

INTERVIEW

Investments of \$900 Billion per Year Will Be Required in the Hydrocarbon Sector in the 2030s

Fatih Birol, Chief Economist of the IEA,
tells AOG

- ▶ **Oil in the Middle East:** the resources are there, but the “above-ground” conditions have to be met as well
- ▶ The total output of **shale gas** will grow by a factor of 3.5 between now and 2040
- ▶ **Natural gas** is the only fossil fuel for which demand in **Europe** could increase over the long term
- ▶ The **EU** has invested far more in **renewables** over the past few years than the United States has in shale gas

(Following is the text of an interview with Mr. Fatih Birol, Chief Economist of the **International Energy Agency** – see following page for his biography and AOG, 1 Nov., 2014, for an interview with Mr. Birol on the IEA’s *Africa Energy Outlook*. This interview deals with the Agency’s *World Energy Outlook 2014*).

Arab Oil & Gas: *According to the central scenario of the World Energy Outlook 2014 (New Policies Scenario, NPS), the growth of world oil demand would slow to a near halt by 2040. The main issue here seems thus to be peak demand and no longer peak oil.*

■ **Fatih Birol:** As fuel use becomes more efficient and the share of other fuels in the global energy mix increases, we see that world demand for oil starts to show signs of a plateau by 2040 in our main scenario. This development at world level is though the product of a range of trends across different countries and regions, with some projected to grow at relatively robust rates all the way through until the 2030s, such as India, while others see slowing growth and others continued decline.

AOG: *According to the same scenario world oil supply would reach 104 million barrels per day in 2040, a rise of about 14 million b/d over the period. This increase is much less important than that considered a few years or several years ago, and it is largely one of the positive impacts of greater energy efficiency, but there is the huge challenge of the replacement of declining fields.*

■ **F. B.:** The projected rates of oil demand growth are lower than in the past, mainly as a result of greater energy efficiency and the use of other fuels. However, as you say, world oil demand still increases to 104 mb/d in 2040. Signs of strain affecting global oil supply can appear



Photo AIE.

not just in countries that are aiming to increase output, but also in those that are attempting to maintain existing production levels. Enhanced oil recovery technologies will help to regain a portion of this decline, but the majority will come from developing new and yet-to-find reserves. This will require serious investments, with the annual investment requirement in oil and gas exceeding 900 billion dollars in the last decade of our projections, up from around 700 billion today. The challenge will be not just in the sheer volume of financing required, but also in the timing of investments, in the availability of human resources, in the political stability necessary to commit these investments and operate production.

AOG: *The IEA was set up 40 years ago to help OECD's energy importing countries face the challenges of energy security. With the Arab Spring, wars in Syria and Iraq, turmoil in Libya and Yemen, sanctions against Iran, the Russia-Ukraine crisis and sanctions against Russia (and this list is not exhaustive) this goal remains very much up to date. The WEO 2014 reminds us that the world will rely more and more on a smaller number of oil exporting countries. But for natural gas the concerns are less acute. Could you elaborate on that?*

■ **F. B.:** The growth in natural gas output is distributed more evenly around the world in our projections, compared with oil production. In fact, with the exception of Europe, regional gas output increases everywhere. Another important difference compared with oil markets is that the world's biggest gas consumer – the United States – is scheduled to become a net exporter of natural gas, while it remains an important – albeit diminishing – net importer of oil even in 2040. In the case of natural gas, more LNG liquefaction and regasification capacity will support more flexible international natural gas trade, with positive implications for security of supply.

> Dr. Fatih Birol

Chief Economist, Director, Global Energy Economics, International Energy Agency, Paris

Dr. Fatih Birol is the Chief Economist of the **International Energy Agency** in Paris. He is responsible for the IEA's flagship *World Energy Outlook* publication, which is recognized as the most authoritative source of strategic analysis of global energy markets. He is also the founder and chair of the **IEA Energy Business Council**, which provides a forum to enhance cooperation between government and industry.

Dr. Birol has been named by *Forbes Magazine* among the most powerful people in terms of influence on the world's energy scene. He is the Chairman of the **World Economic Forum's** (Davos) **Energy Advisory Board** and has served as a member of the UN Secretary-General's 'High-level Group on Sustainable Energy for All'. He is the recipient of numerous awards from government and industry for his contribution to energy and climate economics. Most recently, in 2013, he received the Japanese Emperor's Order of the Rising Sun, the country's highest honour. He has also been decorated by the governments of Austria (Golden Honour Medal), France (Chevalier dans l'Ordre des Palmes Académiques), Germany (Federal Cross of Merit), Iraq, Italy (Order of Merit of the Republic), the Netherlands, Poland, Turkey, the United States and the Russian Academy of Sciences. He is a past winner of the **International Association of Energy Economics'** award for outstanding contribution to the profession.

Prior to joining the IEA in 1995, Dr. Birol worked at the **Organisation of the Petroleum Exporting Countries** (OPEC) in Vienna. A Turkish citizen, Dr. Birol was born in Ankara in 1958. He earned a BSc degree in power engineering from the **Technical University of Istanbul**. He received his MSc and PhD in energy economics from the **Technical University of Vienna**. In 2013, Dr. Birol was awarded a Doctorate of Science honoris causa by **Imperial College**, London. He was made an honorary life member of Galatasaray Football Club in 2013.

Source: IEA.

AOG: *In the NPS non-OPEC supply increases until the mid-2020s. It would be 51 million b/d in 2040, with a share of just under 50% of world oil supply. In the past **non-OPEC oil supply** was often underestimated. Are you confident with these latest figures?*

■ **F. B.:** The *World Energy Outlook* presents various scenarios and case studies with the intention of showing different versions of what the energy world may be like in the future, depending on the policy choices we make. But looking beyond potential policy choices, there are several other sources of uncertainty for the future outlook, including political stability in some cases. There are also a number of specific questions for the oil industry, such as how to manage the complexity of developing more difficult and remote resources in new frontiers like ultra-deepwater, or the speed at which technology opens up new resource plays, which will affect how the US tight oil revolution spreads to other regions with similar resources. Overall though, our projections are based on our best knowledge of the current state and a balance of expectations about future behaviour of the industry and governments.

AOG: *OPEC oil production would increase by less than 1 million b/d up to 2020 but it would need to rise by more than 6 million b/d in the 2020s and by almost as much in the following decade. It seems rather manageable, isn't it?*

■ **F. B.:** For some time, we have stressed the importance of Middle East oil producers to the long-term supply outlook, particularly as non-OPEC production growth rates slow down and then start to decline in the 2020s. Given the long lead times in the oil industry, it is important to make sure that investments are made in time to ensure that we start seeing the required addition to output when it is needed. The resources are there, but the above-ground conditions also need to be in place to ensure these producers' ability to respond to the markets' needs for extra output.

AOG: *The U.S. would remain the leading gas producer in 2040 thanks to shale gas and tight gas. **Unconventional gas**' share of world production would nearly double to 31% in 2040 as against 17% today and would account for almost 60% of the growth in global output during this period. The "shale gas revolution" is clearly not an illusion.*

■ **F. B.:** Total volume of shale gas produced is expected to increase by three and a half times by 2040 in our central scenario, but more than half of this total is still produced in North America, followed by China and Argentina. The shale gas revolution is for real, but unconventional gas takes time to become a broader supply phenomenon outside North America and its development around the world is uneven. In some cases there are resource and geological constraints; in other cases the abundance of conventional gas resources means that they will be developed before the unconventional resources; elsewhere there are above-ground risks that constrain development, including public concern over the social and environmental consequences.

AOG: *According to the WEO 2014 **gas consumption in Europe** would not return to its 2010 level before the beginning of the 2030s. Is this not an extremely pessimistic view?*

■ **F. B.:** Compared to our demand projections for coal and oil in Europe, gas actually fares relatively well. In fact, gas is the only fossil fuel for which we expect demand to increase in the long-term in Europe. But the use of gas in the European power sector is being squeezed from all sides at the moment: by the rapid rise of renewables and also by a lack of competitiveness against coal – not helped by today's very low price on CO₂. There is though an opening for gas

World Energy Outlook 2014

The *World Energy Outlook 2014* was published by the **International Energy Agency** on 12 November. 748 pages, price of 150 euros for the print edition and of 120 euros for the PDF. See the websites www.iea.org and www.worldenergyoutlook.org

See also the executive summary of the *WEO 2014* on page 45 in this issue.

to grow, not least because of the large number of coal and nuclear power plants that are set to retire over the coming decades. The trajectory that gas follows will also be strongly influenced by European policy efforts on CO₂ emissions as well as on energy efficiency and renewables.

AOG: *Renewable energies (including hydroelectricity) would become the top source for power generation with a share of 33% before coal and natural gas (in this order) after 2035. Is this another "revolution" in the energy world?*

■ **F. B.:** We talked already about the shale gas revolution, but investment in renewables in the EU has actually been much higher than investment in US shale gas over the last few years. We expect that the role of renewables in the global energy mix will continue to expand, especially in the power sector and in regions where policies are in place to support their use. In our central scenario, renewables-based electricity generation nearly triples, overtaking gas as the second-largest source of generation in the next couple of years and surpassing coal as the top source after 2035. The rapid increase in renewables-based electricity generation represents an important trend in the power sector today and for the future. However, as the share of intermittent renewable technologies, such as wind and solar PV, increases in the world's power mix, their integration both from a technical and market perspective can become more challenging.

AOG: *Around 2040 world energy supply would be shared in almost four equal parts (renewables and nuclear energy, oil, gas and coal). Would it be a good balance for the world in a long-term perspective?*

■ **F. B.:** In our central scenario, renewables will become a larger and more firmly established part of the global energy system over time and, together with nuclear together, will account for around one-quarter of the global energy mix in 2040. But, while the policy choices and market developments in our central scenario see the share of fossil fuels in primary energy decline gradually to 2040, they are not enough to stem the rise in global energy-related carbon dioxide (CO₂) emissions, which grow by one-fifth. This puts the world on a path consistent with a long-term global average temperature increase of 3.6 degrees Celsius (°C), well above the 2 °C climate goal agreed by governments.

AOG: *You estimate subsidies for fossil fuels at \$550 billion and subsidies for renewable energies at \$120 billion in 2013 at a worldwide level. Will this situation last? Could it last despite numerous warnings regarding fossil fuel subsidies, including from the IEA? It does not seem that governments are really keen to deal seriously with this delicate issue.*

■ **F. B.:** Most countries with large fossil-fuel subsidies recognise the need to eliminate or, at least, reduce them, but often run into difficulties – usually because of strong resistance from

those consumers and producers that stand to lose the most. History shows that subsidy reform is not an easy process. There is no single formula for success and national circumstances and changing market conditions have to be taken into account when preparing reforms. However, the prospects for success can be enhanced by following some basic principles. These include: clearly determining the objective, which in this case is to get energy prices right by ensuring that they reflect their full economic value; setting a clear timetable for the introduction of market pricing and for removing price controls; carefully assessing the adverse effects of energy price increases on the poor and how they can – if necessary – be mitigated through targeted compensation; and, thorough consultation and good communication at all stages of the process in order to win broad-based support for the decisions that are required.

AOG: *In order to face the **climate change** challenge and to not exceed a 2°C rise in average world temperatures the IEA stresses that we must increase **low-carbon investments** (defined as carbon capture and storage, nuclear energy, renewable energy and energy efficiency) four times beyond current levels, which would imply an amount of about \$1.5 trillion (dollars 2013) per year between 2014 and 2040. Do you really believe in such an option?*

■ **F. B.:** According to the estimates of the **Intergovernmental Panel on Climate Change**, a 50% chance of limiting the increase in average global temperatures to 2 °C – the internationally agreed goal to avert the most severe and widespread implications of climate change – implies that the global energy sector cannot emit more than around 1 000 gigatonnes of carbon-dioxide from 2014 onwards. This entire budget will be used up by 2040 in our central scenario. Since emissions are not going to drop suddenly to zero once this point is reached, it is clear that the 2 °C objective requires urgent action to steer the energy system on to a safer path. Achieving the 2 °C goal will entail a substantial transformation in the ways we produce and consume energy, involving major improvements in energy efficiency and a switch to low-carbon energy sources and technologies. However, the best way to achieve these goals will differ across countries, something that will need to be accounted for in structuring a global climate deal in 2015.

☞ See also the **Top of the News** section on page 3 and **Document** on page 45 with the summary by the **IEA** of the **WEO 2014**.

