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## BP Magazine, Issue Four 2009 – Welcome

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### Welcome

It's been a remarkable year for BP. It opened with celebrations to mark the company's centenary year and ended with new deals with Iraq and Azerbaijan, and giant discoveries in the Gulf of Mexico. One hundred years is a long time to be in any business – society, business and technology have changed beyond recognition – but what stands firm is BP's commitment to working out on the frontiers, developing the tough reservoirs, and pushing back technical and geographical boundaries. In this last edition of 2009, we celebrate that commitment, be it in the farthest reaches of Indonesia at the Tangguh gas development (on page 10), tackling Alaska's next frontier (page 40) or commemorating the 15th anniversary of the document that kickstarted BP's relationship in Azerbaijan and gave birth to a major offshore development, as well as one of the world's largest pipelines (page 52). As the company embarks on its second century, it's clear that the oil and gas industry is as exciting now as it was in William Knox D'Arcy and George Reynolds's day. As always, I hope you enjoy this edition of BP Magazine.

**Lisa Davison** > Editor

### Contributors

**Chris Moyse** has been a freelance photographer for 30 years working for companies and magazines specialising in people working within industry.

**Jason Ford** has been working freelance for the past 20 years. A diet of Tintin, Tex Avery cartoons and Marvel comics as a child have contributed to his approach to image making.

**Rashad Bayramov** is the editor-in-chief of Compass, the employee publication for BP in Azerbaijan. Outside work he is engaged as a motivational speaker on career development.



## BP Magazine, Issue Four 2009 – Welcome

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## BP Magazine, Issue Four 2009 – For the record

### The quarter in numbers

**3**

The number of major projects TNK-BP has started up in Russia this year.

**2 million**

The number of barrels of oil lifted at the Ceyhan terminal in Turkey in September. It is the largest lift of cargo from the BTC pipeline

**633million**

The global audience figures for the World Rally Championship

**\$15billion**

The approximate amount that BP and the China National Petroleum Corporation plan to invest in Iraq's Rumaila field over a 20-year period

#### IRAQ:

##### **Contract signed**

BP and the China National Petroleum Corporation (CNPC) have signed a technical service contract with Iraq's state-owned South Oil Company, to expand production from the country's giant Rumaila field, following BP's successful bid with CNPC for the contract in June.

Located in the south of the country, Rumaila currently produces around 1 million barrels of oil per day. Under the agreement, BP will work with its partners to grow output to 2.85 million barrels per day. This would make Rumaila the world's second largest- producing oilfield.

BP chief executive Tony Hayward welcomed the signing: "We are pleased to have this opportunity to work with the people of Iraq to develop one of the world's great oilfields, and to help Iraq rebuild its economy."

#### US

##### **Giant discovery**

BP has made a giant oil discovery at its Tiber prospect in the deepwater US Gulf of Mexico. The well, located in Keathley Canyon block 102, approximately 400km (250 miles) south east of Houston, is in 1,259 metres (4,132 feet) of water. The Tiber well was drilled to a total depth of approximately 35,055 feet (10,685 metres), making it one of the deepest wells ever drilled by the oil and gas industry.

#### Trinidad and Tobago

##### **Production starts**

Natural gas has begun flowing from BP's fourth clone platform in the Caribbean Sea. Savonette is bpTT's newest structure, with a production capacity of 1 billion cubic feet of gas a day. Using a 'cookie-cutter' approach to designing and building offshore platforms has enabled shorter construction times, with Savonette reaching first gas in just 18 months after project sanction.

#### India

##### **Asset sale**

BP has sold its wind power interests in India to Green Infra Limited. The three wind farms have a generating capacity of 100 megawatts and were sold for a total cash-free, debt-free enterprise value of around \$95 million. Green Infra Limited is an independent power producer owned by funds managed by India's leading infrastructure-focused private equity company, IDFC Private Equity.

#### Jordan

##### **New access**

BP is to join Jordan's state-owned National Petroleum Company (NPC) to exploit the onshore Risha concession in the northeast of the country. Subject to the approval of Parliament and the King of Jordan, BP is to farm in to the Risha concession as a partner with NPC. The Risha concession, awarded by the Government to NPC, covers an area of around 7,000 square km (2,700 square miles), and includes the Risha gas field.



## BP Magazine, Issue Four 2009 – For the record

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### Global

#### **Biofuels partnership**

BP and Martek Biosciences Corporation have signed a joint development agreement to work on the production of microbial oils for biofuels applications. The partnership combines a broad technology platform and operational capabilities to advance the development of a step-change technology for the conversion of sugars into biodiesel. Under the terms of the multi-year agreement, Martek and BP will work together to establish proof of concept for large-scale, cost-effective microbial biodiesel production through fermentation.

### UK

#### **New appointment**

Ellen D Williams is to join BP's Research and Technology (R&T) team as chief scientist on 15th January 2010. She will move to London from the University of Maryland, US, where she is currently a distinguished professor of physics. "The chief scientist's role is to offer strategic advice on how the company should position itself to gain maximum benefit from developments in science and technology worldwide," says David Eyton, BP's group head of R&T. Williams replaces Steve Koonin, now under secretary for science in the US Department of Energy.

### Top 10 Strategic Information Technologies for 2010

1. Cloud computing
2. Advanced analytics
3. Client computing
4. IT for green
5. Reshaping the data centre
6. Social computing
7. Security – activity monitoring
8. Flash memory
9. Virtualisation for availability
10. Mobile applications

Source: Gartner ([www.gartner.com](http://www.gartner.com))

### Mailbox

#### **Horizontal history**

Thank you for the Centenary special copy of the magazine, which as an ex-BP employee I read with particular interest and pride. I wish to draw your attention to page 61m which says Since its first horizontal well 15 years ago, BP has developed Andrew, et al, all with horizontal wells. However, the BK36 UK land well was successfully drilled during 1986 and attained a total departure of 857 metres, of which 287 were drilled horizontally – a first for BP or any other UK land operator. The first horizontal wells were 20-odd years ago, however I am pleased and proud to observe this pioneering work did prove beneficial to BP.

Keith Floyd Buckinghamshire, UK

#### **Chemical omission**

I have read the centenary edition of BP Magazine with interest. It is a pity that Alexander Duckham & Co, lubrication technologists, were not mentioned. This company was acquired by BP in the early 1990s and was responsible for producing and marketing the first multigrade oil in the UK under the brand Q5500. What is even more extraordinary is the failure to include BP Chemicals. All the more puzzling is the inclusion of BP Proteins, BP Coal and BP Nutrition in the timeline, which were only fleeting interests, compare to BP Chemicals' 60 plus years. Unfortunately, as a result readers will either be disappointed or have an unbalanced view of BP's history.

Dr NA Perkins Hampshire, UK

Ed's reply – making the story selection for the Centenary edition of BP Magazine was incredibly difficult and invariably we were not able to include every area of the business. While it is with regret that we did not include BP Chemicals in the timeline, we did try to represent both its ongoing role in the company and the part played by our heritage company, Amoco, through the mini-interview with Del Meyer on page 51. Colin Williamson, UK

If you have any comments about BP Magazine then please send them to: [bpmagazine@bp.com](mailto:bpmagazine@bp.com) or BP Magazine, Bldg 200, Chertsey Road, Sunbury-on-Thames, Middlesex, TW16 7LN, UK



### The future of energy: Balancing collaboration with competition

In today's energy landscape, tough choices are needed for a more sustainable future. BP's head of Research and Technology, David Eyton, believes partnerships are part of the solution, but how to balance collaboration with competition?

The International Energy Agency (IEA) predicts that energy demand will roughly double by 2050. Building a more sustainable energy future is clearly a necessity, but what will that future look like? The simple answer is that we do not know exactly, but we can make some informed projections.

With 42 years of proven oil reserves and 60 years of proven natural gas reserves today, and large estimates of resources yet to be found, hydrocarbons will play a major role. In 2050, oil and gas production is still expected to be at around today's levels. Therefore, projected growth will need to be satisfied by nuclear power and renewable energy sources.

Renewable energy is growing rapidly, but from a small, and currently costly, base. The IEA estimates that additional annual expenditure of up to €1.5 trillion will be needed to shift to a more sustainable landscape. This is a vast sum, most of which will need to be spent by developed countries in the developing world.

The cost of renewable energy supplies will fall as new technologies are developed. Hydro-electric, onshore wind and biofuels from certain sources are the most economic forms of renewable energy today, with offshore wind and solar power likely to become competitive after 2020.

The fossil fuel industry must also reduce its environmental footprint to play its part in building a bridge to a more sustainable future.

In the power sector, natural gas is critical to the transition. It is the cleanest fossil fuel and generates less than half as much carbon as coal per kilowatt hour. Indeed, gas offers the greatest potential to provide the largest carbon reductions at the lowest cost, all with technologies available today.

Carbon capture and storage (CCS) offers massive potential for decarbonising electricity generation. Despite the immature technology involved, fossil fuel-based power with CCS competes today with several alternative energy sources, especially if provided with similar policy support mechanisms. BP leads two of the most advanced CCS demonstration projects in the world – hydrogen-fuelled power plants with CCS in Abu Dhabi and California, US – as well as the In Salah CO<sub>2</sub> capture, storage and monitoring project in Algeria.

Given the scale of the challenge, political leaders, industry and scientists need to play their parts in designing and deploying energy solutions – there is no 'magic bullet' and there will be regional variations. Scientists need support in developing affordable local sources of energy that do not damage the environment; and industry will deploy these solutions on a global scale, provided that political leaders create the market context for successful deployment.

Which leads us to perhaps the most difficult task facing political leaders – how to strike a balance between competition and collaboration? Our view is that this can only be achieved through effective dialogue with industry and academia. We should not forget, though, that one of the primary drivers of innovation is competition itself. Collaboration makes sense when the bigger goal is worth it. For example, there are international programmes related to nuclear fusion and space exploration.

Today, some 10-20% of global stimulus packages exceeding \$2 trillion are targeted at energy innovation. The question for a company like BP is how do we engage in this new activity to support its intent? Big energy companies play a vital role in developing a diverse range of technologies, because we have the ability to take financial risk and construct and integrate value chains.

Successful innovation in energy systems will come from a diverse set of players, all of which are needed – from universities and national labs, through start-up companies, to major corporations such as BP.

Indeed, we believe that the ability to collaborate can be a source of competitive advantage – from those with universities, through to public-private partnerships. Why do we believe these collaborations will succeed? The key is alignment of purpose. Addressing climate change together is one such purpose.



## BP Magazine, Issue Four 2009 – The Big Issue

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In 1997, BP accepted the case for precautionary action related to climate change. Throughout the past century, we have operated at the frontiers of the industry, in collaboration with research institutions, other companies and governments. This gives us confidence that we can rise to today's energy challenges – continuing many longstanding partnerships, and, no doubt, starting some new ones.



## BP Magazine, Issue Four 2009 – BP Faces

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### Storm chaser

#### Ed Bracken / chief meteorologist

Weather has a profound impact on BP's global businesses, from energy trading to production, and from refining to personal safety. Around six years ago, meteorologist Ed Bracken joined BP as a weatherman to help the company's global energy traders gain competitive advantage. Today, 'Dr Ed' helps all sorts of businesses and people, providing forecasts as needed: will it flood, and will employees be able to drive to work safely? Is fog expected, and will it impact shear-shore shipping lanes? Where will the next hurricane likely strike, and when should we evacuate platforms? "Anywhere that BP has an asset or simply a need to know the weather, I provide help. I analyse and forecast the weather for many different energy-related sites including wind farms, well-sites, oil and gas platforms, refineries and chemical plants, power plants, ports and waterways," he says. Dr Ed put in quite a lot of time flying in and through storms to become a predictor of Mother Nature's weather whims, while working on his doctorate in meteorology. "There is nothing I enjoy more than making a forecast, communicating it and seeing it used to make important decisions, correctly. The ones I feel best about are when my forecasts are used to keep people safe."



# BP Magazine, Issue Four 2009 – BP Faces

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## A science, and a fine art

While new, thinner lubricant oils play a crucial role in making motor engines more fuel efficient, they can cause greater wear and tear and, sometimes, mechanical break down. Finding the delicate balance of chemicals required to provide optimum performance and lower emissions takes great scientific skill.

Report> Helen Campbell

Illustration> Mike Stones

We probably don't normally pay much attention to the oils that go into our cars, especially in an age when most of us leave oil changes to the mechanic carrying out the annual service. But, even if fewer of us are actively interested in getting our hands dirty, there is strong evidence of modern interest in engine performance, which is where lubricants come in.

Anyone who has ever experienced the horrors of an engine overheating will know what happens if the oil is not kept topped up. Oils are crucial to cooling an engine and reducing friction by preventing the metal parts from rubbing together, and a smooth-running engine is more efficient, usually cheaper to run, always quieter and very often cleaner. With up to 10% of the fuel being consumed just to overcome the frictional losses in an engine, it is clear that lubricants have an important role to play.

But the technology is far from simple, and every lubricant is a complex mixture of base oils, chemicals and additives, combined into the perfect formulation to provide the best performance. In older engine technologies, lubricants typically used to be of a fairly thick consistency. Over the past 20 years, engine technology has advanced dramatically. Alongside this development, advances in lubricant technology have permitted thinner oils to be used. If a lubricating oil is very thin, it can be pumped around the engine's moving parts more easily than a thicker oil, and less fuel is used for pumping. But thinner oils can provide less protection against the engine's components rubbing together resulting in wear and tear, and sometimes engine breakdown.

An array of speciality chemicals are added to the oil to minimise the problem, but if the mix isn't perfectly optimised, some of them can actually increase friction and thereby reduce engine efficiency. Getting the balance right requires a lot of careful scientific experimentation, something BP, with a leading position in lubricants research and development, does very well. To give an example, chemicals containing sulphur and phosphorus are widely used in engine oils to protect the engine's metal surfaces. Unfortunately, they can increase friction in the engine and can, sometimes, be detrimental to the exhaust catalyst systems over time. Where possible, BP has minimised the use of these elements and developed alternative technologies that maintain, or even exceed, the performance of current sulphur and phosphorus technologies.

Traditionally, lubricant suppliers have started working with engine manufacturers towards the end of the engine development process, in many cases after the manufacturer has spent years developing a sophisticated new engine. The manufacturer then subjects this expensive prototype to an extensive range of durability tests, sometimes finding that the oil used in the previous design doesn't work as well, or in the same way.

It is always easier to make effective changes to something at the start rather than at the end, and the best way to make the most effective lubricant is to work closely with the engine manufacturers. That way, BP's engineers and chemists can develop oils that match often very subtle changes made to engine design and, by being involved from the beginning of the design process, can make suggestions so that both parties work together to create optimal designs for both engine and oil.

### Improving efficiency

A lubricant introduced to an existing engine close to production can typically make a difference of only 0.5% to fuel efficiency, certainly of value to a car manufacturer, but pretty small, nevertheless. But, with manufacturers trying to improve fuel efficiency by 40% over the next 10 years, the 2-5% difference that can potentially be offered by a lubricant developed in line with an engine is of high value indeed.

For example, if a car manufacturer designs an engine, and durability tests show excessive wear because the oil doesn't effectively lubricate the metal surfaces in the bearings and valve train, then adjustments can be made to the oil's composition, the engine components' geometries and/or the metal surfaces. Changes like these can be



introduced to counter problems with wear or durability during the engine development phase, while still allowing the engine manufacturer to have a more fuel-efficient engine oil.

A successful partnership between engine and oil means a successful partnership between engine and oil manufacturer, with a high level of trust and communication. Some oils are the consistency of water, others are like honey, and finding the best recipe is what it's all about.

## Lubricants stats

### 25-30%

The percentage of the fuel consumed by the average diesel car on the standard European Drive Cycle that is wasted due to 'parasitic' losses

### 10%

The percentage of energy in a diesel engine that is lost due to friction

### 18%

The average efficiency of the average petrol car



## Growth agenda for tangguh

It's been 15 years in the planning and at one stage required multiple forms of transport to reach, but the start-up of the remote Tangguh gas development, in Indonesia, is testament to the careful dedication of a team determined to help the region unlock a valuable asset.

Report> Amanda Breen  
Photography> Chris Moyes

### Business profile> Tangguh gas development

Space may be known as the final frontier, but what of the far-flung corners of our own planet? Some may well be worthy of a similar title. Consisting of around 17,000 islands, the extremities of the archipelago nation of Indonesia could be a serious contender, with their fair share of isolated shores.

In the far east of Indonesia lies the island of New Guinea, the western half of which forms Tanah Papua (referring to the two Indonesian provinces of Papua and Papua Barat); the eastern half forms Papua New Guinea. Despite being part of the world's second largest island and, on a map, lying tantalisingly close to the vast Australian continent, some areas of Tanah Papua require a voyage worthy of the boldest explorer to reach them.

Air transport alone is inadequate to reach the farthest corners of these Indonesian provinces. A journey may require various methods of transport; perhaps a boat to circumnavigate the coastline or a dug-out canoe to negotiate the inland waterways.

Tanah Papua is a landscape of equatorial swamps and snowy mountains. It is also Indonesia's least populated region. What it lacks in people, though, it makes up for in natural resources – copper and gold have been mined here since the 1960s. Its natural wealth extends offshore, too: in 1994, significant natural gas reservoirs were discovered by BP's heritage company, ARCO, in the Berau Gulf and Bintuni Bay, on Papua Barat's Bird's Head Peninsula.

Located some 3,200km (1,990 miles) east of Indonesia's capital, Jakarta, the peninsula may as well be a whole world away. The discovery in this area was a classic case of stranded gas; far too valuable to be left in the ground, but too far away from any viable market for a pipeline to be even considered a possibility. Liquefying the gas provided the solution, allowing it to be shipped to markets, no matter how far away.

No stranger to operating in some of the world's most isolated locations, BP took an opportunity to grow its portfolio in southeast Asia, developing and operating the Tangguh liquefied natural gas (LNG) project, following its purchase of ARCO in 2000. The development of these offshore gas reserves offered tremendous potential: not just for Papua Barat, one of Indonesia's most under-developed regions, but for Indonesia as a whole to further secure its position as one of the world's leading LNG exporters. With established LNG centres in Arun and Bontang, Indonesia already has a solid record of producing this valuable resource.

At the time of the Berau Gulf and Bintuni Bay discoveries, Papua Barat had none of the infrastructure required to access and develop an offshore gas resource, or construct a world-class LNG plant on its shores. "Building a two-train LNG plant anywhere is a massive endeavour," says William Lin, president of BP Indonesia. "But undertaking this kind of project in such a remote location simply goes above and beyond. It is only when you visit the site that you can truly appreciate its remoteness, so to now enter the operational phase is a monumental achievement."

After 15 years of planning, the facility is now in operation and the first shipment departed for South Korea on 6th July 2009. Tangguh represents a series of firsts for both BP and Indonesia. Where previously the country's LNG facilities had been built, owned and operated by state oil company Pertamina, changes to legislation in 2001 allowed international companies to take control of new developments, under the eye of a new oil and gas upstream regulatory body, BPMIGAS.

Tangguh was the first project sanctioned under this new organisation. With a 37.16% interest, BP operates the project's three licence blocks on behalf of the Government of Indonesia through production sharing contracts. The



only integrated upstream and downstream LNG project in Indonesia, Tangguh is also BP's first fully integrated LNG facility. In other words, the company manages all aspects of the business, from drilling the gas to marketing it to global customers.

Securing gas sales agreements before undertaking any construction in Papua Barat was the cornerstone of BP's strategy. Years before the plant's foundations were laid, contracts to deliver more than 7 million tonnes of LNG a year were signed with customers in China, Korea and the US. As one of the first major projects in the wake of the 1997 Asian financial crisis, sales negotiations – as well as those to fund the venture – were complex. The final investment decision came in March 2004, with loans totalling \$3.5 billion from 11 international banks finalised in 2007.

With customers ready to purchase the gas, and financing in place to move the project forward, BP still faced a number of challenges to bring Tangguh onstream. Those challenges were across the spectrum: technical, social, political and logistical. Undertaking such a venture on the edge of a rainforest and hours from any industrial infrastructure is a task that many businesses may have chosen to avoid; the mission called for ingenuity, commitment and diligence.

No roads, airport, power or water supply meant the project team had to start from scratch. The first challenge lay in getting people and equipment out to the Bird's Head Peninsula – a very long trip faced by BP's staff from the company's country headquarters in the Indonesian capital. "The journey from the office in Jakarta to the field used to take me 18 hours," recalls David Clarkson, who was the project's executive vice president from 2001 until 2008. "We would fly to Bali, then onto Biak, an island off the north coast of Papua. From there, it was a twin-motor aircraft to Kaimana, and next came a helicopter over the rainforest to a place called Saengga, where we constructed a wooden heliport and the base camp. Finally, we took rubber boats or faster fibre glass boats to the bay. I remember wading through warm water up the beach to reach the future LNG site."

Gaining easier access to the site became the immediate priority: a temporary construction jetty allowed materials such as sand and gravel to be delivered, while a dilapidated Second World War airstrip had to be cleared. With these basic transport hubs in place, the way was clear for construction of the offshore platforms and the plant itself.

The best location for the LNG plant, from a technical perspective, had been identified through a series of feasibility studies as land already occupied by the small community of Tanah Merah. On the edge of the bay, with less mangrove density than other areas and a favourable water depth, the site was ideal. In 1999, negotiations with the villagers resulted in 127 families agreeing to be relocated to two sites, one of which was a newly-constructed village.

Under the Government of Indonesia's regulations, the project required an integrated environmental and social impact assessment to establish its non-commercial development commitments. In addition to seeking advice from experts at The World Bank, Asian Development Bank and non-governmental organisations, two years of consultation saw BP teams visit dozens of Papuan villages to hear locals' thoughts on the development.

The Indonesian government sanctioned the project in 2005 and construction on- and offshore began shortly after. Tangguh's gas comes onshore, untreated, from nine offshore wells, via two unmanned platforms. Two pipelines carry the gas to the Tangguh onshore receiving facility, which has two LNG processing trains and uses the 'combined cycle' method of harnessing power from the waste produced by the processing, making it one of the most efficient LNG plants in the world.

Water and condensate are removed from the gas before it is liquefied in what are essentially giant refrigerators. The liquefied gas is then stored in one of the plant's two tanks which, at 170,000 cubic metres (6 million cubic feet) each, are some of the largest LNG tanks in the world.

With operations now underway, the BP Indonesia team has taken the opportunity to reflect on achievements to date. "Success in reaching the operations phase is thanks to the co-operation of all our stakeholders, including the Government of Indonesia, the regulatory body, NGOs, our contractors and, of course, the local people of Papua," says Nico Kanter, BP Indonesia head of country. "It has been a result of teamwork and determination to get things done in such a remote area."

Community support was crucial to ensure the project's progress. As part of BP's commitment to local people, during the construction phase, jobs were offered to at least one member of every family listed in the 2002 census of the resettlement-affected villages. A series of development programmes was also implemented in areas such as education, health and governance. While BP is committed to its integrated social programme throughout Tangguh's operational period, sustainability is the focus, with the aim for local communities to become self-reliant and thrive long-term.



“We cannot be complacent, therefore, we will continue to engage with the community,” adds Kanter. “Our commitment to them is equally important throughout the operating phase.”

Looking ahead, the main objective for Tangguh next year is to establish safe, reliable and efficient operations at the LNG plant. “A world-class facility like Tangguh deserves a world-class operating organisation,” says Lin, “and that is in our sights, as we continue to recruit and retain the best people for the job.”

With Tangguh now up and running, BP is also examining other opportunities for growth in Indonesia. Coalbed methane is one option: the Indonesian provinces of East Kalimantan and Sumatra have the potential to produce significant supplies of this natural gas. And via an agreement with the national oil company Pertamina and more than 30 years’ experience in producing this lower-carbon fuel from the San Juan basin, in Colorado, US, BP is well-positioned to leverage its expertise and technologies in this area.

In addition, BP Indonesia will return to its roots, says Lin. “The significance of the Tangguh start-up gives us license once again to look at future prospects for growth and to re-establish ourselves as the world-class explorer that we are.”

Clearly, for BP in Indonesia, Tangguh is not the final frontier. As remote as the LNG plant is, there remain further places on those many Indonesian islands where the company can offer its 100-year experience in meeting the world’s energy requirements.

### Monitoring responsible development

The impact of BP’s activities in Papua Barat has been overseen by an independent panel of advisors. Established in early 2002, the Tangguh Independent Advisory Panel (TIAP) was charged with advising BP on how the liquefied natural gas (LNG) project could achieve its potential as a world-class model for responsible development.

Even before the project was officially sanctioned and construction began, BP set in place action plans for the communities that would be affected by the future plant. The integrated social programme has seen development efforts concentrated on improving health, education and general living standards, as well as offering support in livelihood and governance.

Results of the social development programme have been reviewed by members of the TIAP, who have visited the LNG site, the surrounding villages and some of Indonesia’s major cities on seven occasions. As part of its brief, the panel met with many Indonesians, including leaders of the directly affected villages, officials from the Regency of Bintuni Bay, along with government ministers and non-governmental organisations (NGOs) representatives in Jakarta.

They have reported their findings annually and made them available to the general public via the internet. They include a series of recommendations made to BP across areas ranging from security to in-migration. Lord Hannay of Chiswick, a former British diplomat and former ambassador and permanent representative to the United Nations, was among TIAP’s members and talks to BP Magazine about the panel’s role.

#### **What was the primary function of the Tangguh Independent Advisory Panel?**

Our main objective was to oversee the socio-economic and environmental aspects of Tangguh; our role was advisory, not executive. It was completely unprecedented, though, for BP to establish such an independent body from the very start of its project planning. On other occasions, a panel has been set up once a project is already underway, but never at such an early stage.

#### **How did you become involved with the panel?**

All the members were assembled by BP and none of us knew each other previously. The company selected a former American senator of great distinction, George Mitchell, to chair the group, along with Sabam Siagian, a former Indonesian ambassador to Australia and former chief editor of the Jakarta Post, Reverend Herman Saud from Jayapura, and myself.

Our first visit together to Indonesia was a voyage of discovery. Access to Bintuni Bay was unbelievably difficult as there was no airstrip. We had to go in by helicopter, but nearly didn’t get out again on schedule, as the weather closed in. Needless to say, it was fantastically arduous compared with the journey there today.

#### **What happened after each of the panel’s visits to Papua Barat?**

In the following months, we would compile our report and pass it on to the company. We were absolutely determined – and BP accepted – that every word of it should be published. We suggested that publication should only take place



when the company was ready to respond to our recommendations, so both documents came out together. Once the report was available, we held events in Washington DC and London for NGOs and others, to explore the contents of the report. That's the pattern we followed since our first visit, with considerable success.

### **How was TIAP's remit devised?**

We had a number of briefings, but both BP and TIAP came to the conclusion that there were half a dozen key issues. Security was the most prominent, followed by factors such as education, health, governance and capacity-building. There was also the question of revenue flows from Tangguh: a clear link needed to be established between the gas being exported, the money going to Indonesia and seeing real results in Papua at the end.

Various issues evolved over the course of seven years, but they remained the same issues at heart. For example, with employment of the local community, the first challenge when building the plant was how to employ enough Papuans with the right skills. Then, as we completed construction, it was about how to demobilise a workforce without causing disturbance, and, finally, there was the matter of how to deal with Papuan recruitment in the operating phase.

### **Why was security so important for the Tangguh project?**

At the outset, there was concern regarding a possible influx of Indonesian armed forces and police into the area to guard the LNG facility, and how they might act. BP wanted to implement a community-based security programme, which had never been tried before. It was far from certain that the Indonesians would accept this method, but after gaining the support of the then coordinating Minister of Political and Security Affairs, Susilo Bambang Yudhoyono, who is now in his second term as the President of Indonesia, along with the police chief in Jayapura, the community-based concept was implemented.

As time went on, the prominence of the security issue as part of our work became less and less, because it was a good news story. The programme has been very successful so far and the panel has overseen its transparency: every payment from BP to local police for running training exercises or other activities has been published.

### **How has local migration impacted on the Bintuni Bay area?**

I don't think the migration story is a bad one. Obviously, this massive project was going to have local consequences as it brought more cash and purchasing power into the area. But the point is, these consequences were kept under strict control and the recruitment process was very well handled. The villages have certainly not been swamped with in-migrants, but there was one small matter which took a while to rectify: some people in the directly affected villages, who had absolute guarantees of employment, were passing these on to in-migrants. That was halted, though.

Now, as a result of the Tangguh project, the small town of Bintuni has doubled in size, with shops opening and the emergence of certain service industries. A local government is now in place, which is creating an infrastructure. I don't think this is a bad thing at all.

### **What was the reaction of local Papuans to the Tangguh project?**

We saw the attitude of locals to the project change a great deal over time. In the beginning, they regarded us, the panel members, as people who they could complain to and then something better would happen. But at our last meeting in December 2008, when we brought all the villagers to Babo, there was hardly a single word of criticism. It was extraordinary. They were saying 'Please, more of the same. It's going well.' These town meetings were very important and had never happened before. The people had never seen an Indonesian official, above the local village chief, let alone a foreigner. They responded extremely well and made some very pertinent points.

### **Reflecting on the Tangguh project, is there one particular challenge that stands out?**

I think the biggest one that remains is the commitment to have Papuans in 100% of the skilled positions, and significant portions of management roles, 20 years after operations begin. It is a huge challenge and if it is accomplished, Tangguh will be a real showcase project for Papuans and Indonesians. It is quite demanding, as it takes time to move people through the education process. But there has been a start with 53 Papuan operators trained at Bontang, one of Indonesia's other LNG centres, and now working at Tangguh.

### **Does Tangguh set a benchmark for other projects in under-developed parts of the world?**

I think it should do, but we'll only really be able to write that story in 30 years' time. So far, the panel's reports reflect a positive story. For example, driving the incidence of chronic malaria down from 23% in 2000 to 2.4% in 2008 is tremendous. The improvement in education standards is also very good news. Local villages have been helped to build jetties and to collect rainwater so they are not drinking from contaminated sources. But there is a long way to run with a 30-year production span, possibly longer if more gas is discovered. It is a case of so far, so good.



### An interview with BP's newest board member

#### Bob Dudley

Interview: Martin Vander Weyer  
Photography: Graham Trott

With a 30-year career in the oil and gas business, Bob Dudley has seen his fair share of challenges – be they technical or political. But it's clear his appetite for taking each of them on is as healthy now as it ever was.

In the week I met Bob Dudley, he was celebrating 30 years in the oil and gas business, and BP had announced a major new deepwater find – the Tiber field in the Gulf of Mexico. It was a nice coincidence of timing, because for a 54-year-old who has had a pretty tough career so far, Dudley exudes a young man's enthusiasm for the challenges ahead.

He's fascinated by the advances in science he's seen since his early days as an engineer in Amoco's Texas fields, and those he expects to see in years to come: the imaging technology that makes it possible to visualise and exploit deepwater finds such as Tiber, or the developments in petrotechnology and biofuels, in which he believes BP can lead the transition to lower-carbon energy. But he's also been fascinated throughout his career by the human and political factors: what he calls 'the intercultural chess game' of big oil, the positioning and relationship-building which are now at the core of his role as a main board director and executive vice president for Asia and the Americas.

Not being on the operational side of the business – fellow executive directors Andy Inglis and Iain Conn hold that responsibility – gives him "the luxury of being able to think about these complex relationships and strategies to be able to help the management team anticipate the relationships of the future. The complexity of our partnerships and joint ventures has risen considerably in the past 10 years and we're going to continue, in my opinion, down that path. BP's strengths – being good at technology, but also good at forging and maintaining relationships – are a vital combination heading into this century."

When Dudley took up the job in April 2009, chief executive Tony Hayward described it to him as being "the management team's Foreign Secretary – or perhaps Secretary of State in American terms." Those 30 years of experience equip him handsomely for it, and indeed the globetrotting role is perhaps the ultimate fulfilment of the urge that brought him into the oil business in the first place: "I've always had a burning passion to see the world."

Born in New York and raised in Mississippi, the son of a US naval officer who became a physics professor, Dudley studied chemical engineering at the University of Illinois and management at the Thunderbird global business school, before joining Amoco in 1979. After his first hard-hat-and-boots stint in Texas, the formative moment of his early career came when he was posted to Aberdeen, to work in the North Sea as an engineer.

#### Leading edge

"This was the place to be," he says. "It was the leading edge of oil and gas technology. My skin tingled every time I went offshore and landed on those big platforms. It opened my eyes to the engineering capability of our industry. I loved that. I was there for three years, and I probably enjoyed living in Scotland more than any place my wife and I have ever lived."

Next, in 1987, he took on a deepwater project in the South China Sea. There were "all kinds of personal lessons from working with the Chinese": it was an opportunity to see their country in the first phase of radical economic transformation. "Watching the project move from a gleam of an idea, all the way through to finding the oil and developing it and putting thousands of people to work, was really the first time I saw the prosperity that a company like BP could bring. To be able to be part of and see such 'real life' change was transformational for me. And I realised I really enjoyed it."

The South China Sea project ran for 15 years until, as originally agreed, what had by then become BP's interest was returned to the Chinese state oil company. Meanwhile, Dudley moved to Moscow in 1994. Here was another transition economy, in the unpredictable grip of Yeltsin-era capitalism. Dudley's assignment was to try to cement a strategic alliance with one of the emergent Russian oil giants, Yukos, but, after two-and-a-half years of negotiation, the local partners swept the deal off the table. For a young executive who got such a buzz out of bringing projects to fruition, it



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was a blow – but not enough to put off Dudley returning to Russia a few years later for the bigger challenge of TNK-BP.

Before that, however, came BP's marriage proposal to Amoco. Dudley was general manager of strategy in Chicago at the time; when the merger went through, he moved to London to join John Browne's team working on the integration. "It was a fantastic experience to get to know BP's people and assets around the world. And I could bring a perspective from Amoco to John and the team here. But people forget that at that time the price of oil was down below \$10 a barrel, so there were fierce cost pressures and it was always going to be painful. BP led the consolidation phase of the whole industry. We had to take decisions very quickly. Everybody rolled up their sleeves and worked very long hours and it created a teamwork that I think is still here today with the people who were involved."

Once the merger had bedded down, Dudley spent time as head of renewable and alternative energy, focused on solar and wind technology, and then in his 'dream job', working on exploration and production in places including the Caspian, Angola, Algeria and Egypt: "some difficult parts of the world but, for me, the most interesting."

'Difficult but interesting' would certainly sum up his experience with TNK-BP, the Russian joint venture where he was president and chief executive from its formation in 2003 until – as the world knows – strained relations with the Russian shareholders forced him to leave Russia and eventually step down from the post last year. Looking back, he's philosophical and optimistic. "There was a lot of pressure, but it's probably fair to say, although it felt personal, that most of it was just business Russian-style. In the end, I needed to step out because there was no dispute mechanism. But it has had a pretty good outcome. The ownership structure has been preserved. There are outside directors now working with the company and it continues to do well – and that's the most important thing. Anyway, as I've said, I love every aspect of this energy business, always have, and I think we can call that an example of the extreme end of the fun!" Enough said.

### Family ties

A consolation for the occasional stresses of his working life is the fact that Dudley's family has always followed him wherever he was posted – his son and daughter, now students at US universities, attended an Anglo-American high school in Moscow, and his wife, Mary (who he met at Thunderbird), has a continuing commitment to a charity she founded in 1997 that supports disabled Russian children. Now, the family homes are in London and the US, where they also keep a sailing boat: a competitive swimmer in his youth, Dudley says "I've always loved the water."

But there's no hint that he's looking for a more settled way of life. He recites his itinerary for the next six weeks, crisscrossing China, India and the US. "I'm not tired of travel. I enjoy meeting people and learning about their countries. I like making connections for BP, making things happen, making them move forward."

And there's plenty more of that to be done. In the US, where BP is the largest oil and gas producer, he's working with teams in Houston and Washington that are thinking about the cleaner fuels of the future, and making sure legislators across America are fully informed about what the energy industry can and can't do. "More than many other energy companies, BP participates across the spectrum – exploration, production, refining, marketing, solar, wind and biofuels. That gives us solid credentials to lend expertise to the policy debates that will shape our industry going forward."

Similarly, the Chinese, despite their huge current appetites for oil and coal, are also interested in BP's experience of renewable and low-carbon energy – because they want to become a global centre of green-tech manufacturing, and they don't want to be disadvantaged by climate change agreements. "In a small but real way, BP can help link Chinese, US and European policymakers."

### Chess game

Against that background, Bob Dudley has no doubt that there's still a long future for fossil fuels – a 20-to-30-year search for viable new hydrocarbon resources, while the alternatives are developed to commercialisation. And despite occasional setbacks in the chess game, he believes there's a continuing role for the corporate model that BP represents.

There will be more sophisticated partnerships with state oil companies as they go global, he predicts, along the lines of BP's venture with the Chinese in Iraq. But, fundamentally, there's 'a certain amount of magic' that international oil companies still bring to the party. "Our combination of capabilities and outlook strongly supports our business model. It goes through cycles: in my career, I've been through the oil price cycle roughly four times. I've been through contractions, expansions and excesses, and each time, someone declares that the role of international oil companies is dead. It is not, and I'm excited about the future, and BP's next century."



## BP Magazine, Issue Four 2009 – technology

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### Bringing genius to the table

Innovation board> enhanced performance

Sniffer dogs, slugs and ventilated trousers may not be the first things that come to mind when discussing BP's core values, but, strangely enough, they provide proof that the spirit of innovation is alive and well.

Report> Nick Reed  
Photography> Jason Ford

#### Innovation

is the lifeblood of any progressive company eager to make a difference in an increasingly competitive marketplace. And it is innovation that will be one of the key differentiators of performance for investors in the wake of the latest global economic crisis, helping them decide which organisations can do things better, faster and more efficiently than their rivals.

That's why 'innovative' is one of BP's core values. It is constantly looking to change, improve and enhance its operations and performance: through innovation, it aims to "push boundaries today and create tomorrow's breakthroughs" via its people and technology.

Examples of innovation abound throughout BP, of course. But some of the most intriguing projects over the past decade or so have come out of Exploration & Production Technology (EPT), where a multi-disciplinary Innovation Board has scored some remarkable successes through its seed-funding of enterprising new ideas submitted by employees.

The concept is quite simple. Most innovation within EPT, probably within BP as a whole, is driven by the needs of a particular project or task. To be truly 'innovative', however, there also needs to be a channel that allows individual bright sparks to bring their ideas to the company table, regardless of any connection those suggestions may have to that employee's job or department.

This is where the Innovation Board comes in. Established in 2000, with a clear mission to nurture and promote sustainable growth in the innovative capacity and capability of EPT, the board meets every two weeks to consider new ideas submitted via a simple online form, and to discuss the progress of those projects already in the system. Membership of the board varies from eight to a maximum of 13 at any given time, and deliberately rotates on a regular basis – not only to ensure all disciplines are appropriately represented, but also to keep the process fresh and vital.

#### Compelling case

More than 40 members have sat on the board in the past 10 years, during which time in excess of 700 ideas have been considered and more than \$20 million in funding distributed. Many suggestions, not surprisingly, have been rejected as being unworkable or for having no commercial value. But no fewer than 65 have been turned into compelling business cases by their originators, and 14 have already added significant value to the company. Others in the pipeline are expected to do the same.

For as little as \$15,000 seed funding to help build a business case internally and with external bodies as necessary, sometimes to secure intellectual property rights too, some projects have gone on to add millions of dollars in value to BP.

"If we decide that an idea should be developed, we encourage the person who submitted it to stick with it and use our funding to make the business case. We also appoint someone from the business, not necessarily a board member, to be their coach and mentor," says Don Harrop, senior advisor/segment engineering technical authority, Materials and Corrosion. Harrop is not only the current chairman of the Innovation Board, but also one of its few remaining founding members.

"The funding, however, is probably the least important aspect of what we do. Of far greater significance is the support and expertise we give people to help knock their ideas into shape, before they go in front of BP's decision makers.



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This also establishes a connection between our research and development function and the strategic performance units early in the process, ensuring a proper customer focus, a smooth development of the idea, and, ultimately, its adoption if applicable.”

By tracking the ideas as they are developed, he adds, the board can also understand the role it plays in the overall innovation value chain.

### Idea generation

The EPT Innovation Board's role doesn't stop with this Dragon's Den-style approach to ideas pitched, however, as Elaine Svärd, EPT Innovation Board coordinator explains: “To reinforce the importance of innovation within the wider business, we also organise and run innovation training programmes, forums and workshops, which, in turn, generate further proposals.”

None of this happens by chance, of course. Key to the board's success is not only its diverse membership, but also how such diversity is managed. That task falls to Svärd, who has been the Board's coordinator almost since its inception.

One of the board members is an external expert, Steve Markham. As professor in management, innovation and entrepreneurship at North Carolina State University, who has helped set up similar bodies at organisations such as Nortel and Ameritech, Markham is ideally placed to judge the effectiveness of EPT's board. “It's certainly one of the most successful innovation projects I've seen within an organisation,” he says. “The variety and size of projects that get picked up on a regular basis proves that, and the number of material successes is really quite remarkable.”

He adds: “People don't think you can manage innovation, but it's quite predictable, and this board proves that it can be done. We've focused on short-term wins and long-term benefits. The board managed projects quite aggressively to ensure we had successful outcomes and that has demonstrated to employees the value of them submitting ideas. “Since companies are under such pressure these days in terms of time and budgets, there is often no room or patience for innovation. BP has proved that, if you give individuals the right space and encouragement, you can ensure that innovation is an investment, not a cost.”

One employee who agrees emphatically with that assessment is Norman Sanderson, an advisor in pipeline technology. He is one of a select band known as ‘serial innovators’, due to the large number of ideas they submit to the board. His suggestion for fibre optic cables to detect pipeline leaks (see page 28) is just one of several to have already been successfully adopted.

“I see it as a marvellous opportunity, because it gives you a home for ideas, and the freedom to develop them even if they are outside your own area of work,” he says. “If you don't have time to develop the idea yourself, you can also pass it on to one of our enthusiastic, young graduate engineers. Since it encourages them to take up a challenge and gain experience of running a project, it is potentially an important contribution to talent development, too.”

### From innovation board to drawing board to commercial reality

Seed funding from the EPT Innovation Board provided the impetus for two projects commended in last year's Helios Awards finals – BP's global recognition programme.

One idea originally submitted by then Challenge graduate Yue Wu and subsequently refined and taken forward by Paul Oram, Patrick Calvert and Paul Hocking from EPT, won the Helios Award for innovation last year. The team developed and successfully deployed a novel automatic control system for stabilising oil and gas flow in wells and risers – preventing the liquid ‘slugging’ that can sometimes cause the flows to become erratic and unpredictable.

Such stabilisation has resulted in increased production and promotes ‘silent running’ of downstream facilities, significantly impacting E&P's bottom line through increased oil and gas production. The technology is now an embedded application within Field of the Future™ and being deployed across existing and new facilities.

‘Serial innovator’ Norman Sanderson also received a Helios Award commendation for his idea to use an innovative fibre optic system to monitor the major external threats to onshore pipeline systems. The work directly addresses BP's expectation of no accidents, no harm to people and no damage to the environment on the largest physical interface between BP and the outside world. The idea has been commercialised through a partnership with Schlumberger and now has its first application on a BP development.

Sanderson's ‘one man and his dog’ idea, which suggested the use of sniffer dogs to track down illegal ‘hot taps’ in pipelines, is now used in a routine operation, despite failing to receive R&D funding through conventional routes.



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While intelligent ‘pigs’ have become an industry standard for monitoring the integrity of many pipelines around the world, BP’s Georgia operations pipeline team has successfully field-tested this promising new ‘K9’ strategy for pipelines in areas at high risks of these illegal taps.

So where do the ‘ventilated trousers’ come in, apart from winning the ‘most innovative project’ title ever submitted to the EPT Innovation Board? Well, this was a fresh approach suggested by David Charlesworth to combat a process known as vortex-induced vibration (VIV), which can cause hugely expensive drilling downtime, due to adverse currents at deepwater facilities.

The Ventilated Trouser (VT) suggested by Charlesworth is a loose-fitting sleeve, or ‘trouser’, formed of a light, flexible net with integral bobbins. Tests have proved that the VT suppresses VIV and reduces drag, with a far simpler deployment than conventional suppression systems, as well as lower capital and maintenance costs and minimal storage requirements.

Planning for a field trial of the VT began this year, following successful tank testing, with one estimate suggesting there could be a \$60 million reduction in drilling costs at BP’s Gulf of Mexico facilities alone.



## BP Magazine, Issue Four 2009 – US special

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### State of the union

Report> Nic Welsh  
Photography> Simon Kreitem

It's 40 years since the discovery of the Prudhoe Bay field in Alaska, marking a new era in the US oil and gas industry. In the second part of our US special, BP Magazine looks at some of the stories behind BP's US exploration and production business.

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#### **Natural choice**

Unlocking North America's tight gas

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#### **Horse power**

On a roll in the Gulf of Mexico

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#### **At Liberty**

Tackling Alaska's next frontier

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#### **Picture perfect**

Celebrating America's diversity



## Staying connected

When the going gets tough, the tough get going – and take advantage of the new opportunities that hard times can offer. As BP Magazine discovers, in spite of a fall in gas prices, the future for North America Gas looks very bright.

### North American Gas > continuous improvement

Report> Nina Morgan  
Photography> Marc Morrison/BP Imageshop

A year ago, gas prices stood at around \$13 per thousand standard cubic feet (mscf). “Today, it’s more like \$4 [mscf],” says Andy Hopwood, leader of BP’s North America Gas (NAG) business. So, why is Hopwood still smiling? “This drop in gas prices is actually making us a better business,” he says. “Instead of feeling disheartened about gas prices, we are grabbing the opportunities this fall in prices has brought. Gas will continue to be a fundamental part of the energy mix in the US, particularly when carbon is on the agenda. The fall in prices is encouraging and enabling the industry to become more efficient, and the efficient companies are the ones that will survive. We’ll be one of the survivors.”

To cope with the lower gas prices, NAG is relying on a simple four-point strategy: halving the number of recordable safety incidents; temporarily reducing activity levels to hold the business steady; recapturing margins by taking a more aggressive stance with the supply chain on cost structure; and driving waste out of the business through a culture of continuous improvement (CI). “The essence of CI is about the local teams figuring out what their obstacles are, then going on to fix them, with the leadership setting simple, clear objectives,” says Hopwood. “In such a geographically spread operation, it would be impossible for people in a ‘head office’ to know what is really important in the field. So, our method is to establish a clear strategy that will enable us to continue to reduce recordable safety incidents and to make money at \$4mscf. Then, we turn to those who are really in the know – the local leadership of the teams on the ground – to determine how best to carry this out.”

This approach has not only made it possible for NAG to live within its means during this low gas price regime, “it has,” says Hopwood, “also set us up to be stronger. We will be around to provide heat, light and energy to homes and businesses across the US for a very long time.” The development and application of new and exciting technologies will, he believes, play a key role in achieving this. As well as making it possible to increase production by tapping into difficult or ‘unconventional’ gas reservoirs, the new technologies will also help to boost BP’s already impressive reputation for environmental stewardship (see opposite: Award-winning performance).

There is no shortage of gas resources available in the NAG region. But there is a catch. The ability to produce gas depends greatly on the characteristics of the reservoir rocks, in particular on the porosity – or the amount of space between the grains – and the permeability – or the channels between rock grains that allow the gas to flow into the well bore. Most of the ‘easy’ gas – the gas resources held in high-porosity, high-permeability reservoirs – has already been discovered. What’s left is the more challenging ‘unconventional’ gas, including tight gas, coalbed methane and shale gas reservoirs, where potential reserves are very high, but permeabilities very low. “Permeability is the main challenge in developing unconventional gas,” says Phil Smith, head of technology for unconventional gas, based in Houston. “The reservoirs we are dealing with have lower permeabilities than the concrete on your driveway.” (see page 37: Measuring permeability).

Because onshore wells are relatively cheap to drill, the traditional method for producing unconventional gas is to drill a large number of wells, and accept that some of these might turn out to be uneconomic. Although the remaining wells might only produce small amounts of gas, the hope is that production will continue over a long enough period to make the wells worthwhile. “In NAG, we take a different approach to producing ‘unconventionals,’” says Smith. “We take advantage of technology to help us gain a clearer understanding of the geology below the surface. This enables us to determine the optimum locations for our wells, and helps to eliminate the drilling of uneconomic wells.”

In order to locate the so-called ‘sweet spots’ – areas of higher permeability where gas will flow more easily – and to ensure that effort and investment is focused on the best targets in the best fields, the experts in NAG rely on a wide array of information, including data from well logs and seismic studies, to develop a detailed understanding of the



subsurface geology. This often involves drawing on technologies and techniques developed for exploration offshore, where costs are much greater and a very detailed knowledge of the geology is required to reduce the risk of failure.

In addition, new onshore seismic acquisition techniques, such as cableless seismic – where, instead of using cables and geophones, seismic signals are recorded by small boxes fitted with wireless antennae – are proving to be a boon when it comes to the acquisition of high-quality, onshore seismic data. “This technology makes it possible for us to place the geophones exactly where we want them so we can get the highest quality images of the subsurface areas we are most interested in, more quickly and at a much lower cost,” says Smith.

Once optimum well sites are located, more efficient drilling techniques are helping to enhance production, while reducing costs and environmental impact. These include drilling multiple wells, often with complicated geometries, from a single well pad, and drilling horizontal wells to allow access to a greater area of the reservoir from a single well. And after the wells are drilled, new techniques for fracturing – or fracing – reservoir rocks are also being deployed to maximise well performance. Many of these are being developed and tested onsite in the fields. “When you are drilling hundreds of wells a year, you essentially have a laboratory where you can carry out controlled experiments in the field,” says Smith. “We’re taking advantage of that to find the best ways to improve production.”

The challenges associated with producing unconventional gas may be great, but the effort is worth it. For a start, the emergence of the ability to tap into vast shale gas reserves has greatly increased the security of energy supply in the US and reduced the need for gas to be imported via liquefied natural gas (LNG) tankers. And in financial terms, tackling these challenges will also enhance BP’s bottom line. “By tightening up our business practices and taking advantage of new technology, we are positioning ourselves to be a long-term provider of cleaner energy,” says Hopwood.

Smith agrees: “By continuing to get better at what we are doing, we can not only survive at lower gas prices, we can thrive.”

### Measuring permeability

Permeability is measured in units known as darcy (d). In conventional gas reservoirs, permeabilities range from 0.1 millidarcy (md, or 10<sup>-3</sup> d) to several darcy. In tight gas reservoirs, permeabilities can be as low as 1 md (10<sup>-6</sup> d). In shale gas reservoirs, permeabilities are typically an order of magnitude lower, in the range of just hundreds of nanodarcy (10<sup>-9</sup> d). In coalbed methane reservoirs, the pore space is often filled with water, and the gas is absorbed, or attached, to the surface of the rock grains.

### Award-winning performance

**On both the safety and environmental fronts, North America Gas has chalked up some impressive awards. Here are some of the most recent:**

**October 2009:** The 2009 Interstate Oil & Gas Compact Commission Chairman’s Stewardship Award for the large company category. This is the nation’s highest honour for exemplary efforts in environmental stewardship.

**Between 2008 and 2009:** Operations in South Texas, South Louisiana and Wyoming’s Overthrust belt achieved star status in the Voluntary Protection Program (VPP), Occupational Safety & Health Administration’s highest award for safety.

**January 2009:** The Arkoma Operation Center’s project, implementing electrification of its Red Oak central compressor facility in Latimer County, Oklahoma, picked up an honourable mention for the coveted Frank Condon Award for Environmental Excellence, presented by the Environmental Federation of Oklahoma.

**May 2008:** One of three winners of the US Bureau of Land Management’s 2008 awards for its use of environmental best management practices. Cited were the drilling of multiple wells on single pads; centralising the location production facilities outside of critical wildlife habitats in Wamsutter; work to retrofit existing drilling rigs with cleaner engines; and the incorporation of ‘green’ completions into drilling operations to reduce methane and nitrous oxide emissions, and improved reclamation practices to reduce surface disturbance.

**August 2007:** The US Bureau of Land Management honoured BP with a best management practices award for its 18-month Manzanares 3D seismic survey project in northwest New Mexico, citing BP’s high regard for sensitive environmental and archaeological areas. This is the first time such an award has been given for a seismic survey.



## Gulf of Mexico

### Deep developments

Report> Paula Kolmar  
Photography> Marc Morrison

Over the past 20 years, BP has built a material profit centre and earned itself the number one position in the US Gulf of Mexico (GoM). BP is the largest producer, has the largest leasehold position and the largest reserves to be developed. It has also been the most successful explorer, discovering more than 30% of all of the major deepwater fields in the GoM with Tiber marking its latest success.

Neil Shaw, BP's senior vice president for the GoM, says: "We've built significant operational momentum across all aspects of the business over the past two years. Atlantis and Thunder Horse are ramped up and production has doubled, making us the biggest producer in the GoM."

The future is equally exciting for the business, with a strong portfolio of projects comprising four subsea tieback projects that will fill the Atlantis, Na Kika and Mad Dog hubs, four material new hub developments, and the recent Paleogene discoveries at Kaskida and Tiber.

Shaw notes that "the skills, experience and technology BP has built over the past 20 years will be invaluable as we continue to push the frontiers of technology. We are very well positioned to continue to grow the business into the second half of the next decade."

Look out for an indepth view of BP in the GoM in BP Magazine in 2010.

**Giant construction:** the Thunder Horse platform is the largest semi-submersible facility in the world, at 130,000 tonnes displacement. It has a deck load capacity of 40,000 tonnes and is designed to process and export up to 250,000 barrels of oil and 200 million cubic feet of natural gas per day.



## Liberating a technical challenge

### Alaska > Liberty development

Report > Frank Baker  
Photography > Judy Patrick

While BP has pushed technical boundaries in Alaska for more than 40 years, construction on one of the world's largest, most powerful land-based drilling rigs at its new Liberty development marks a major milestone in one of its biggest challenges to date.

#### Expansion plans:

Liberty's drilling site is the manmade satellite drilling island – part of BP Alaska's Endicott development. More than 100 workers are involved in constructing the drilling rig.

Off Alaska's northern coast, on the edge of the Arctic Ocean, more than 100 workers swarm around an assemblage of blue-coloured modules, various sized pipes and other equipment – pieces of what will eventually become the world's largest and most powerful land-based drilling rig – a rig that next year will embark on one of BP's most technically challenging developments – Liberty.

Once commissioned and operational in 2010, the rig will make history by drilling the longest extended-reach wells ever attempted.

Specially fabricated for BP Alaska by Parker Drilling, the unassembled rig arrived at its northern destination via two barges in July, following a three-week, 5,300km (3,300-mile) sea journey from its manufacturing site in Washington state on the US west coast. Liberty's drilling site is the manmade satellite drilling island (SDI) of BP Alaska's Endicott development, located in the Beaufort

Sea around 25km (15 miles) east of Prudhoe Bay. The island was expanded this past summer to accommodate the large rig, camp, wells, manifolds and ancillary facilities.

Visiting the site in late August, BP's Exploration & Production chief executive Andy Inglis said: "This is an incredible project. In the past, a new island and offshore pipelines would have been required. This project is an example of what BP can deliver, bringing technology and capability together to do what, not long ago, was considered impossible. This is BP at its best."

#### Tapping into the offshore Liberty

field from the near-shore SDI will require wells with a horizontal 'departure' of nine to 13km (six to eight miles). To handle the exceptional demands of rotating and moving a drill string in a well bore this long, the rig has to be able to apply an exceptionally high turning force to the drill pipe. Consequently, a key component in the new rig will be the massive top drive, the device slung in the rig derrick to grip and rotate the drill pipe.

"The drive can apply 105,000 foot-lbs of torque to the drill pipe, while rotating the pipe at 130 revolutions per minute," says Darryl Luoma, BP Alaska's Liberty project general manager. "In a typical North Slope rig, the top drive will provide torque in the range of 30,000-45,000 foot-lbs. In fact, the power of the drive is the highest rated on any drill rig worldwide. This piece of equipment delivers more than twice as much power requirement to turn the drill pipe as any other piece of equipment used on the North Slope."

BP Alaska is developing a specially designed drill pipe that is relatively lightweight, but that can withstand the high torques that the top drive will be able to deliver.

Because a single well might require 27,500-30,500 metres (90,000-100,000 feet) of drill pipe and casing, the new rig layout will include a pipe barn with more than 2,322 square metres (25,000 square feet) of area. Equipment to automatically handle the assembly and positioning of the drill pipe will enhance rig safety, Luoma adds. "People won't have to physically screw the pipe lengths together. There is equipment that picks it up, puts it together, and then lifts it onto the drilling rig floor."



The long wells will also require fluid pressures of up to 7,500 pounds per square inch, compared with the 3,500 to 4,500 pounds per square inch of a typical Prudhoe Bay drilling operation. And the volumes of fluid involved require an especially large drilling service module for fluid handling.

Advances in measurement while drilling technology will allow drillers to reach their distant targets with almost pinpoint accuracy.

Powered by natural gas, the rig will be outfitted for Arctic conditions, including low-temperature-tolerant steel and thermal sound dampening insulation. It will be equipped with an integrated control system that provides centralised monitoring, command and management systems. The rig will operate with a crew of 84 people (42 days/42 nights). Operation centres, which will provide real-time drilling status monitoring, will be located on the North Slope and in Anchorage.

### Collaborative effort

Shepherding Liberty from concept and planning to the execute phase has been a multi-year effort on the part of BP Alaska's technical, commercial, supply chain management and other support teams.

"Liberty has been a multidisciplinary effort spanning more than four years," says Max Easley, business unit leader for the Alaska Consolidated Team (ACT). "It has taken a phenomenal amount of both surface and subsurface effort to get the rig built and delivered to the North Slope, and more work remains to make it ready to drill. A key part of this was securing numerous permits from state and federal agencies, and working closely with North Slope community leaders to assure them we are developing the field responsibly, with minimal environmental impact. Despite all these challenges, the project has moved steadily along, safely, on schedule and within budget."

### Freezing temperatures

Winter comes quickly in Alaska: in September, cool breezes sweep across the Endicott gravel causeway and its drilling islands. In only a matter of weeks, winter arrives to freeze the ocean fast to shore. And with the first snowfall, the islands and causeway are reduced to grey outlines against a world of white. By October, temperatures fall below zero Fahrenheit and winds scour freeze-dried snow off the island where the Parker drilling rig will stand tall – reaching 70 metres (240 feet) above the pancake-flat terrain – the highest point for miles.

Winter in this remote, northern outpost will quickly usher in some of the harshest weather on Earth. But the workers will be there, methodically putting the drilling rig together, piece by piece, and testing its components.

They and others involved with Liberty will be so immersed in their work they probably won't have time to reflect on something they have in common with their parents, grandparents and friends, some of whom worked decades earlier on the Trans-Alaska pipeline and at Prudhoe Bay.

They will be making history.

### Liberty Fast Facts

<b>Discovery:</b>	1997
<b>Estimated recoverable oil:</b>	100 million barrels
<b>Production start:</b>	2011
<b>Plateau production rate:</b>	40,000 barrels per day
<b>Development costs:</b>	\$1.5 billion
<b>Drilling location:</b>	On Endicott satellite drilling island, 25km (15 miles) east of Prudhoe Bay, near Alaska's Arctic coast
<b>Drilling start:</b>	2010
<b>Wells required:</b>	up to six
<b>Length of wells:</b>	nine to 13km (six to eight miles) – world record



## Portraits of America

### American landscape > Photo story

Report > Lisa Davison  
Photography > Marc Morrison

Throughout its 40-year history, BP America has played a major role in many diverse communities across the US. Over the next few pages BP Magazine takes you on a pictorial journey through some of the locations in which it is most prominent.

**Location:** New York

**Nickname:** the Empire State

**BP presence:** BP is the leading gasoline marketer in New York City. It also delivers natural gas and solar panel systems, as well as supplies La Guardia airport with fuel via Air BP.

**Location:** Alaska

**Nickname:** the Last Frontier

**BP presence:** BP's relationship with Alaska stretches back to the 1960s and the discovery of the giant Prudhoe Bay field. Since then, the company has tackled many technical challenges, including the construction of the Trans-Alaska Pipeline, in order to bring Alaska's hydrocarbons to market. BP continues to invest to maximise recovery of oil and unlock the potential of Alaska's significant resources of heavy oil and natural gas.

**Location:** South Carolina

**Nickname:** the Palmetto State

**BP presence:** South Carolina is home to the largest purified terephthalic acid (PTA) plant in the US – BP's Cooper River site. As well as being a major PTA supplier, much of the Cooper River site is managed as a wildlife habitat.

**Location:** Texas

**Nickname:** the Lone Star State

**BP presence:** BP's operations in Texas span its entire portfolio. It represents the largest concentration of BP people and assets anywhere in the world, hosting 7,500 employees. It is one of the company's main exploration and production hubs, with responsibility for its Gulf of Mexico operations, and is home to BP's largest refinery – Texas City – and significant wind developments.

**Location:** Illinois

**Nickname:** Prairie State

**BP presence:** Chicago is home to the second largest concentration of BP employees in the US, with around 3,000 people working for the company. It is also a major gasoline marketer in the region. Its next door neighbour – Indiana – is home to BP's Whiting refinery, which is currently going through a major upgrading programme to allow it to process a greater amount of heavy crude oil.

**Location:** Colorado

**Nickname:** the Centennial State

**BP presence:** from its operations centre in Durango, BP supplies customers in California and the southwest with natural gas from its onshore fields and is currently investing to sustain production. The company also operates the state's largest wind farm, which consists of 224 wind turbines generating 300 megawatts of power.

**Location:** Louisiana

**Nickname:** the Pelican State

**BP presence:** BP is a major onshore oil and gas producer in Louisiana and the state is home to its largest US lubricants processing plant. BP is also the largest offshore producer in the Gulf Coast region, which borders the state, and it is from Louisiana that employees fly in and out when travelling offshore.



## BP Magazine, Issue Four 2009 – Factfile

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### Top 5 retail products

These days it isn't just gasoline that people are picking up when they visit a BP service station. In the UK, newspapers, energy drinks and snacks are just as popular.

#### 1 The Sun

The UK's biggest selling newspaper is also the bestselling item at BP's retail sites in the UK. First set up as a broadsheet newspaper in 1964, it was bought by current owner Rupert Murdoch five years later, and transformed into the 'red top' tabloid that it remains today. It has a daily circulation of more than 3 million copies.

#### 2 Red Bull energy drink

Launched in Austria in 1987, Red Bull was specially developed to help support periods of increased mental and physical exertion. A decade later, it became an international bestseller and continues to be extremely popular in the UK. It is best known for its catchphrase "Red Bull gives you wiings!"

#### 3 Coca-Cola

The biggest-selling soft drink in history, Coca-Cola was created on 8th May 1886 by Dr John Pemberton, and was first offered as a soda fountain beverage at Jacob's Pharmacy, Atlanta, US. It arrived in Britain in 1900 and was regularly sold through soda fountain outlets, including Selfridges and the London Coliseum in the early 1920s. Coca-Cola is now the most recognised trade mark in the world.

#### 4 Lucozade Orange Energy

Lucozade was first manufactured in 1927 by a British chemist who had experimented for several years to create a source of energy for those who were sick with common illnesses, such as colds or flu. It was initially available in the UK for use in hospitals, under the name Glucozade, which was then changed to Lucozade in 1929.

#### 5 Walkers cheese and onion crisps

One of the UK's bestselling potato chip brands was first developed after the Second World War by a butcher who began selling cooked slices of potato, as a consequence of meat rationing. By 1954, the cheese and onion flavour crisp was born. British soccer star Gary Lineker has been the 'face' of Walkers crisps since the mid 1990s.



## Azerbaijan in the ascendant

### Azerbaijan: operational frontiers

Report> Rashad Bayramov  
Photography> Stuart Conway

It has been 15 years since BP and its partners signed a joint development and production sharing agreement with the Azerbaijan government to develop the Azeri, Chirag and deepwater Gunashli (ACG) oilfield in the Caspian Sea. Here, some BP 'veterans' share their memories of the day that the 'contract of the century' was signed.

It was not a typical autumn day in Baku on 20th September 1994 – the sun was shining and the birds were singing loudly in the fresh air outside the Gulistan Palace, where, among the rows of parked cars, stood Ahsan Jafarov's vehicle. He was a personal driver for Amoco's resident director in Azerbaijan, and he had brought him to a most remarkable event – the signing of the production sharing agreement (PSA) for the Azeri-Chirag-deepwater Gunashli (ACG) fields, immortalised by some as the 'Contract of the Century'.

One of the first nationals in Amoco's office in Baku, Jafarov has, over the years, moved from working as a driver to waste operations manager in BP Azerbaijan. "I joined Amoco in 1992 and escorted a number of foreign negotiators to meetings with state officials," he says. "A lot of hard work, sleepless nights, tough negotiations and mutual compromises were made before 20th September turned into a reality. I still feel very grateful to these pioneers who paved the way for one of the greatest undertakings in Azerbaijan's modern history."

The ACG contract opened Azerbaijan – a state that had just regained its independence after the collapse of the Soviet Union – to significant foreign investment. Moreover, the contract promised to bring the country billions in oil revenues once the oilfields, located approximately 130km (80 miles) east of Baku in the Caspian Sea, with estimated recoverable volumes of more than 5 billion barrels, reached peak production of more than 1 million barrels of oil per day – a record for Azerbaijan.

Jafarov recalls the time he drove Zbigniew Brzezinski, the prominent US public figure, around Baku on official visits. "Zbigniew and I used to spend some afternoons in Baku's seaside park, drinking hot tea and talking about the future of Azerbaijan.

"He was sure that Azerbaijan would blossom after the oil revenues started pouring in. In fact, some time after the signing of the contract, Zbigniew told me he would like to come back to Baku in around 2010 to witness the vast changes to the face of the city."

The ACG PSA is first of all a legal document. It contains more than 200 pages, and Mamed Husseinov, today working in BP Azerbaijan's communications and external affairs team, was in the group of translators who undertook a huge task – to translate the entire PSA into Azerbaijani. "To understand how challenging the assignment was, one should realise that it was the first PSA in the country's history, and a lot of legal and industry terms did not have direct correspondence in our native language. So we had to be very creative at times," he remembers.

A lot of terms 'invented' by Husseinov and his colleagues became instant neologisms in the native language. In fact, throughout his long career with BP, Husseinov has made a personal hobby out of collecting words and phrases in his own English-Azerbaijani dictionary of oil and gas terms. Today, he is among the rare authorities on the subtleties of 'BP language' and its equivalent in Azerbaijani.

When asked about 20th September 1994, Husseinov vividly remembers the day and the ceremony. "The palace was a brightly lit hall, packed with top state officials, foreign dignitaries, and international oil company representatives," he says. "The air was filled with pride, and everyone shared a sense of accomplishment. I was proud that I had made my small contribution to this historic event."

Judging by its sheer size, and the scale of activities, the ACG project was unprecedented for Azerbaijan. It included fabrication and construction of platform jackets and topsides, both in Azerbaijan and abroad, installation and commissioning of these platforms using the world's most advanced technologies in the Caspian for the first time, laying of hundreds of kilometres of subsea oil and gas pipelines, and significant expansion of the oil and gas terminal in Sangachal near Baku.



## BP Magazine, Issue Four 2009 – exploration + production

A huge amount of these activities were completed in Azerbaijan using the local workforce, and through contracts with local companies. Gulya Novruzova from BP's procurement and supply chain management (PSCM) group was involved in negotiating quite a few of them. With the company since 1993, she still remembers 20th September 1994. "We all gathered in the staff lounge in Amoco's office, located in the recently demolished Intourist hotel. The television was airing the signing ceremony live from the Gulistan Palace, and a bottle of Champagne stood on the table, ready to be opened the moment signatures were on the paper."

Her favourite memories are from her role as PSCM operations support team leader, when, in 2004-5, the team was responsible for the delivery of operations support contracts for all BP's operational facilities in Azerbaijan. "We delivered

\$300 million worth of contracts in preparation for first oil from Central Azeri – the biggest platform in the Caspian Sea – with some of the best-producing wells in BP's global portfolio."

Beyond the oil revenues, the ACG project brought many other tangible benefits to Azerbaijan, including the introduction of international standards in health, safety, and environmental management. One of the pioneers in this field was Oleg Reshikov, who has been with the company since 1991. Starting out as a personal driver, he has, over the years, risen to become an HSSE manager in the ACG project. "I was lucky to be part of the process from beginning to end," he says. "I was there when an exploration project became a discovery, the discovery turned into a project on paper, the paper transformed into steel, the steel turned into complex drilling and production facilities, and now we have a high-tech production line that extracts hydrocarbons from the deep sea and delivers them to customers more than 1,700km [1,050 miles] away, across three countries."

If you benchmark the ACG project with others around the world, it is certainly a first-class delivery, according to Greg Riley, BP Azerbaijan exploration manager. Having worked for various projects in Azerbaijan for the past 14 years, he is one of the highly respected and experienced specialists who know the Caspian basin very well.

For Riley, it is not an overstatement to say that superb ACG delivery was among the key factors in the Azerbaijani government's decision to sign a new memorandum of understanding with BP to explore new geological structures in the Caspian. "The memorandum between BP and the State Oil Company of Azerbaijan (SOCAR), signed in July 2009, gives BP an exclusive right to negotiate a production sharing agreement to explore and develop the new Shafag and Asiman structures," he says. For BP, it marks the next frontier in its relationship with the country.

It is 20th September 2009. Ahsan Jafarov is sitting in Baku's seaside park, sipping hot tea and looking at the sea. The fresh evening breeze brings cool air and thoughts from the past. Jafarov looks back at the 15 years that have elapsed, at his own gradual growth from driver to senior manager in BP, and struggles to comprehend the magnitude of the transformation. "BP and its partners have created thousands of jobs in Azerbaijan, built a world-class oil and gas infrastructure, introduced international business practices and standards, and generated sustainable development opportunities for local communities. The face of Baku has changed so drastically over the years – today it is a true metropolis," he says proudly, adding a little later: "I only hope to see Zbigniew one day to tell him that his prophecy has come true."

### Did you know?

- From the start of production in November 1997 until the end of August 2009, 166.3 million tonnes of oil (1,230 million barrels) had been produced at ACG
- More than 17 billion cubic metres (around 600 billion cubic feet) of associated gas were delivered to Azerbaijan between 2007 and August 2009
- Total investment in the ACG project by the end of 2008 was more than \$20 billion
- In 2008, Azerbaijan received around \$14.4 billion in revenues from the ACG project. The total ACG revenues delivered to the State Oil Fund of Azerbaijan is around \$23 billion
- From the start of the ACG project in 1994 until the first half of 2009, ACG shareholders spent more than \$12 million on sustainable development projects in Azerbaijan alone.

### ACG History

#### September 1994

ACG production sharing agreement is signed by BP, its coventurers and the Government of Azerbaijan to develop Caspian offshore resources

#### February 1995

Azerbaijan International Operating Company (AIOC) is formed



## BP Magazine, Issue Four 2009 – exploration + production

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### **November 1997**

First oil is produced from the Chirag portion of the field

### **August 2001**

ACG Phase 1 is sanctioned

### **September 2002**

ACG Phase 2 is sanctioned

### **September 2004**

ACG Phase 3 is sanctioned

### **February 2005**

Production at Central Azeri begins

### **March 2005**

Azeri crude oil exports commence

### **May 2005**

Gas deliveries to Azerbaijan from Central Azeri start up

### **December 2005**

West Azeri oil production begins

### **November 2006**

East Azeri produces first revenue oil

### **April 2008**

First oil from Deepwater Gunashli

### **July 2009**

BP and Socar sign a memorandum of understanding to jointly explore the Shafag and Asiman structures in the Azerbaijan sector of the Caspian Sea.



### Clear outlook for solar

#### Business focus> solar

Report> Ian Valentine  
Photography> Marc Morrison

**It's been a tough time for BP Solar of late with falling demand and difficult economic conditions. But with 35 years' experience, it's also a business that knows how to ride the bumps and grab opportunity from adversity.**

"We are a 35-year-old company in a 100-year-old corporation." So says BP Solar's chief executive, Reyad Fezzani. "Many people find that very surprising." In a world where the role of alternative energies is still a fledgling one, it's easy to forget just how long solar power, and BP Solar, have been around.

And yet, 35 years on, solar still manages to bring out the best, and worst, in commentators. For every person who recognises the merit of investing in the low carbon electricity that solar power provides, there is a naysayer ready to knock this renewable energy source.

#### Tough choices

In recent months, it seems as though those doom-mongers have got a little louder. Much like the rest of the global economy, the solar sector has suffered a decline in demand for the first time in many years, with consequent reductions in prices. But the third quarter saw a strong rebound.

BP Solar has had to make some tough choices to position the company to become more cost competitive, including the closure of three panel construction factories in Europe and Australia. Fezzani notes that the past 12 months have been a period of extreme volatility for solar power, just like every sector of industry, in light of global financial uncertainty. But BP was first to act to restructure and has reinforced its commitment to solar.

Before the economic crisis last year, ever-lower costs for solar energy spurred increased demand of 86% in 2008 and, says Fezzani, there was a sense that this could last forever. But, as he explains: "If you are a consumer who wants to put a solar system on your roof and it costs you \$25,000 to do that, and you are worried about job security, you are not going to front the money, even if it will result in much lower energy bills. The result is that our industry, which had been powering away, found itself with excess capacity for the reduced demand that we experienced during the first half of 2009."

But a financially stable company with a long-term vision can ride the bumps. "In solar, when the price goes down, demand usually picks up because the return on your investment in a solar system gets better," he says. "We are beginning to see the effects of that now. After a tough first half, as the price has gone down, demand is up and, for BP Solar, the third quarter will reflect a new record for sales, with a more than 50% increase over the previous record."

#### Maximising investment

The company's 35-year reputation allows it to steal a march on fledgling competition, as clients want to know that the vendor can guarantee electricity production for the next 25 years, so maximising the potential from their investment.

"It is not like buying an electronic item, such as an iPod or a TV; you are buying something that is more akin to a home water-heating system, so you want to be sure that it is a product that will last a long time," says Fezzani. "If you buy a solar system, you want to know that, if something goes wrong in year 16, the company is going to be there to cover you and fix the problem. Unlike many other companies in the sector, BP has been around a long time and it has stood by its obligations. A lot of our customers admire that because they do not want to take risks on such a big investment. It has led to this significant increase in sales."

However, the closure of three factories – two in Spain, one in Australia – and the elimination of a modular assembly line in Maryland, US, led some to believe that BP was exiting the solar business. "Nothing could be farther from the truth," says Fezzani. "In fact, our capacity this year will grow versus last year because we shut down relatively small factories that were not able to produce the product at a profit, and our Indian and Chinese sites are expanding much more rapidly." He adds that in the past 12 months, BP Solar has reduced costs by more than 25%, and expects to continue that as lower cost production facilities, including third party manufacturing, ramp up.



## BP Magazine, Issue Four 2009 – Alternative energy

Far from witnessing a regression in solar power take-up, Fezzani has been inundated with requests from new commercial customers. Much of that growth is coming from retailer and logistics companies with ample roof space to install systems; and some is coming from information technology corporations chasing clean energy to power their super-servers, homebuilders who have found they sell houses quicker if they are pre-wired with solar, and utility companies with surplus land and grid connections who are responding to government mandates on percent renewables content.

That recognition has helped BP Solar develop some strong strategic partnerships, with governments, suppliers, customers and financiers. One such very successful partnership is with Wal-Mart. Formed in 2008 to help the US retail giant take steps towards its goal of acquiring all its power needs from sustainable sources, this partnership is enabling the generation of 4.3 megawatts (MW) of solar power by laying solar systems on seven Californian Wal-Mart rooftops, providing power equivalent to that used by 600 typical US homes.

### Largest system

Meanwhile, across the Atlantic in Germany, the world's most advanced solar-powered country, BP Solar has joined forces with the developer RGE to build a farm of 250,000 solar modules on a disused air force base, generating 46MW for the next 25 years. This is the world's largest system being built today.

"RGE could have made their decision based on short-term financial gain," says Fezzani. "But they reasoned that our sophisticated silicon crystalline products – which we were prepared to guarantee – would earn them more over the next 25 years. It is a very interesting project, high-profile in Germany, and the first of its kind."

Like all other parts of BP, the solar organisation takes its safety responsibilities very seriously and a fire in June in a small proportion of roof-mounted solar panel arrays on a warehouse complex near Mannheim in Germany raised important questions about that responsibility. "We are learning that our product is robust. It has been developed and optimised for 35 years," says Fezzani. "That product has to be put into the field and converted into a power system and we have learnt that the standards and quality requirements for installation and operation need to be very, very high.

"We believe the causes of that fire were primarily around third party installation and operation of the system, rather than the product," he continues. "But we are keen to ensure that the lessons learnt from that are shared across the industry. We want to push for greater and higher levels of industry standards for installation, operation and maintenance. We are also doing a lot ourselves to set and define those standards, sharing our lessons with the industry."

### Record sales

With record sales already forecast for 2009, Fezzani is buoyed by the future of solar energy production within BP. The Chinese government has prioritised solar as the next focus area for its energy policy, with the introduction of substantial incentives for 2010, and there are significant growth options in India, where BP has a 20-year joint venture with Tata Group. "The

Indian government has introduced a solar mission that is going to be scaling up solar to multi-gigawatt scale in a short period of time. We are very excited to participate through Tata BP Solar in the growth of the Indian market."

But perhaps the most encouraging sign of a global shift towards solar energy has come from the continued backing of alternative energy programmes by governments worldwide, despite the recent drop in the global oil price.

"The climate change agenda has really moved governments to take the issue of introducing low-carbon power much more seriously," says Fezzani. "Governments are gaining confidence in the experiments many countries have made in subsidising these technologies, and believe that they can scale them up. There is also the case for scale-up to eliminate the need for subsidies; I think that case is now clearly made. We can now see a path in a relatively short period of time to having grid-competitive solar power. That has changed the dynamic dramatically, and I believe this truly is the century for solar."

**Clean energy:** BP's partnership with Wal-Mart is providing the retail giant with power equivalent to that used by 600 typical US homes each year.

**Close collaboration:** BP Solar has developed some strong strategic partnerships, including one with US retail giant Wal-Mart.

## BP Magazine, Issue Four 2009 – Alternative energy



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**Innovation delivered:** over the past couple of years, BP has worked in partnership with FedEx to install solar panels on some of its distribution hub rooftops.



## BP Magazine, Issue Four 2009 – Archive

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### Historic step into Iraq

#### Photography > BP Archive

BP has announced that it has signed a technical services contract to develop one of the world's largest oilfields – Rumaila in southern Iraq – but as the archives show, the company's relationship with Iraq spans the past century.

Opposite: drillers and staff in Kirkuk in the 1920s. The giant Kirkuk field was developed by the Iraq Petroleum Company and the first well was brought onstream in the presence of King Faisal in 1927.

Below opposite: the pipeline camp during the 1930s.

This page: blasting and air compressor operators at work in the 1920s.

Above: Baba Gurgur No 1 well, Iraq, where oil was discovered on 15th October 1927. Located immediately north of Kirkuk, Baba Gurgur was a spectacular strike, which flowed with such force it temporarily created a river of oil.

Left: drilling at the Rumaila field, southern Iraq, during the 1950s. Oil was discovered at Rumaila in 1953 by the Basrah Petroleum Company, of which BP was a part. Exports began a year later.

Below left: welding a pipeline during the 1930s.

Below right: a Rumaila wellhead, circa 1960. Rumaila remains one of the world's largest oilfields today.



## BP Magazine, Issue Four 2009 – Parting shot

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### Cool encounters

Photography> Marc Morrison

Marc Morrison photographs art car designer Rockette Bob (real name Robert Van Keuren III). Officially based in Nevada, Rockette Bob spends part of his year in California's Slab City – an 'off-the-grid' community made up of squatters, 'snowbirds' and nomads who have pitched camps across an area of open desert that is a former US Marine Camp from the Second World War. Rockette Bob poses in the window of one of his many creations.