

City Talk

HOW THE SEABED KEEPS US SUPPLIED WITH OIL

As oil and gas reserves from land-based sources become depleted in some parts of the world, scientists discovered that there were abundant quantities below the seabed, hitherto not accessible to us.

Engineers were called upon to develop the means to extract crude oil and natural gas from beneath the seabed.

During the 19th century, submerged oil wells were discovered in the lakes and seas in and around the United States. Huge rigs were developed in the form of drilling towers, which were erected and able to sit on the seabed. These were used to extract oil and gas for processing.

During the 1990s, offshore oil and gas drilling enabled Scotland to rapidly grow its economy, as large capacity wells were discovered in the North Sea.

Early versions of oil rigs were simple tower structures erected to sit on the seabed. However, there is a natural limit to what depth of water these drilling towers can operate, known to be about 500 meters.

For oil wells operating in deeper water, compliant towers were developed to allow for lateral movements due to tidal behavior. Such towers can extract oil and gas at a depth of about 900 meters.

As the scale of drilling and processing increased with time, semi-submersible platforms soon replaced the earlier drilling towers. They are huge in size and can accommodate processing, storage, workshops and personnel accommodation. Contemporary oil rig platforms often have helipads to facilitate personnel shift changes and access for maintenance and emergency crews. They have evolved into small production cities with self-sustaining facilities.

With advent of automation, and to reduce operating costs and minimize the need for full-time manual operation, modern oil rigs now have minimal operating staff on site.

Modern deep-sea drilling often



Nuts and bolts

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involves drilling holes in the seabed at depths exceeding 1,000 meters. Instead of a vertical rig and drill, oil wells can be drilled by unmanned submersible platforms, installed on the seabed, powered and controlled by long lengths of cables, dubbed umbilical cords.

The submersible platform, called a template, is lowered to locations above the highest point of a gas field, and fixed to the seabed. It includes essential machinery for drilling and extracting oil and gas and is connected to remotely positioned, semi-submersible platforms floating in the ocean.

Drilling operations are controlled by Artificial Intelligence from remote control centers. To demonstrate just how accurate such controls can be, it is like your dental surgeon operating with remote drills in your mouth from a tall building 30 floors above!

When the installation of the template has been completed, it will guide the drilling operation for best collection of natural gas, and operate as a giant control valve, monitoring the flow. The gas is then transported to a processing station either on land or on a semi-submersible platform before delivery to consumers.

As we enjoy a plentiful supply of natural gas and petroleum products, we may not notice the huge facilities that bring them to our homes and office buildings, until recent disruptions suddenly affect supply of these essential fuels for urban life.

The irony is people who brought convenience and comfort to us are now subject to severe disruption to their energy supplies. The recent shocking geopolitical developments have become a big wake-up call to us all.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over features of modern life



Large natural gas reserves have been discovered off the Black Sea coast. AP