



Big top

This is the world's tallest tensile structure, the Khan Shatyr Entertainment Center (KSEC) in Astana, Kazakhstan. Essentially a very large, transparent tent standing 150m tall at its tip, the structure has a three-layer outer shell of ETFE (ethylene tetrafluoroethylene – a type of plastic), suspended by a network of cables, which protects the interior from the region's climatic extremes.

In Astana, temperatures can reach 35°C in summer and plummet to –35°C in winter. But inside the KSEC a much milder environment is maintained all year round. Air jets beneath the inner canopy prevent the formation of ice in winter, while an outer foil layer provides solar shielding during the summer.

The area inside the structure, which has an elliptical base measuring 140,000m², is terraced, with different terraces housing shops, restaurants, a cinema and a water park. The KSEC was designed by Foster & Partners alongside Linea Tusavul and Gultekin Architects. It opened on 5 July, in a ceremony attended by the presidents of Kazakhstan, Russia, Ukraine, Turkey, Belarus, Armenia and Kyrgyzstan.

Caped defence

This deep-sea squid isn't something you'd want to see served up on your plate. Seen here in what's known as the 'pineapple defense posture', the vampire squid (*Vampyroteuthis infernalis*) lives at the lightless depths of most tropical and temperate ocean regions. Growing up to 30cm in length, this unique member of the cephalid family lacks the normal squid defence mechanism, the ink sac.

Instead, it has developed other ways to deter predators. Its body is covered in light-producing organs called photophores, which create disorientating flashes of light in the depths of the ocean. In response to threats the squid draws its caped arms over itself in a defensive web, which is covered in harmless spikes called cirri. Then it discharges a cloud of luminescent mucus from the tips of its arms, for up to 10 minutes. These 'bioluminescent fireworks' are released far above the squid's head, diverting attacks away from critical areas. If the squid itself does come under attack and loses an arm, it can regenerate one.





California oil

Stretching as far as the eye can see are hundreds of nodding donkeys, pumping oil to the surface. These pumps lie in the North Belridge Oil Field, which runs along California State Route 33. North Belridge is part of a much larger complex of oil fields 35km (22 miles) long and 4km (2.5 miles) wide.

Several oil companies operate in this area near Bakersfield. The largest, Aera Energy, is a joint venture between Royal Dutch Shell and ExxonMobil. It produces both oil and gas, lifting the equivalent of 100,000 barrels of oil to the surface each day.

Nodding donkeys – also known as pumpjacks, oil derricks, or horsehead pumps – are the classic sign of an onshore oil field. They provide a system for converting the rotary motion of a motor into a vertical motion to drive the pump shaft, and are used to lift oil out of a well mechanically if there's not enough pressure underground to lift it all the way to the surface. In the most oil-rich areas of the North Belridge field, the nodding donkeys are less than 15 metres apart.