



# Relating

Under its Great Universities Programme, BP is initiating new relationships with leading academic institutions in Russia to help find the best ways to develop the nation's vast energy reserves. *Frederick Brooker reports*



# to Russia

What do you do if you are on a drillship moored in the East Siberian Sea and a large ice island or a fast moving, resilient ice ridge looms up out of the mist? What you don't do, says Graham Thomas, BP's director of Arctic and cold region technology and engineering, is hang around. You slip your moorings and move off as rapidly as you can.

Precisely how you build the sort of advanced mooring system that would be

necessary to enable a vessel to moor in Arctic areas and unmoor at speed, or the specialised ships and equipment necessary for drilling and producing in seas that are frozen over for most of the year, is the sort of thing BP hopes to work out with the help of engineering expertise in Saint Petersburg, the former capital of imperial Russia.

Thomas and his colleagues are in the early stages of 'getting to know you' discussions with centres of expertise such as the Saint Petersburg State Polytechnical

University, to help BP create a network of leading authorities to host a BP centre for Arctic and cold regions technology in Saint Petersburg. The centre would draw on the expertise of the Polytechnical University and other institutions like the Arctic and Antarctic Research Institute, the oldest and largest Russian institution devoted to polar region studies, and the historic shipping institutes such as Krylov, which has its roots in the late 1800s as the home of Russia's first model basin for testing ship designs. ►

BP intends to set up a network of leading authorities for an Arctic and cold regions technology centre



► 'We want to understand the expertise that exists in Saint Petersburg,' says Thomas, 'and also have them help us with new development concepts and technology.'

The Saint Petersburg State Polytechnical University is one of the top universities in Russia with which BP has recently formed links. Two others, based in Moscow, are the Gubkin Russian State University of Oil and Gas and the Moscow State Institute of International Relations, universally known as MGIMO. The Moscow universities are now part of BP's Great Universities Programme, the initiative under which BP has formed partnerships with leading universities around the world, from Princeton and Caltech in the USA to Cambridge in the UK (see panel on page 38). Saint Petersburg State Polytechnical

University is not yet part of that scheme, says Steve Wittrig, BP Group Technology's director of advanced technologies, but it is a good candidate to become so because of its tremendous capabilities.

Wittrig, who has done much of the groundwork for the Russian Great Universities Programme, was also instrumental in setting up BP's links with Chinese universities a few years ago (*Frontiers*, April 2003). It seems appropriate, therefore, that one of the first Russian projects to get under way is about exploring Russia's relationship with China. It is no secret that both countries have a lot to gain from collaborating on energy matters. Wittrig believes MGIMO, which for many years was the training ground for Russia's diplomats, is

well equipped as a partner to help understand and illuminate some of the many issues in this complex territory.

'We recently took people from Russia, including some from MGIMO, to Beijing for joint academic discussions of Russia-China cultural issues. This could be the beginning of setting up academic dialogues between them,' he says.

### International standards

While MGIMO's programme leans heavily on law and the social sciences, the programmes at Gubkin University are more technology oriented. Gubkin, which takes its name from the geologist Ivan Gubkin, who helped discover some of Russia's biggest oil fields, is the country's premier university for oil and gas studies.

BP hopes to develop relationships with its Russian academic partners which will provide insights into the current status of the oil and gas industry in Russia. The universities are vast storehouses of information about Russia's oil and gas fields and the technology that has been used to develop them. Many of the academics hold key positions in the bodies that provide technology and regulations for the industry. If BP can accurately assess the current status of the industry it will have a much clearer idea of where its own resources and expertise can be used to best advantage.

Several 'oversight' projects are planned or are already under way. One such project is focused on the environmental aspects of developing the oil and gas industry in Russia.

'There are vast resources in Russia,' notes Wittrig, 'but historically there has not been as much emphasis on the environmental impacts of oil and gas production as might have been given to such matters. The TNK-BP joint venture is Russia's second largest oil company, and BP is the largest foreign direct investor in Russia (*Frontiers*, August 2005). It's important to maintain BP's international standards when we go into greenfield sites, and to understand what's already in place in Russia and how best to improve BP's operations in those areas as well.'

BP will be working with the universities to determine the present state of environmental thinking in Russia and, in return, will help to develop effective environmental protection laws and useful additions such as environmental impact statements.

'Gubkin is the leading institution in Russia for training people in all aspects of the oil and gas industry, from geology, through oilfield reservoir management and oil production, to pipelines and refineries,'



Broken ice and ice ridges are some of the conditions encountered in the Sakhalin region, offshore eastern Russia, where BP plans to develop hydrocarbon resources

says Wittrig. ‘Many of the managers and engineers that run Russia’s oil and gas companies are Gubkin graduates. The professors know how the industry operates. They know the technology and how it has developed over time, and they have very strong networks across the industry.’

BP is particularly interested in Gubkin’s encyclopaedic knowledge of the technical codes and practices that have applied over the years to Russian oil and gas projects, which have been different from international codes and practices. But that is changing. A major effort is being made to harmonise standards and bring Russia into the international fold.

‘One of the difficulties in executing projects in Russia now is precisely because all of this is changing and there is a push to harmonise,’ Wittrig adds. ‘Many of the people who understand all of this and are helping BP to work through the issues are Gubkin people.’

One BP-sponsored project that was completed shortly before Gubkin and the company signed the five-year Great

Universities agreement, is a preliminary examination of the pipeline construction industry in Russia. A report has just been issued.

‘The key thing about the report,’ says Trevor Hill, director of surface engineering for BP’s Russia and Kazakhstan strategic performance unit, ‘is that it helps BP understand how the Russian pipeline industry’s design and construction methods and processes differ from those used by BP elsewhere.’

The report covers everything from construction techniques, to health, safety and the environment. There are often significant differences, observes Hill.

## BP believes its new Russian academic partners will provide unique insights

‘For example, there are differences in cost estimation,’ he points out. ‘In the old system, there wasn’t a thorough bottom-up estimate of what everything would cost. It was done a lot more on averages. There are differences in the way that costs are estimated and tracked and allocated. That system continues to have a lot of influence.’

### Recovery review

BP recently organised workshops to explore another area of expertise at Gubkin – enhanced oil recovery (EOR), the methods used to coax more oil from oilfields as they mature.

‘EOR has not been exploited in Russia in the way it has in many of BP’s other assets around the world,’ says David Szabo, technical director for the Russia and Kazakhstan strategic performance unit, ‘so there is a huge opportunity here.’

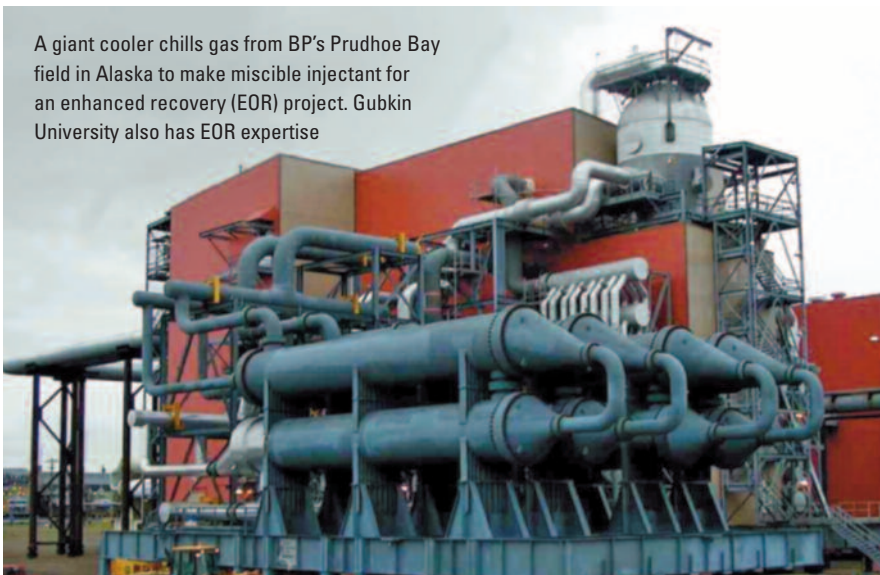
But while there has been relatively little application of EOR in Russia, says Szabo, there has been a lot of academic work on the subject.

‘We want to engage the Gubkin scientists because they’ve done this work and we can tap into what they’ve learned, particularly around the application of EOR in the various types of reservoirs there are in Russia.’

BP, which has several advanced ways of approaching EOR – for example, through different kinds of water and chemical injection, alongside strategies for placement of wells and setting production rates – believes there is scope for BP to introduce sophisticated EOR techniques to Russia, where there are differences in approach.

For example, Professor Igor Mischenko, head of the faculty of oil and gas field development at Gubkin, is an authority on

A giant cooler chills gas from BP’s Prudhoe Bay field in Alaska to make miscible injectant for an enhanced recovery (EOR) project. Gubkin University also has EOR expertise



# Great universities

In addition to the academic institutes in Russia, BP is engaged in long term collaboration agreements with a number of the world's other leading universities and research institutes under its Great Universities Programme. Each of these is addressing strategically important aspects of the energy industry in areas where the organisation has particular expertise. The universities include:

## **BP Institute, University of Cambridge, UK**

A joint venture across five science discipline departments, focused on fluid flow, including multiphase flow (*Frontiers*, August 2002)

## **California Institute of Technology (Caltech), Pasadena, and University of California, Berkeley, USA**

Together Caltech and Berkeley form the Methane Conversion Cooperative, studying ways to convert natural gas into liquid fuels and chemicals (*Frontiers*, April 2004, and see also the feature on page 18 of this issue)

## **Imperial College of Science, Technology and Medicine, London, UK**

The BP Urban Energy Systems project is exploring how energy and money could be saved if cities integrated the systems that supply their resources (*Frontiers*, December 2002)

## **Institute of Chemical Physics, Dalian, and Tsinghua University, Beijing, China**

BP sponsors the 'Clean Energy: Facing the Future' programme, investigating advanced energy technologies for China and the world (*Frontiers*, April 2003)



## **Massachusetts Institute of Technology, Cambridge, USA**

BP and MIT run the Projects Academy, launched in 2002, to improve the performance of BP's current and future managers of major projects (*Frontiers*, August 2003)

## **Princeton Environmental Institute, Princeton University, New Jersey, USA**

In conjunction with Ford Motor Company, BP is supporting the Carbon Mitigation Initiative, seeking solutions to the carbon and climate problem which are safe, effective and affordable (*Frontiers*, April 2006 and April 2002)

## **Scripps Institute of Oceanography, San Diego, California, USA**

Research into ocean science with focus on geohazards in offshore facilities design, and autonomous underwater vehicles for deepwater operations (*Frontiers*, April 2006)

BP has also recently set up three new university relationships: one between BP Solar and Caltech, a second between BP Solar and the University of Lisbon (see page 5), and a third between BP and the Dalian Institute of Chemical Physics in China (see page 39)

► relating damage to the permeability of rock in the wellbore, caused by EOR techniques, to subsequent rates of hydrocarbon production. The models developed at Gubkin provide several options for production strategies from a given well and the overall rate of production. There is a hypothesis that maintaining low production rates can increase the overall amount of oil recovered over a long period of time. There are other techniques that can be used to produce nearly as much oil but over a much shorter period of time. It is a difference in philosophy. An important question, then, is how some of BP's more sophisticated EOR techniques might fit in with the Russian mind-set. Is there room for a meeting of minds?

BP hopes to learn a great deal about the Russian oil and gas industry from its new

academic partners, and to incorporate what it learns into its own Russian ventures. In return it will fund teaching and research.

'Russian universities in general have had a difficult period over the last several years,' say Wittrig. 'The great academic and scientific institutions of the past in Russia have been short of resources since the political changes in the 1990s, which has led to a general decline in the academic and research capabilities of the universities over time. But Russia is now in a period of rebuilding academic and scientific excellence in its universities.'

Although not the only aim, a very important element of the Great Universities programme in Russia is about what Wittrig calls 'capacity building' – helping the universities to regain their footing and work toward world class performance. A very

practical example of that will be BP funding to help create a new high-tech facility at Gubkin that will draw people together from different disciplines and enable them to integrate their expertise. The new facility is expected to have many state-of-the-art features, for example those found in BP's 'highly immersive visualisation environment' 3D workrooms already established in several countries where teams can share and manipulate complex data and images, and other advanced technologies arising from BP's Field of the Future programme (*Frontiers*, December 2003).

The aim of the Great Universities Programme in Russia is simple, concludes Wittrig: 'Everywhere BP operates, we want to help build the capability and capacity for investigating and applying science at world class levels.' ■