Shah Deniz 2 and Opening of the Southern Corridor
Azerbaijan is the birthplace of the oil industry. For the entire history of the modern oil industry, Azerbaijan has provided energy to Europe. In the 19th Century, Azerbaijani kerosene was used for heat and light. In the 20th Century, its oil industry grew, culminating in the 1990s through the giant Azeri-Chirag-Gunashli and Baku-Tbilisi-Ceyhan projects. These have provided world scale volumes of crude oil to global markets.

Now, in the 21st Century, Azerbaijan is poised again to bolster European energy security – this time through its natural gas resources.

The discovery and development of the giant Shah Deniz field and the South Caucasus Pipeline, enabled Azerbaijan to become a major gas exporter in 2006. Since then, over 40 billion cubic metres of Shah Deniz gas has been supplied to domestic, Georgian and Turkish consumers. Now, through the development of the Southern Gas Corridor, Azerbaijan will change the energy map of Europe for decades to come by supplying customers in Greece, Bulgaria and Italy as well as Azerbaijan, Georgia and Turkey.

The Shah Deniz Stage 2 and Southern Corridor pipeline projects will include:

- Over $45 billion of investment
- Deployment of advanced subsea production technology in the Caspian
- Advanced drilling and completion solutions to produce wells at the world’s highest rates
- Approximately 3,500 kilometres of pipelines linking seven countries from Azerbaijan to Europe
- More than 30,000 new jobs in seven countries over the next five years

Shah Deniz co-venturers are BP, SOCAR, Statoil, Total, NICO, LUKoil and TPAO.

"The Southern Corridor will change the energy map of Europe and open up additional opportunities for our country and countries in the region."

- Ilham Aliyev, President of Azerbaijan

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The Shah Deniz Stage 2 and Southern Corridor pipeline projects will be one of the largest and most complex endeavours in the history of the energy industry. The project will require cooperation and long-term relationships between 11 companies, seven governments and 11 wholesale gas buyers.
Shah Deniz (the King of the Sea) lies some 70 kilometres offshore in the Azerbaijan sector of the Caspian Sea. Discovered in 1999, it remains one of the largest gas condensate fields in the world.

The reservoirs currently being developed in Stages 1 and 2 have 0.9 trillion cubic metres (33 trillion cubic feet) of gas initially in place. There are additional shallow and deep reservoirs that could increase the gas in-place volumes to 1.4 trillion cubic metres (50 trillion cubic feet).

Stretching out over 140 square kilometres, the reservoir is similar in size and shape to Manhattan Island.

This giant field is being developed in stages. Shah Deniz Stage 1 involved the construction of a single platform with pipelines back to Sangachal Terminal, near Baku. It is now a world-class asset producing more than 9 billion cubic metres per year (bcma) of gas and approximately 55,000 barrels per day of condensate. It has some of the most productive wells in the world – each producing more than 2 bcma.

Since 2006, Shah Deniz has proved a safe and reliable exporter of gas to Azerbaijan, Georgia and Turkey: it has a strong safety record and its facilities operate at a near perfect availability of 99 per cent.

Stage 2 will focus on the remaining resource potential in the currently producing reservoir intervals, adding 16 bcma of gas and increasing condensate production to 120,000 barrels per day.

Shah Deniz partners have a long-term vision for a new Stage 3 development that would achieve enhanced recovery factors for Shah Deniz field. This vision is based on a new exploration well (BP drilled in 2007) – the deepest ever drilled in the Caspian Sea. The discovery of a new high-pressure reservoir opens up an exciting new future for the field beyond Stage 2. But given the high pressure of the new reservoirs, new technology and new exploration will be needed to develop these resources.

“The key to the development of the Southern Corridor is one field that has the scale to launch this giant endeavour – Shah Deniz.”

Al Cook, Vice President, BP Shah Deniz Development
“The United States supports Azerbaijan’s goal of establishing a Southern Corridor for natural gas exports to Europe, a crucial link that will solidify Azerbaijan’s ties to the Euro-Atlantic community.”

Hillary Rodham Clinton

The Shah Deniz Stage 2 and South Caucasus Pipeline Expansion Projects

- $25bn+ investment
- 2 new offshore platforms
- 26 subsea production wells
- 500 km of subsea pipelines and flowlines
- New 48”- diameter pipeline through Azerbaijan and into Georgia

Two giant new compressor stations in Georgia

New 48” pipeline through Azerbaijan

Two new ‘bridge-linked’ platforms with 26,000 tonne decks

Subsea technologies including Direct Electrical Heating

Existing Shah Deniz platform

New terminal at Sangachal with two 8 bcma processing trains

500 km of subsea flowlines in up to 550m water depth

26 subsea wells drilled with 2 semi-submersible rigs

“…natural gas exports to Europe, a crucial link...”
The development of Shah Deniz will see several industry technologies being deployed in the Caspian for the first time, including:

**Subsea production systems**

The giant geographical spread of Shah Deniz, over 140 square kilometres, creates a reservoir access challenge. Wells will be drilled in several locations to maximise gas extraction. Rather than building several surface facilities which can be inefficient and difficult, Shah Deniz will have a subsea production system. This system will be world-scale, having 500 kilometres of flowlines connecting 10 subsea manifolds and 26 subsea wells.

**High Integrity Pressure Protection System (HIPPS)**

At some 6,000 metres below sea level, the main Shah Deniz reservoir has some of the highest reservoir pressures in any field operation in the world. To ensure that Shah Deniz operates with high integrity, BP will utilise the ‘HIPPS’ valve for Shah Deniz. Capable of shutting in just 15 seconds, HIPPS allows Shah Deniz to achieve the very highest safety standards.

**Direct Electrical Heating**

The deepwater location, in over 500 metres of water, results in high ambient pressures and a cold environment: around 5 degrees centigrade. This could cause the fluids in the pipelines to solidify and cause blockages. Direct Electrical Heating will prevent the oil and gas pipeline flows deep on the seabed from cooling down and waxing. This would otherwise risk the formation of lumps of ice called hydrates to quickly build up and block the lines.

**Subsea Compression**

As hydrocarbons are extracted the reservoir pressure will decrease, leading to production decline late in field life. Subsea compression could help to further enhance recovery factors by making best use of the existing infrastructure in a cost efficient manner. This technology is designed to arrest the production decline in late field life by overcoming the backpressure on the production wells. The Shah Deniz partners will examine this emerging technology later in field life and seek to make an extensive assessment of its potential.

**International standards**

The Shah Deniz Stage 2 and SCP expansion projects will be built to the highest operational, environmental, safety and social standards, consistent with BP practice, Host Government Agreements and international legislation. Project standards and practices align with and improve upon those adopted for Shah Deniz Stage 1. Further improvements in Azerbaijan and Georgia will target waste minimisation and upgraded waste management and disposal facilities; a wide range of energy efficiency and greenhouse reduction initiatives; holistic noise reduction standards at Sangachal Terminal; SCP Right of Way reinstatement using operational recovery data to develop habitat-specific re-vegetation targets.

Environmental and Social Impact Assessments (ESIAs) were completed in both Azerbaijan and Georgia in 2013. TANAP plans to submit its EISAs to the government of Turkey in the first half of 2014. TAP has submitted its ESIAs in all three of the pipeline’s host countries – Greece, Albania and Italy.
New Azerbaijani Capability

“The development of Azerbaijani petrotechnical professionals and highly skilled workers is a priority for BP and important to the development of the oil and gas industry. We fully support the President’s vision of turning oil capital into human capital.”

Gordon Birrell, Regional President for BP in Azerbaijan, Georgia & Turkey

New Construction Capability

Virtually all platform and subsea structures will be constructed in Azerbaijan. Shah Deniz will need to increase both the capacity and technological capability at two of Azerbaijan’s key construction yards.

ATA Construction yard – advancing platform construction capacity and capability
- Expansion to allow simultaneous construction of large decks
- Repairs to maintain high-quality, high-productivity facilities
- Creation of new facilities to allow exotic piping fabrication

BOS Shelf Construction yard – new subsea capability
- A new subsea specialist painting, coating and insulation facility
- Creation of a subsea piping workshop
- Storage and quayside improvements to meet subsea requirements

New Vessel Capability

To execute a project of the scale and complexity of Shah Deniz 2 requires improvements to Azerbaijan’s marine vessel capabilities. Through investing around $700 million, existing vessels will be upgraded and a new subsea construction vessel will be built.

New Subsea Construction Vessel
- A dynamically positioned Subsea Construction Vessel to install facilities in deeper water than previously achieved in the Caspian Sea
- Creation of new capabilities to support further subsea development in other fields

Vessel Upgrades
- Derrick Barge Azerbaijan (DBA) Lift Vessel Upgrade in crane handling to perform sensitive subsea operations
- Pipelay Barge Israfil Huseinov (PLBH) Vessel Upgrade to allow pipelay in deeper waters than currently achievable
- Diving Support Vessel (DSV) Upgrade to allow operational efficiency improvements

New Workforce Capability

The Shah Deniz 2 and SCP expansion projects will create around 10,000 local construction jobs in Azerbaijan. New skills will need to be developed to operate the new high technology installations. Over 150 Azerbaijani technicians are being trained in the latest production technology. In addition, 500 welders will be given training in the latest construction techniques in line with the highest international standards.
TANAP and TAP Projects

"We are delighted that Azerbaijani gas will be transported to Europe, enabling the implementation of the Southern Gas Corridor."

The TANAP and TAP projects will be built to allow for more than 16 billion cubic metres per year (bcm/a) of Shah Deniz Stage 2 gas to be delivered to markets in Turkey, Greece, Bulgaria and under the Adriatic Sea to Italy. These pipelines alone will cost more than $15 billion. Once built, they can be expanded to twice their initial capacity, providing a transportation route for future gas resources.

Trans Anatolian Pipeline (TANAP)
TANAP is a major international project led by the Azerbaijani Government and SOCAR. The Intergovernmental Agreement for TANAP was signed by President Aliyev and Prime Minister Erdogan in 2012.
Set to become a key part of the Southern Gas Corridor, TANAP will start at the South Caucasus Pipeline expansion outlet at the Eastern Turkey border and will connect some 1,900 kilometres away, with TAP at the Western Turkey border.
The 6 bcm/a of Shah Deniz Stage 2 gas intended for Turkish customers will be transported up to Eskisehir via a 56” diameter pipeline and also to a second delivery point further downstream at Thrace. At Eskisehir the pipeline diameter will reduce to 48”.

More than 10 bcm/a of gas intended for European customers will be transported via the 48” diameter pipeline to the connection with the TAP inlet at the border with Greece.

Trans Adriatic Pipeline (TAP)
The Shah Deniz Consortium selected TAP in June 2013 to transport gas from the Turkish-Greek border onwards to European markets. The initial capacity of TAP is 10 bcm/a. Its direct route, and the use of a large diameter pipe, also means that TAP will have the capacity to expand readily to accommodate volumes of up to 20 bcm/a, as further gas resources come on stream.
TAP will connect to TANAP and start from Kipoi in Greece on the border with Turkey. From there, TAP will cross Greece and Albania west to the Adriatic coast. The offshore section of the pipeline will begin near the Albanian city of Fier and cross under the Adriatic Sea, coming ashore in Italy’s Puglia region. Here it will tie in to Italy’s gas transportation grid operated by Snam Rete Gas. The total length of TAP will be about 1,200 kilometres, of which 800 kilometres is in Greece, 210 kilometres in Albania, 125 kilometres under the Adriatic Sea and the remaining few kilometres in Italy.

TANAP shareholders are SOCAR, BP and BOTAS
TAP shareholders are SOCAR, BP, Statoil, Total, E.ON, Axpo and Fluxys.
Energy Security for Georgia, Turkey and Europe

The Market

With a final investment decision in December 2013, first gas deliveries from Shah Deniz Stage 2 are expected in 2018 to Turkey and approximately a year later to Europe.

In 2011, Shah Deniz concluded a gas sales agreement with Botas to sell 6 bcm of Stage 2 gas to Turkey, adding to the supplies it already receives from Stage 1 and cementing Turkey’s position as the leading importer of Azerbaijani gas.

In September 2013, sales agreements were signed with nine companies for European gas consumption. The agreements are for 25 years and worth around $100 billion, which makes this one of the biggest gas deals in the history of the energy industry.

Demand for natural gas supplies along the European end of the Southern Corridor is high. Italy, a focal destination, is one of largest natural gas markets in Europe with consumption of around 70 bcm. The Southern Corridor will also open up a new source of gas for the Greek and Bulgarian markets.

For Albania, the Southern Corridor creates an opportunity to develop its gas industry and achieve higher efficiencies in its electricity generation.

When Shah Deniz reaches its peak production it will provide enough new natural gas to meet the needs of every capital city along the Southern Corridor – more than twice over.

“The Southern Corridor will contribute to peace and security.”

Ahmet Davutoglu, Foreign Minister of Turkey

Partners
By opening up a new gas export route and linking Azerbaijan directly with Europe for the first time, the Southern Corridor will become an important contributor to European energy security and will bring a number of key benefits to all countries it crosses:

Azerbaijan
The increased production will underpin the country’s role as a major regional gas supplier. It will add to the country’s oil and gas revenues for decades to come. Azerbaijan will gain new onshore assets, offshore facilities and export infrastructure - all built to international standards using the most advanced technology.

Georgia
Georgia will benefit as a recipient of Shah Deniz Stage 2 gas, but also directly from the South Caucasus Pipeline expansion. The project is expected to provide $2 billion in foreign direct investment to the country. 20 percent of the capital expenditure is planned to be spent on goods and services provided by local Georgian suppliers. Around 2,000 local jobs will be created on construction projects.

Turkey
Shah Deniz currently provides around 15 per cent of Turkey’s gas demand and with Stage 2, this could rise to 25 per cent. Development of a new Trans-Anatolian Pipeline will create up to 15,000 new construction jobs in Turkey and bring major capital investment to the country. By increasing Turkey’s capability to transport affordable, secure and sustainable gas supplies, Shah Deniz Stage 2 and TANAP will support the development of Turkey as regional energy hub and a significant provider of European energy security.

Europe
TAP will bring substantial direct foreign investment to Albania, Greece and Italy, and will create thousands of new jobs. In Greece alone, the project is expected to inject direct foreign investment worth €1.5 billion, as well as creating 2,000 direct and 10,000 indirect jobs.

Shah Deniz Stage 2 gas will provide a new source of gas to consumers in Greece, Bulgaria and Italy. For Albania, TAP creates a rare opportunity to develop its gas industry and achieve higher efficiency in electricity generation. TAP may also connect with existing and planned pipeline infrastructure developments such as the Ionian Adriatic Pipeline, and the Greece-Bulgaria Interconnector. An Inter-Governmental Memorandum of Understanding signed by Albania, Bosnia Herzegovina, Croatia and Montenegro in May, 2013, has enhanced these prospects.

By helping shift the balance of the energy mix in Europe towards natural gas, the cleanest burning fossil fuel, the Southern Corridor can help countries to reduce their emissions of carbon dioxide.

“The most important positive economic development for Greece in the last decade.”

Antonis Samaras
Prime Minister of Greece
Opening the Southern Corridor: A Vision for the Future

“Realising this corridor is in our shared strategic interest. It is vital for the security and diversification of our energy supply and demand.”

José Manuel Barroso
President of European Union

Shah Deniz Stage 2 and the Southern Corridor pipelines are some of the largest and most important projects in the energy industry. But, if history is any guide, they will represent just the initial step in the development of the Southern Corridor. Once a first gas transportation route is opened, further market development, additional gas and expanded infrastructure can follow. It is expected that with additional gas production opportunities in Azerbaijan, the ability of the Southern Corridor to bring new sources of supply could in future extend beyond Bulgaria, Greece, Albania and Italy to South East Europe and Central Europe.