nature insight

hydrocarbon reservoirs

Cover illustration
A natural gas platform at sunset.
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The importance of fossil fuels to human society cannot be overstated. Naturally formed reservoirs of hydrocarbons occur in a variety of geological contexts (most notably as oil and gas) and are exploited to satisfy the majority of our energy needs. Such resources are finite, yet the demand for fossil fuels is growing as the industrialization of the world continues apace. The usage of fossil fuels also comes at a cost, for example, they are strongly implicated as the main driver of climate change. Consequently, the societal impact of hydrocarbons is multi-faceted, encompassing economics, politics and the environment — all issues that are the subject of ongoing and often heated public debate.

But until we find economically viable alternative sources of energy to support our energy-hungry way of life, research is needed to further our understanding of hydrocarbon- and reservoir-formation processes, in order to exploit diminishing supplies.

It has long been appreciated that a rethink is required concerning both the location and nature of the reserves that have yet to be exploited: the 'low-hanging apples' have long since been plucked, and greater ingenuity is required to both locate and economically extract the deposits of hydrocarbons that remain. And as the industry extends its reach into increasingly hostile environments (such as deep water) — or turns its attention to unconventional classes of hydrocarbon that have until now been largely ignored (for example, gas hydrates) — it finds itself faced by a host of unfamiliar scientific challenges.

Despite the maturity of the industry as a whole, its academic needs have never been greater. No longer is it simply a case of seek-and-drill and wait for the fuel (and profits!) to flow: the modern hydrocarbon engineer increasingly needs to draw on a wealth of scientific expertise, integrating disciplines as diverse as physics, chemistry and biology to both understand and successfully exploit previously intractable reservoirs. This Insight aims to give a flavour of these diverse scientific challenges and, in so doing, highlights the need for a 'renaissance' approach to industrial hydrocarbon research.

Karl Ziemelis Physical Sciences Editor

Web focus: Fossil fuels To accompany this Insight, *Nature* presents a special web focus on the implications of hydrocarbon fuel usage, including collections of news, features and research.

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