

Servicing over 30% of the Rigs in the US, and Multiple Internationally, C-MOR's Patented Crown Light[™] is the Crown Jewel[™] of Lighting Systems Helping Customers to Achieve Net Zero

Since the first **Crown Light[™]** Lighting System was installed on a drilling rig in West Texas in Early 2018, C-MOR has successfully **Installed OVER 350 Crown Light[™]** systems throughout the U.S. and South America. The installed base for the **PATENTED Crown Light[™]** system includes almost every major drilling contractor and operator in the US. Operators and Drilling Contractors who have installed the **Crown Light[™]** system have not only cut lighting costs dramatically, but have improved safety and lowered Greenhouse Gas Emissions. **In 2019 C-MOR's Crown Light[™] System REDUCED Exxon Mobil's Diesel Consumption by nearly 2,000,000 Gallons and over 60,000 Tons in Greenhouse Gas Emissions.**



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**CMOR PROMISES TO HELP
REDUCE GREENHOUSE GAS EMISSIONS**

Light Towers -What are the True Environmental Costs??

Lighting accounts for 15% of total electricity consumption and 5% total greenhouse gas emissions worldwide. The production, transport, processing and consumption of oil and gas products accounts for 60% of all global greenhouse gas emissions, with a quarter of those (15%) directly attributable to the oil and gas industry. Upstream operations account for two-thirds of sector-specific emissions. By deploying energy efficiency and circular solutions, companies can leverage less carbon-intense clean electricity, displace diesel with gas or electricity alternatives, and reduce waste energy consumption.

One of the present methods of illuminating Oil and Gas locations at night involves the use of lighting systems powered by diesel generators and HPS Lamps which contribute to air pollution, vibrations, and noise in the work environment. Each HPS lamp contains 10-50 milligrams of mercury — enough to poison an entire classroom of children above threshold limits. While there is a strict exposure limit for occupational exposure, many do not consider the toxicity risk of exposure from broken bulbs, even though these are extremely common. A typical six tower diesel fueled light package runs approximately 5,110 hours per year, with an average output of 26.432lbs of CO2 per hour.

Lower Your Carbon Footprint

- Reduced CO2 emissions
- Reduced work site noise generation
- Reduced road traffic and dust pollution
- Zero spill potential



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Other LED lighting systems may have been beneficial with regard to worksite lighting; however, these systems were unable to achieve the dependability, ease of installation, illumination coverage, cost savings, increase in safety and environmental benefits, which sparked the development of the **Crown Jewel[™] Lighting System**.

C-MOR Energy Service's Commitment to Help Reduce Greenhouse Gas Emissions

The Multi-Patented Crown Jewel[™] and Guardian[™] Gen 3 Lighting Systems have an important advantage over diesel powered lighting trailers in that they produce little to no greenhouse gases or noise. C-MOR's Lighting Systems have significantly lower maintenance requirements as compared to diesel powered lighting trailers. Furthermore, C-MOR's systems increase the use of alternative energy but also provide environmental benefits which result in lowered costs and safer worksites. The Crown Jewel[™] reduces highway traffic by eliminating the need for delivery or pickup of Light Towers between locations.

The Crown Jewel[™] and the Guardian[™] Gen 3 Lighting Systems utilize LED bulbs which operate at much lower temperatures when compared to Metal Halide Lights on diesel lighting trailers, and therefore lighting directions can easily be readjusted at the work site since fixtures are not at high temperatures; furthermore, any existing vibrations at the work site will not adversely impact the lifespan of the lights. Specific LED bulbs are individually configured in order to provide the most visibility coverage with the least amount of dissipation compared to balloon lights and Metal Halide Light Towers. Additionally, the Crown Jewel[™] and Guardian[™] Gen 3 Lighting Systems result in noise reduction at a worksite since the diesel generators used for existing lighting systems are noisy.

If Green House Gas Emission Reductions, Cost Savings and Increased Safety are your goals, then the Crown Jewel[™] and the Guardian[™] Gen 3 Lighting Systems are a must over the use of Diesel-Powered Light Towers

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Lighting Climate Impacts and other Social Costs

Although light pollution and excess noise levels may have an adverse effect on workers and wildlife in the surrounding areas, the impact of air pollution from diesel generators used in temporary lighting can have far greater environmental impacts; therefore, it is important to minimize these factors in work zones.

Other effects that can be measured quantitatively such as excess noise levels may make it difficult for crews to communicate or cause long term hearing damage.

If standards were put in place to globally adopt the best available lighting technology, by 2030 we would be saving 640 TWh of electricity annually—equivalent to \$360 billion in avoided investment in 290 large coal-fired power plants. [Source: United for Efficiency, in 2017]

Improving Energy Efficiency and Saving Energy

The most cost-effective method of reducing greenhouse gas (GHG) emissions is to save energy. According to analysis by the International Energy Agency (IEA),²⁷ with potential improvements in production and end-use efficiency, coupled with energy conservation, forecasted energy demand in 2040 may be roughly 12 percent less than current levels.

~40% of global GHG emissions are driven or influenced by companies through their purchases

In addition to financial benefits, the advantages of LED luminaires are vast. According to reports, LED lights are nearly 80% more efficient than their traditional counterparts like metal halide and high-pressure sodium, as they convert 95% of the energy into light and only 5% into heat. The instant-on capability of LED lights also contributes greatly to energy-savings in industrial applications, especially conditions which require around-the-clock lighting.

Due to their lower energy consumption, LED luminaries account for the least amount of CO₂ emitted into the air, as compared to other lighting sources. For instance, the use of conventional incandescent bulbs can result in emissions of

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over 4,500 pounds of carbon dioxide each year, whereas LEDs are responsible for only around 451 pounds of CO₂ emissions per year.

A global switch to energy efficient LED technology could save over 1,400 million tons of CO₂ and avoid the construction of 1,250 power stations.

Lighting efficiency has advanced precipitously in the past quarter century, resulting in the increasingly ubiquity of LED lights, which last 20 times longer than traditional lights and consume far less energy. According to a 2015 analysis by the Clean Energy Ministerial, an overnight global transition to highly efficient LED lamps would avoid 801 Mt of CO₂ emissions, equivalent to displacing 684 coal-fired power plants around the world.

The cost of LED lights has declined rapidly around the world in recent years. Recent analysis of price trends from LED Insider, US DOE, and the University of California's Lawrence Berkeley National Laboratory shows a strong downward trend globally – from around US\$30 per 60W equivalent LED lamp in 2012 to around US\$10 per 60W equivalent just four years later – a 67% reduction. In India alone, 770 million LED bulbs are sold daily.

LED lights typically have mean times to burnout 100s of times higher than incandescent light sources with power requirements 1/9th that of incandescent lighting. LED lighting systems generate better directed light, with 85% of the light generated by the lamp reaching the worksite surface (without requiring complex reflector systems), versus only 40-50% light output from the lamp reaching the road surface from conventional sodium or mercury installations. LED lights realize a 35-65% reduction in energy consumption compared to sodium or mercury lamps and have a longer service lifetime.

Greenhouse Gas Emissions Reduction

Emissions typically include discharges associated with the energy used to power operations. A company can reduce its emissions by: lowering its energy demand; replacing fossil energy sources to lower carbon-intensity electric power.

An example would be shifting away from Diesel Operated Light Towers to C-MOR's High Efficiency, LED Crown Light System which operate off of an Electric Power Source.

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Lighting can be a huge source of energy consumption, and small changes can make a big difference. Replacing outdated lighting with modern LED systems can effectively reduce energy use and carbon emissions.

Electrification of Oil and Gas Locations

There is a growing trend to cut emissions by electrifying operations instead of using wellhead gas and diesel to fuel onboard generators, gas compressors, and pumps.

The benefits include:

- 1) Elimination of noise, carbon emissions and toxic fumes from work-sites improving the environment;
- 2) Energy security by eliminating dependence on fossil fuels;
- 3) A significant reduction in total life cost since they run off free energy and eliminate routine diesel engine maintenance; and
- 4) Improves labor efficiency by eliminating fuel and maintenance trips.

Using New Equipment and Advanced Technology for Greater Efficiency

C-MOR Lights can be used for utility infrastructure construction; routine maintenance and repairs in noise sensitive areas; power plant shut downs; recovery following natural disasters, or an electric grid disruption, etc.

The Multi-Patented Crown JewelTM and the Guardian Gen 3TM Lighting Systems are far superior to Metal Halide Light Towers and Balloon Lights which are both powered with diesel generators. Our LED lights that are environmentally friendlier, resulting in Green House Gas Emissions Reductions.

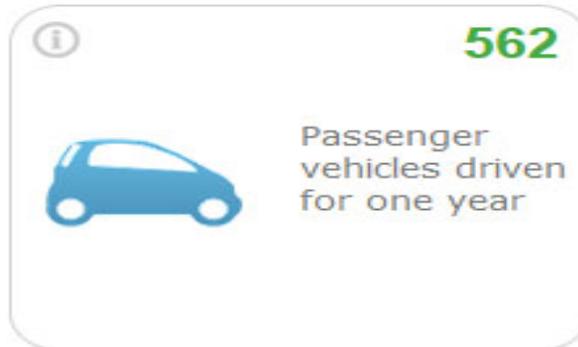
An annual Green House Gas Emissions Reductions of up to approximately 630 Tons using our Advanced LED Lights and an additional 2,869 Tons from the reduction in diesel fuel based on an operator using a 6-Rig C-MOR Crown Jewel Light Package.

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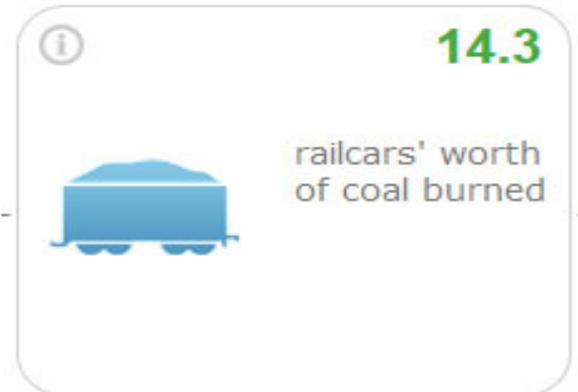


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This is equivalent to Greenhouse Gas Emissions Reductions of removing:



OR



LED Lights Compared to Metal Halide's Typically Seen on Light Towers on Oil and Gas Locations

In the Oil and Gas Industry, most tasks and drilling operations are performed during the night time since night operations provide certain advantages. The use of a proper lighting system is therefore important not only for worker and traveler safety but also in terms of cost and environmental impact. LED lights are up to 80% more efficient than traditional lighting, such as high-pressure sodium and metal halide, with 95% of the energy in LEDs converted into light and only 5% released as heat. ... Less energy use by LEDs translates into reduced demand from power plants and DECREASED Green House Gas Emissions.

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Fewer Luminaires Needed

LEDs exhibit far superior light distribution by focusing light in one targeted direction as opposed to other types of lighting that waste energy by emitting light in all directions. As a result, fewer LED luminaires are required to achieve the same level of brightness given off by HID, fluorescent, or incandescent lights. Fewer lights reduce energy consumption and therefore benefits the environment in many ways.

LEDs Run Cooler

LEDs give off very little heat. And what heat is produced is dissipated by metal heat sinks that wick away the heat from the light source. Lowering the facility's temperature naturally reduces the power load on heat-sensitive systems, like air conditioning and refrigeration. Adding dimming, sensors, or smart controls to LED fixtures can also reduce energy usage, while extending service life.

LEDs Don't Contain Mercury

LED luminaires are mercury-free. Therefore, from cradle to grave, they are not toxic to the environment and are 100% recyclable, helping to reduce the amount of waste materials delivered to landfills. Both fluorescent and mercury vapor lights contain mercury internal to the bulb and thus require special handling at the end of their service life. While mercury is effective at enabling white light, it is also highly poisonous and is especially harmful to the brains of both fetuses and children. None of these health considerations are linked to LED technology.

Zero UV Radiation

Most HIDs emit a significant amount of UV radiation and require specific UV-blocking filters to meet safety standards in industrial spaces. When an industrial sized space is lit by many powerful HIDs, it becomes a safety concern for employees. Health problems include skin damage, energy depletion, eye damage, and worsening existing conditions such as lupus. Unlike HIDs, LEDs do not emit ultraviolet radiation. LEDs represent a healthier, cleaner source of lighting that doesn't harm employees or the ozone, plus it is ideal where there are materials stored that are highly sensitive to UV. This is why museums around the world, including the Van Gogh museum in Amsterdam, have retrofit their lighting with UV-free LEDs and are preventing damage to priceless paintings.

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Durable, Long-lasting Design

Today, LED luminaires are rugged and much more likely than their predecessors to survive harsh vibrations, corrosion, or moisture on a plant floor during production. Even in the face of carelessness or accidents, the risk of damage is minimal. Not only does this keep employees safe, it also reduces a company's contribution to landfill crowding, manufacturing, and resource use.

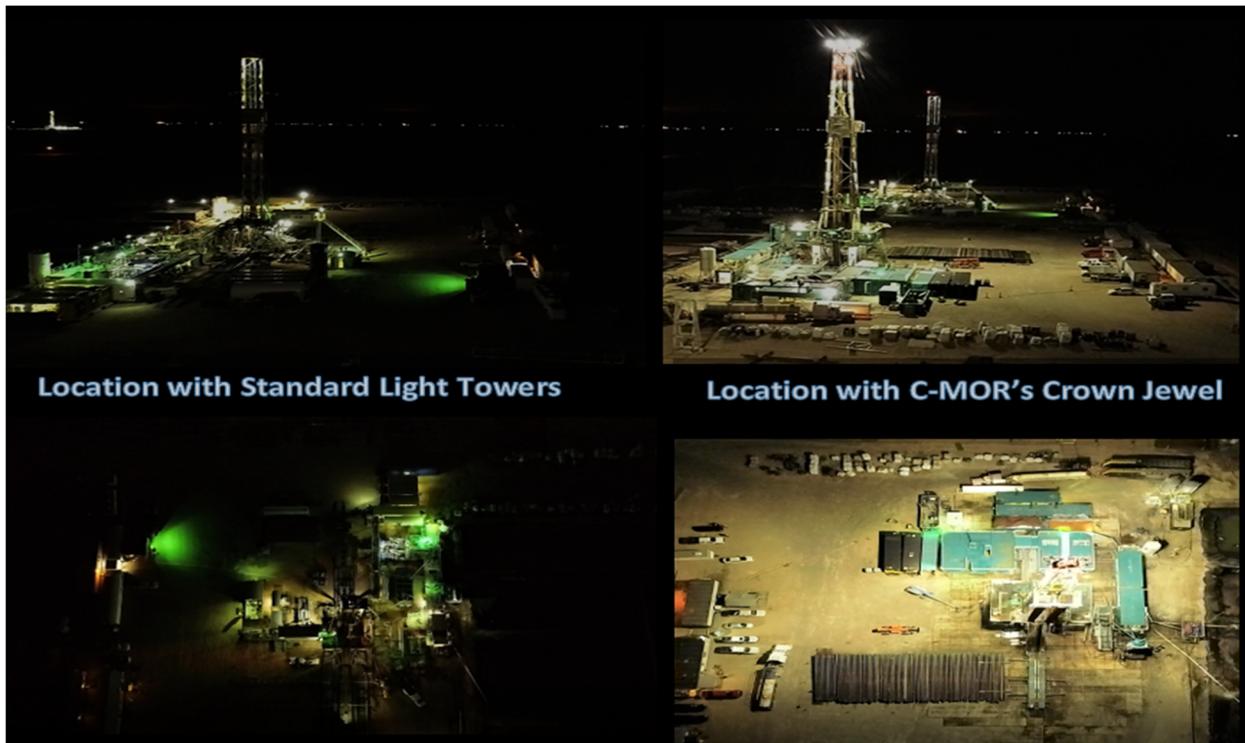
Several factors combine to give LED the smallest environmental footprint of any lighting source. The benefits it provides simply can't be ignored, either by end-users or manufacturers.

C-MOR has a Proven Track Record of Reducing Greenhouse Gas Emissions.



"The world increasingly demands more energy and needs the full spectrum of low-carbon solutions to provide it. Oil and gas is a significant part of this future energy mix but must be supplied with the lowest emissions possible."

Alex Schneider, CEO, Lundin Energy

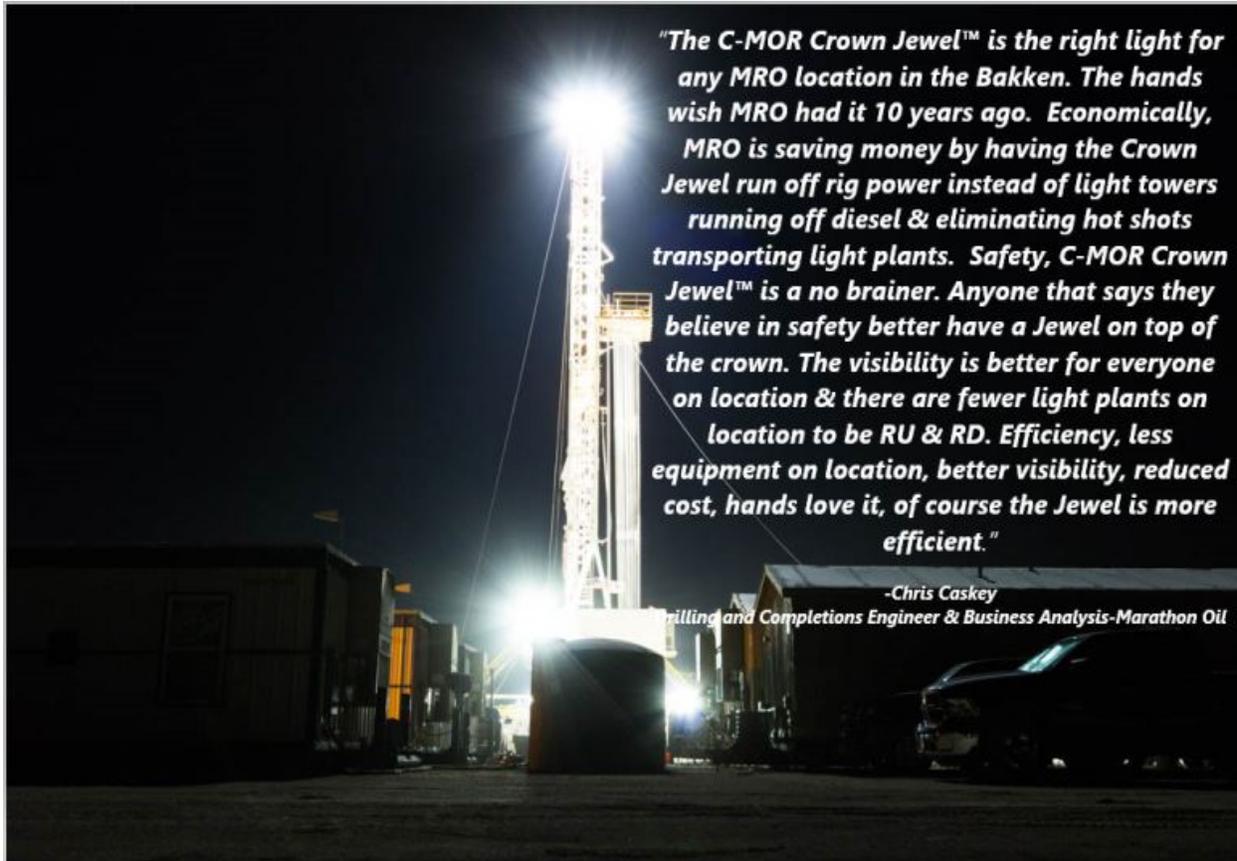


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Safety Advantages



The low color rendering index (CRI) of HPS lighting creates a dismal environment that can affect employees' energy and alertness levels. With physical labor, 24-hour operations and 12-hour shifts extremely common in the shale gas businesses, fatigue and drowsiness can be a key contributor to accidents and injuries.

Increased illumination has proven to decrease accident rates by as much as 60%.

Industrial LED technology provides crisp, clear, white light that mimics daylight, which helps improve workers' visibility, safety and alertness. In one study conducted by the Centers for Disease Control (CDC), floor trip-hazard detection improved by 23.7%, and a CDC/NIOSH study found that workers could detect trip hazards 94% faster with LED lighting in place.

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Safety Benefits from Using Light Sources like C-MOR's Crown Light[™] include:

- Increased work site visibility, limiting slips and trips
- Fewer work site traffic obstacles, ideal for tight rig sites/locations
- No heavy equipment required for rig up or rig down. The lightweight independent pole mounted design allows 2 technicians the ability to complete setup in only a few hours without the use of cranes, or other heavy equipment, which greatly reduces the risk for accidents during setup
- OSHA Approved
- Reduced work site noise generation
- Reduced road traffic and dust pollution
- Designed to be left in place during rig move to improve safety and reduce cost
- The white light of LEDs encourages alertness and reduces fatigue by a factor of 5X, helping workers to feel more awake, engaged and less drowsy on any shift. In fact, studies have shown that LED lighting can even enhance worker productivity and efficiency

Slips, Trips and Falls - Deadly!

- According to OSHA, Slip, Trips and Falls cause 15% of all accidental deaths, second only to motor vehicles.



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Environmental Conditions Increasing Risk of Trips & Slips

- Poor lighting ✓
- Glare ✓
- Shadows ✓
- Bulky PPE (includes improper footwear)
- Excess noise or temperature
- Fog or misty conditions ✓
- Poor housekeeping
- Improper cleaning methods & products
- Inadequate or missing signage



**WEIGHING UNDER 500 POUNDS IT'S THE LIGHTEST,
BRIGHTEST PATENTED RIG MOUNTED SITE LIGHTING SYSTEM
THAT EXISTS.**

C-MOR's Crown Light[™] system (US Pat. 10,473,282, US Pat. 10,900,626, US Pat. 10,883,684, US Pat. 10,473,310 US Pat. 10,711,961) provides 5-year warrantied LED lights and a structure which was developed with **SAFETY, REDUCING OPERATING COSTS** and the **GREENHOUSE GAS EMISSIONS** as primary concerns.

The customization, engineering and flexibility of design, allow for use on virtually all oilfield derricks and can eliminate the need for Conventional Light Towers.

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The *Crown Jewel*[™] value proposition has so many benefits to the installed base, through increased safety, productivity, positive environmental impact and costs savings. Some of the benefits cannot have a quantifiable dollar amount.

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Here is What Our Clients are Saying About C-MOR's Crown Light[™] System...

"The C-MOR Crown Jewel[™] is the right light for any MRO location in the Bakken. The hands wish MRO had it 10 years ago. Economically, MRO is saving money by having the Crown Jewel run off rig power instead of light towers running off diesel & eliminating hot shots transporting light plants. Safety, C-MOR Crown Jewel[™] is a no brainer. Anyone that says they believe in safety better have a Jewel on top of the crown. The visibility is better for everyone on location & there are fewer light plants on location to be RU & RD. Efficiency, less equipment on location, better visibility, reduced cost, hands love it, of course the Jewel is more efficient."

-Chris Caskey
Drilling and Completions Engineer & Business Analysis-Marathon Oil

"We have installed one system on another rig and everyone loves it. With the increase in costs for the light towers these lights now make good economic sense."

-Drilling Superintendent- XTO Energy

"Two things I miss from my last rig are the crews (they were trying and coming around) and our Crown Light[™] system. Like going back to the caveman days without them."

-Rig Manager- Helmerich & Payne, Inc.

"With Felderhoff moving in next door and having the Crown Light[™] system, we've even benefited from their lighting. I think we're all in agreement that this system is far more superior than using the light plants. From a cost standpoint we currently have several light plants for \$30/day each. With the fuel added each day and the usage of them being turned on for 14 hours/day we saving money with the Crown Light[™] system. The part I like is how low maintenance the system is and the time saved for the motor man to be focused on the necessary rig components, but most importantly is the safety. With our location lit up properly, we are eliminating many hazards altogether."

After looking at the design and price, I know we all feel there should be no reason not to have these on every rig in the Permian."

-Drilling Engineer - XTO Energy

"You have a hell of a good product and it has the potential to save more lives by eradicating the dark where all those creepy crawlers like to bite from. It was a real pleasure to meet you and a blessing from God!"

-Drilling Performance Adviser- Helmerich & Payne, Inc.

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ExxonMobil's greenhouse gas emission reduction plans

The Company recently announced plans to further reduce greenhouse gas emissions in its operations by 2025, compared to 2016 levels, while aiming for industry-leading greenhouse gas performance across its businesses by 2030. The 2025 plans include a 15 to 20 percent reduction in greenhouse gas intensity of upstream operations. The reductions will be supported by a 40 to 50 percent reduction in methane intensity; and a 35 to 45 percent reduction in flaring intensity. The Company also plans to eliminate routine flaring by 2030 in upstream operations, as defined by the World Bank.

The 2025 emission reduction plans include actions that are expected to reduce absolute greenhouse gas emissions by an estimated 30 percent for the Company's upstream business. Similarly, absolute flaring and methane emissions are expected to decrease by 40 to 50 percent. ExxonMobil's emission reduction plans cover Scope 1 and Scope 2 emissions from assets operated by the Company.

Actions will include deploying industry-leading best practices such as increased leak detection and repair, the application of advanced technologies to improve inspections, and improved facility designs including the phase out of high-bleed pneumatic devices. See page 36 for more information.

ExxonMobil's emission reduction plans will leverage the continued application of operational efficiencies, ongoing development and deployment of lower-emission technologies, such as carbon capture, and through additional purchases of renewable electricity for its operations.



→ ExxonMobil is working to find new and better ways to monitor and reduce methane emissions, including in its Permian operations.

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energyfactor
BY EXXONMOBIL



PERSPECTIVES & PARTNERS

Reducing natural gas flaring

06.29.2020



At a recent meeting of the Texas Railroad Commission, the Texas Methane Flaring Coalition laid out a series of best-practice recommendations for industry and regulators to consider as we all move toward a goal of zero routine flaring in the Permian Basin.

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2020 Year in Review: 10 Developments Reshaping Petroleum Engineering

JPT Editors | 21 December 2020



Topics: [Production and well operations](#) [R&D](#)



A worker climbs down the mast of a drilling rig in the Permian Basin. Source: Shell

d regulatory battles

TRENDING

Tight oil market in first half could push crude to \$65, says Goldman

TRENDING

Shell targets power trading and hydrogen in cli



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LIGHTEST, BRIGHTEST RIG MOUNTED SITE
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Wyoming Oil Field Service company expands to North and South America saving money **and the environment along the way.**

JCA Companies and its subsidiary C-MOR Energy Services are experts in oil field safety, and how to prevent slips and trips in the hazardous work environment.

They saw the need to increase the light in the work space, while reducing costs. Relying on their years of experience in the oil fields, they were able to add technology to an old solution and saved the industry millions costs and significantly reduced the impact on the environment..



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