

## Technology & standards

The Arctic – with its temperature and climatic extremes, environmental sensitivities, dynamic ice conditions and frozen ground and permafrost – presents a challenging operating environment for any development, including oil and gas. To meet those challenges, the industry is developing and using a range of cutting-edge technologies and operating standards. These help to ensure the integrity of facilities, the safety of personnel and the protection of the environment.

OGP members continue to invest in developing new technologies for use in the Arctic. Recent efforts to enable safe and environmentally sound Arctic operations have included:

- 3D seismic on ice
- Acoustic monitoring programmes to detect and track marine mammals and subsequent sound mitigation measures
- Improvements in well design and well control
- Significant advancement in oil spill prevention, preparedness and response capabilities

In addition, specific Arctic operations practices and standards cover routine

construction projects (such as road-building) and other logistical challenges.

The oil and gas industry has been operating in the Arctic for more than 80 years. Over this period there have been significant advances in technology across the full life cycle of hydrocarbon exploration and development as we have also advanced our understanding of the natural environment. During this time, pioneer work in ice load calculation has enabled the design of a variety of offshore structures to safely resist the loads and pressures caused by a variety of ice conditions.

The industry has also developed new pipeline design tools. For instance, forces created by ice ridges dragging along the seafloor, variations in permafrost, deep water pressures and the impacts of the earth's own seismic activity can all be modelled using a strain-based reliability framework that allows pipelines to be designed to withstand these forces.

Arctic drilling operations also require special treatment. In the past, offshore drilling either took place during the open water season or year-round from shallow-water, bottom-founded platforms or gravel islands that were fortified to withstand ice loads. As oil and gas resources have been discovered in deeper waters, the industry is now designing and building a new class of drillships for the Arctic. These will be able to operate in greater water depths and to drill deeper. With effective ice management programmes, the operating season can be reliably and safely extended to allow drilling beyond the open water season.

Specially-designed equipment will significantly reduce the risk of spills from such operations.

Equally important are efforts to minimise the footprint of upstream operations both offshore and onshore. The industry is accomplishing this through techniques

such as extended reach drilling (as in Sakhalin Island and Alaska), greater use of subsea technology and the use of smaller rigs wherever possible.

Progress in Arctic design and operating standards has kept pace with new technologies and procedures. These standards ensure the use of best practices and adhere to the same philosophies of Health Safety and Environment (HSE) management systems used in other operating environments while specifically addressing the risks associated with the Arctic. These aim to employ the resources, skills, systems, procedures and tools to perform in a manner that is safe, reliable and protects the environment. An example that addresses one of the cornerstones of oil and gas Arctic operations is the newly developed International Standards Organization (ISO) standard for the safe and reliable design of offshore structures in ice.

There are several other pan-Arctic guidelines in place or being developed. The Arctic Council has recently revised their Arctic offshore oil and gas operating guidelines for the Arctic States, which recommend voluntary standards, technical and environmental practices, management policy and regulatory controls for Arctic operations. Industry has developed guidance on health aspects of work in extreme climates and the OGP is updating and revising environmental guidelines relevant to both offshore and onshore Arctic operations. On a more regional level, there is an effort underway in the Barents Sea to develop unified HSE standards to address factors such as ice load design, operational emissions and discharges, and emergency response.

We are continuing to progress standards and practices as we learn and advance our knowledge of the Arctic. Advances in technology will allow currently undeveloped resources to be considered and developed in the future.



### About OGP

OGP represents the upstream oil & gas industry before international organisations including the International Maritime Organisation, the United Nations Environment Programme (UNEP), Regional Seas Conventions and other groups under the UN umbrella. At the regional level, OGP is the industry representative to the European Commission and Parliament and the OSPAR Commission for the North East Atlantic. Equally important is OGP's role in promulgating best practices, particularly in the areas of health, safety, the environment and social responsibility.