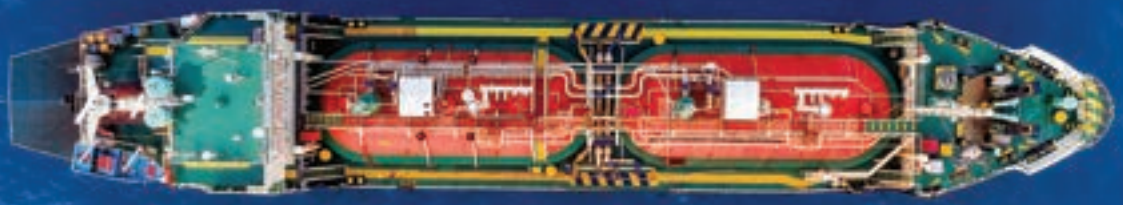


THE NATURAL GAS INDUSTRY IS ACTIVELY REDUCING EMISSIONS

The natural gas industry is actively implementing a range of strategies and technologies across the natural gas value chain to reduce greenhouse gas emissions. These efforts reflect a commitment to environmental stewardship and significantly contribute to meeting global emission reduction targets.

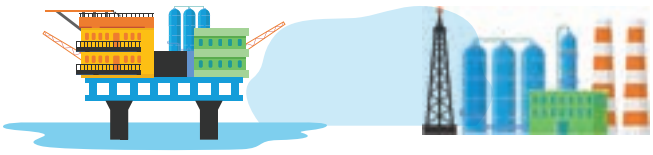
1 UPSTREAM (NATURAL GAS PRODUCTION)

ELECTRIFICATION OF OPERATIONS:
Upstream operators are increasingly using electricity from low-emission sources to power equipment. This can include renewable energy from solar or wind farms, hydroelectric power, or more efficient natural gas-powered generators, which reduce the carbon footprint of the extraction process.

ADVANCED METHANE LEAK DETECTION:
Technologies such as FLIR cameras, drones, and continuous monitoring systems are used for early detection of methane leaks. This allows for rapid response and repair, minimizing the volume of greenhouse gas emissions.

FLARING REDUCTION PROGRAMS:
Efforts to minimize routine flaring involve capturing excess natural gas that would otherwise be burned off. Utilizing this gas either as a fuel source on-site or redirecting it into the distribution system mitigates the emission of methane, CO_2, and other pollutants.

CARBON CAPTURE UTILIZATION AND STORAGE (CCUS):
Upstream facilities are beginning to integrate CCUS technologies to capture CO_2 emissions at the source. These are then either used in enhanced oil recovery or stored underground, which significantly reduces the overall carbon emissions.



2 MIDSTREAM (LIQUIFICATION AND PROCESSING)

LOW-EMISSION PNEUMATIC DEVICES:
Pneumatic devices are often a major source of vented natural gas emissions in midstream operations. Replacing high-bleed pneumatic controllers with low- or no-bleed alternatives or electrifying these devices reduces methane emissions.

CARBON CAPTURE AT PROCESSING FACILITIES:
Midstream operators are examining the implementation of carbon capture technologies at natural gas processing facilities, which can remove CO_2 from the gas stream before it is transported via pipelines.

PIPELINE OPTIMIZATION:
Midstream operators are focusing on improving pipeline efficiency to reduce leaks and minimize the need for compression, which can be energy-intensive and lead to higher emissions.

SUPPLY CHAIN EMISSIONS MANAGEMENT:
There is an increasing emphasis on working with suppliers to manage emissions throughout the supply chain, ensuring that sustainability programs are in place and adhered to by all parties involved.

3 AT THE EXPORT FACILITY (LOADING, TRANSPORT, DELIVERY)

EFFICIENCY IN LIQUEFACTION:
The use of the latest high-efficiency gas turbines and other advanced technologies in liquefaction processes minimizes the energy required to liquefy natural gas, resulting in reduced emissions.

RENEWABLE ENERGY INTEGRATION:
Facilities are committing to integrating renewable energy sources into their operations, reducing emissions for power generation within the liquefaction process.

LEAK DETECTION AND REPAIR (LDAR):
Advanced LDAR programs and technologies are deployed to identify and address emissions points within the liquefaction facilities, ensuring that any leaks are repaired promptly to minimize emissions.

PRESSURE SAFETY VALVE MONITORING:
Increased monitoring and maintenance to prevent leaks from safety devices that are designed to release gas when there is an overpressure situation, which reduces unintended emissions.

4 DOWNSTREAM (POST-EXPORT)

ADVANCED LNG CARRIER TECHNOLOGIES:
Ship builders are employing the newest and most efficient designs for LNG carriers, including hull design, propulsion systems and materials, to reduce the emissions associated with maritime transport.

VAPOR RECOVERY SYSTEMS:
Implementing vapor recovery systems on LNG carriers to capture and reliquefy boil-off gas, reduces the need for flaring and venting of natural gas during transport and allows for on vessel power production.

EMISSION TRACKING AND REDUCTION RESEARCH:
Ongoing research and cross-industry collaboration to measure and find new ways to reduce emissions from LNG carrier ships and other transportation methods.

ALTERNATIVE FUELS FOR SHIPPING:
Professionals are looking into alternative, lower-emission fuels for maritime transport such as biofuels, hydrogen, and ammonia, which could revolutionize the shipping industry and reduce its carbon footprint.

center for LNG

Learn more at **lngfacts.org** and **ngsa.org**

NGSA
Natural Gas Supply Association