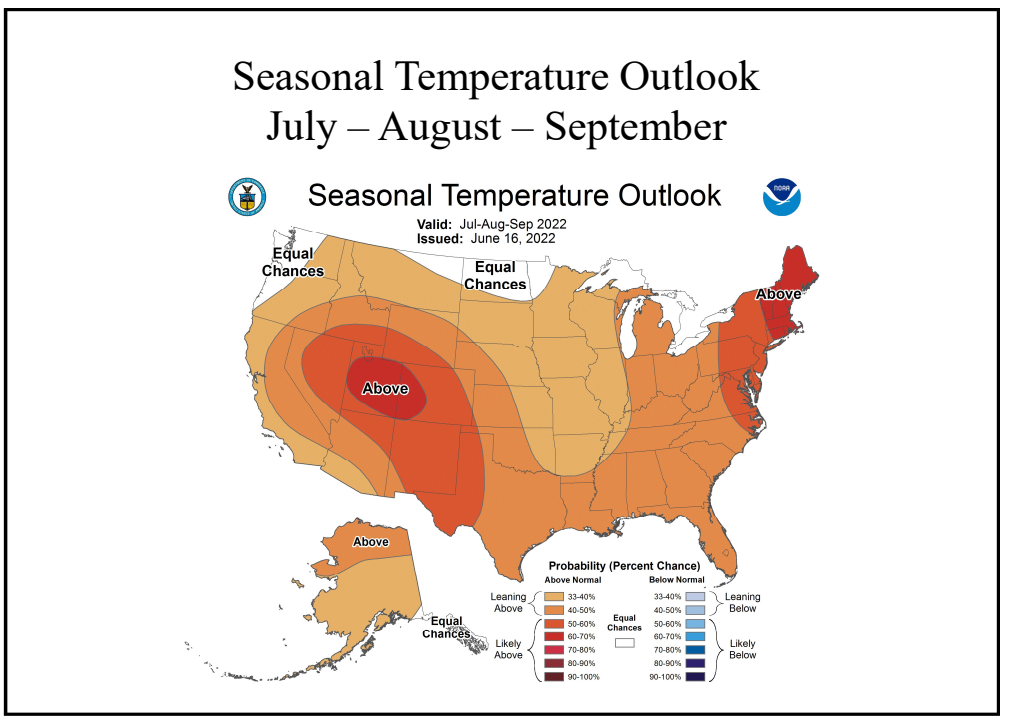
In the process of putting together the report, which encompassed all 50 states and involved thousands of interviews during the course of a year and a half to complete, Wagner admits that there were a few errors, though not in the material itself. The coalition is correcting the inaccuracies with the republished report.

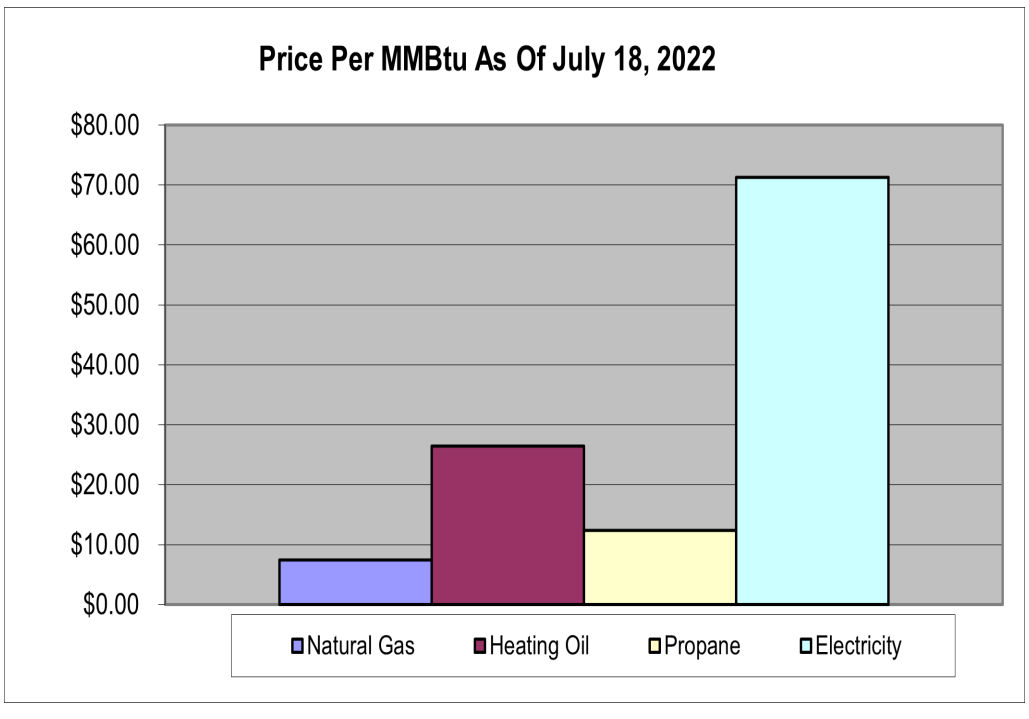
"The important message here is that this is an imminently fixable situation," Wagner says. "We can dramatically improve the system to improve public safety and cut waste with a combination of law, regulation and process changes mirroring what the best performing states are already doing."

Snapshots









811 in Crisis

Study Shows Failures in Utility Locating System Cost 61 Billion Annually

A recent study has found that failures in the 811 one-call system used in the United States to prevent damage to underground utility lines are costing $61 billion per year in waste and excess costs. The result of this waste is the creation of unnecessary hazards for public safety, particularly in states where the implementation and accountability are most lax. These findings were reported in an independent review, titled "811 Emergency," conducted by Continuum Capital.

The report includes an in-depth examination of 811 operations in every state and Washington, D.C, and shows these costs and the increased risk to public safety could be substantially reduced if states with the worst records adopt more effective practices and procedures already in use in other parts of the country

The review was commissioned by the Infrastructure Protection Coalition, a group of associations representing broadband, electric, natural gas, pipeline, transportation, sewer and water industries, and the stakeholders who design, construct, maintain or locate these underground systems with both union and non-union workforces. These are regular users and stakeholders of the 811 system who want to see it run safely and efficiently. Members of the coalition include the American Pipeline Contractors Association (APCA); Distribution Contractors Association (DCA); National Utility Contractors Association (NUCA); Nulca - representing utility locating professionals; and the Power & Communications Contractors Association (PCCA).

Originally released on Nov. 17, 2021, the study was conducted using a painstaking review of records, regulations, laws and enforcement actions in every state. An update to the report is set to be published this summer.

"Ultimately, ratepayers are picking up the tab for this waste and bearing the public safety risk," says Tim Wagner, a coalition member and executive director of APCA. "Some states have figured out how to work this system safely and efficiently, and there's no reason others cannot do the same."

A handful of states - Arkansas, Florida, Georgia, Michigan, Missouri, Wisconsin and the District of Columbia - account for more than 20 percent of the national waste, for an estimated $13 billion, because of 811 policies that lack serious consequences and, in some cases, do not require mandatory reporting of damage to utility lines, the study showed.

The review found waste and cost overruns largely were caused by: utilities and third-party locators needlessly sent out to locate lines for construction projects that then do not happen; poor instructions given to locators, causing wasted time or additional work; locate marks destroyed by construction and then needing to be reinstalled; and contractor wait time when location efforts exceed the legal notice period.

A Correlation and Solution

One possible solution for the waste and excess costs is wider adoption of subsurface utility engineering (SUE) practices, says Nicholas Zembillas, CEO of Subsurface Utility Engineering LLC, who has more than 40 years of combined experience in Federal Highway Administration (FHWA) and Department of Transportation (DOT) utility policy and utility accommodation, and subsurface utility engineering. Zembillas has been involved with the introduction and development of the SUE practice and SUE standard of care in seven different countries.

When Zembillas reviewed the study's findings, he discovered an analogy between the better performing states and the use of SUE.

"When I read the report, I found it to be right on the 811 findings," he says. "Concerning utility strikes, when the report broke it down by state and it identified 811 stakeholder's view on high and low performing state 811 systems, what caught my attention was a correlation with the study findings and my knowledge of the states that have a successful evolving history with SUE in accordance with ASCE38. These high performing states have a developed diverse market that is applying SUE to the planning, design and construction project delivery phases."

Zembillas explains that SUE applies civil engineering, geophysics, survey and mapping, and the use of geospatial and geotechnical technologies. The SUE project delivery process, when following ASCE 38, produces accurate and comprehensive underground utilities mapping and data deliverables - and thus more successful projects from design through construction. SUE employs the applicable suite of surface geophysical technologies and the fullest extent of applying the best practice techniques to achieve maximum detection, collection and depiction of utilities. Also, SUE is given an adequate time schedule to produce the SUE deliverables for project design.

811, a "Call Before You Dig" program, is being used to provide utility location information for the use on engineering and designer drawings, he says. This practice of using 811 was not meant to be a "Call Before You Design" program.

"The way we're going to fix this problem, is not all on 811," Zembillas says. "The 811 program is a 'Call Before You Dig' program for construction. Each state has established 811 guidelines and horizontal tolerance requirements." He adds that those approximate horizontal tolerances are not adequate for design and should not be used on construction projects involving construction and subsurface excavation.

"It is going to take all stakeholders to apply the appropriate best practices and the standard of care in project designs that assure reliable, accurate and comprehended utility deliverables," Zembillas says. "All local governments, utility owners, engineers and designers need to understand there is a standard of care for SUE since 2002, and they should know of it and apply SUE per ASCE 38 accordingly to its fullest extent."

While more than 40 states and federal government agencies recommend, require and fund for the use of SUE, Zembillas explains that nationwide many local government agencies and private utility owners have been slower to embrace and adopt the standard of care. He says that construction industry organizations, such as American General Contractors (AGC) and NUCA have consistently voiced their strong concerns with the lack of reliable utility information with project owner design and bid documentation for construction. Their long history of endorsing the use SUE appears to be falling on deaf ears.

"Most state transportation agencies have some degree of a SUE program," he says. "I saw that the states that achieved better 811 results were also states that have a mature and relatively successful SUE program."

Zembillas says very few utility construction projects apply SUE, and believes the reasons for its lack of use start with the project owner. Some of the reasons can be attributed to the following:

- Project owner lack the knowledge of SUE and the ASCE 38 standard.
- Project owner knows of SUE/ ASCE 38 and chooses not to use it.
- Project owner sees SUE as an added cost and chooses not to use it.

"The current process being used for design is not good," Zembillas says. "They're relying on a mark that is intended to be approximate and for the use of construction. Approximate is not good enough for engineering and design."

Fixing the Situation

The 811 study comes at a critical time for U.S. infrastructure, with the passage of the Infrastructure Investment and Jobs Act in November. The bill commits $1 trillion for new projects, including energy, highway, bridge, road, broadband and water and sewer infrastructure construction, all of which will be near existing underground utilities.

"We originally commissioned the study to find what's broken in the system, because there were a lot of

Continued on page 3.

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