



## The 7th Dewhurst Lecture The Oil Industry: Great Achievements and Big Challenges

In 1933, Thomas Dewhurst (1881-1973), then President of the Institute of Petroleum in UK, organised what was to become the first World Petroleum Congress. The Dewhurst Lecture, initiated in 1991, is a tribute to him and to the person asked to deliver it. The recipients of the award are well known throughout the industry and have demonstrated unusually high achievements over many years. The 7th Dewhurst Lecture was given on 3 July 2008 by HE Ali I. Al Naimi, Minister of Petroleum & Mineral Resources, Kingdom of Saudi Arabia, and is published here together with a list of the previous awards.

I would like to thank the Government of Spain and the organisers of the 19th World Petroleum Congress for this honour and the opportunity to deliver the Dewhurst Lecture on the 75th anniversary of the World Petroleum Council.

The number and variety of participants at this gathering has truly been outstanding. The excellent meetings and events of the past week are a tribute to Thomas Dewhurst's vision of establishing a forum where the best scientific and

technical minds in the petroleum industry could come together with the common goal of sharing knowledge for the betterment of mankind.

I wonder if, 75 years ago, on the occasion of the first Congress in 1933, Mr Dewhurst could have imagined the legacy he created.

Just as the World Petroleum Council is celebrating its 75 years of accomplishments, we in Saudi Arabia are also celebrating a diamond anniversary. Seventy-five years ago, at the direction of His Majesty King Abdul Aziz, Saudi Arabia signed the concession agreement with the Standard Oil Company of California allowing that company to explore for oil in the Kingdom. Thus began Saudi Arabia's oil industry, without fanfare and virtually unnoticed by the outside world. No one could have predicted back on 29 May 1933, that the signing of that document would set in motion a series of developments which would dramatically alter the future of the peoples of Saudi Arabia and the critical role their country would play in the global economy.

From its humble beginnings in 1933, Saudi Arabia's oil industry became the vehicle through which His Majesty King Abdul Aziz would even-

HE Ali I. Al-Naimi (CENTRE) receives the Dewhurst Award from WPC President Randall Gossen (LEFT) and NOC Chairman Jorge Segrelles (RIGHT).



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tually realise his vision of transforming Saudi Arabia into a modern state that provided a better life for its citizens.

The legacy of His Majesty's vision is apparent in what some refer to as "the economic miracle in the desert". I have witnessed in my lifetime the transformation of Saudi Arabia into a modern country with a vibrant economy and an oil industry that is second to none.

### ● **Legacy of the petroleum industry**

In preparing for this lecture, and with these two auspicious anniversaries in mind, I was drawn to reflect on how I would sum up the legacy of our industry, the petroleum industry, over the past 75 years.

Physicists tell us that energy is the ability or capacity to do work. But when combined with the power of the human mind, energy is much more. It becomes the means to a better way of life, a tool for achieving mankind's aspirations for prosperity, for health, for personal mobility and the freedom it provides.

Thomas Dewhurst understood that the petroleum industry had the ability to harness science

and technology for the betterment of mankind. I believe his faith in our industry has been justified time and time again.

The age of petroleum coincides with a period in world history unlike any that had gone before. The 20th century has been a period of unparalleled achievements in science and technology. From the human mind came innovations that have changed the world in previously unimaginable ways and, in the process, transformed our lives.

We can be proud of the fact that our industry played a critical enabling role in the economic and transportation revolutions of the 20th century that produced rapid improvements in both living standards and personal mobility.

Innovations that increase mobility have the effect of compressing time and distance and have been important drivers of commerce, and of economic and social change. Throughout history innovations like the wheel, the sailing ship, the steam engine and the internal combustion engine have allowed mankind to overcome the limitations of the physical world, and in doing so, to expand the realm of what is possible.



Having signed a concession agreement with Standard Oil in 1933, Saudi Arabia exported its first oil on 1 May 1939. The picture shows HM King Abdul Aziz Al Saud taking the salute onboard the tanker D. G. Scofield prior to its departure from the port of Ras Tanura.



Recent past award recipients include Lord Browne (RIGHT), who gave the 6th Dewhurst Lecture to WPC-18 in Johannesburg (he is seen at right in the picture receiving a gift from the outgoing WPC President Dr Eivald Røren), and Euan Baird (OPPOSITE), who gave the 5th Dewhurst Lecture to WPC-17 in Rio de Janeiro.



Not only could people do more work, but they could do it faster, more efficiently and at a lower cost. These advances became catalysts for unprecedented leaps forward in productivity, competitiveness and prosperity.

Affordable transportation fuels derived from petroleum made widespread personal mobility a reality, and in doing so, created a revolution and a new world of possibilities, with opportunities and choices for increased freedom, prosperity, security, health and happiness.

The 20th century was a period of unprecedented growth in world economic prosperity and mobility fuelled by innovation and access to plentiful supplies of cheap labour and cheap resources. The world however is changing – demographics, geology, geo-politics and the environment are challenging this old model of economic development. In fact, what our industry does in the next 50 years will probably do more to determine our legacy than what we have accomplished in the past 150 years.

The legacy we leave to our children and grandchildren must be one of prosperity and environmental stewardship.

The beginning of the 21st century has been a tumultuous time for petroleum and energy markets. Oil markets have witnessed surging demand, political instability, severe weather, infrastructure mishaps, fears of a global climate catastrophe, changing specifications in international product markets, the flow of speculative funds into oil futures and pessimism about the availability of petroleum resources to meet future needs.

Developments over the last several years have created a crisis in confidence about our energy future. Events have raised serious doubts in the minds of the public about petroleum and the petroleum industry and their ability to continue to deliver prosperity to future generations in a safe and reliable manner.

While the growth of economic prosperity and personal mobility during the last century has been truly remarkable, billions of the world's people have yet to enjoy their benefits. These people have been literally left behind. Many of the basic conditions taken for granted in the developed world are only a dream for them.

The numbers tell the story. Over 1 billion people around the world lack access to clean drinking





water and 2.4 billion live without adequate sanitation. Experts tell us that there are still 1.5 billion people who lack access to electricity. Nearly 3 billion are said to live on less than \$2 per day and the UN estimates that 80% of the world's total financial resources devoted to health currently are spent in OECD countries.

While these figures are staggering, the scope of the problem will only become larger as the world's population grows. The UN's mid-range estimate indicates that the world will add another 2.6 billion people by 2050, raising total population from 6.6 billion currently to almost 9.2 billion.

Population growth and the demands of people in both the developed and developing countries for increased prosperity and greater personal mobility are primary drivers of the expected large growth in energy demand over the next 20-30 years.

#### ● Meeting rising energy demand

The task of meeting this rising energy demand is complicated by mounting concerns that the use of carbon-based fuels is contributing to global climate change. There is a growing political consensus that global climate change can not be ignored and that meaningful action to stabilise atmospheric CO<sub>2</sub> concentrations requires that we find new ways to lower the carbon footprint of human activity.

While the climate change issue has gained widespread attention worldwide, a significant portion of the world's population faces a more immediate and pressing problem – poverty. Poverty and its corrosive effect on the human condition are very real and immediate threats for vast numbers of people in developing countries. For the person living in poverty, climate change is only one of a myriad of problems, one whose effect is not readily visible. In the developing world, climate change is often viewed as a problem created by the developed world, and as such, is the responsibility of the developed world.

The task before us is not simply to “get the carbon out”, but to do so safely, and in a socially and economically responsible manner that recog-

nises the legitimate aspirations of all the world's people for greater prosperity, health and happiness.

Unfortunately, there is no easy or quick way to achieve this. It will take time and a significant commitment of financial resources. The fact is carbon-based fossil fuels still are the cheapest, most efficient and most reliable energy sources for our mobile societies.

Nevertheless, it is politically popular these days to extol the virtues of so-called alternative fuels because of their lower carbon emissions. However, claims of a reduced carbon footprint for some bio-fuels do not always hold up under closer scrutiny. While we welcome these supplements, they are not replacements at scale for petroleum and they will have drawbacks and challenges.

The challenge is clear; can we simultaneously increase and broaden economic prosperity and meet the world's desire for mobility while making meaningful progress toward reducing our carbon footprint? The answer is: “Yes, we can!” and I believe the petroleum industry must be in the forefront of this effort.

A common theme we hear these days is that we need to look past petroleum for the solutions to





our future energy challenges. Such statements create the false impression that jettisoning oil is a requisite for progress in meeting our energy and environmental goals. I believe that nothing could be further from the truth.

While estimates of demand growth can vary widely, there is one common thread – we will need more and more BTUs from all sources to meet the expected growth in demand for energy. The goal of expanding economic prosperity in the coming decades requires that we increase production of all fuel sources including oil, gas, coal and alternatives. To do otherwise would be a prescription for failure.

Currently petroleum is unrivalled in its ability to provide safe, efficient and cost-effective transportation to the world's people and I see little to change this in the foreseeable future. It is highly risky at this early stage to assume that unproven technologies could quickly replace petroleum on a large scale.

Oil will continue to be an essential part of global energy mix for many years to come. Therefore it is incumbent upon all of us to use it wisely, in the most efficient and environmentally friendly manner possible.

#### ● **Resource base**

There has been much discussion over the last few years about the adequacy of the oil resource base. Peak oil theories have created negative sentiments and fears about the future of petroleum. Informed studies of the resource base tell us there is plenty of recoverable oil left in the ground, perhaps as much as 5-7 trillion barrels counting both conventional and unconventional resources. The issue is not whether it is there. We know it is. We only have to look at the recent extraordinary deepwater discoveries off Brazil, the Gulf of Mexico and the west of Africa for evidence that there are significant volumes of oil yet to be found.



Oil will continue to be an essential part of global energy mix for many years to come – Saudi Aramco's refinery at Ras Tanura.





Even in the US onshore, perhaps the most intensively and extensively explored oil provinces anywhere, the petroleum industry is demonstrating once again that there are significant quantities of oil left to be found and produced. For example, recent estimates indicate the resource base in the Bakken formation, spanning the states of North Dakota and Montana, may contain as much as 500 billion barrels of oil in place. While recovery levels have traditionally been low due to the complex and challenging geology, new science and technologies – like horizontal fracturing – are unlocking more and more of the formation’s resources.

I am just as confident that significant quantities of oil remain undiscovered and unproduced in both “mature” and frontier areas around the world. Armed with new technologies and the power of innovation the petroleum industry will find this oil and produce it. Of this I am sure.

The limits to future petroleum supplies have more to do with politics than with geology and resource availability. For example, the most promising acreage remaining in the US is located offshore, most of which is off limits to the industry.

The human mind and its seemingly limitless ability to innovate are wonderful tools empowering our industry to do more while lowering costs. At Saudi Aramco, we have witnessed the power of innovation and its ability to transform our industry. Cutting edge technologies such as extended reach wells, intelligent completions and geo-steering – combined with better reservoir description and improved monitoring and reservoir management strategies – have allowed Saudi Aramco to increase recovery rates in some fields to 70%. In fact, our goal is to reach similarly high recovery rates in as many of our fields as possible.

Looking to the future, major technology opportunities include the use of nanotechnology in sub-surface science and engineering, and the development and deployment of new tools to better manage the reservoirs. Some of the areas

our scientist believe hold promise, include extreme-reservoir-contact wells, smart inflow-control devices, autonomous fields, passive-seismic monitoring, gigacell simulation, smart fields, bionic wells and, yes, even nano-robots.

The petroleum industry has a long history of using technology to minimise the environmental footprint of its operations and the products it produces. New technologies under development today and in the future hold great promise for improving energy efficiency and reducing the environmental footprint of global energy use.

Carbon sequestration is one approach to climate change that is generating much interest from the petroleum industry. Capturing CO<sub>2</sub> and storing it underground in depleted petroleum reservoirs show promise as an effective means to help manage atmospheric carbon concentrations. For this reason, Saudi Arabia is a member of the Carbon Sequestration Leadership Forum, a group of nearly two dozen nations.

We are investing substantial sums to develop the required technologies. For example, Saudi Aramco is already a sponsor of the Weyburn-Midale CO<sub>2</sub> Monitoring and Storage Project in Canada, an international effort to study the feasibility of long-term carbon storage in conjunction with enhanced oil recovery.

Carbon management is just one area where the industry can help protect our environment. There are other promising lines of research that are being explored. For example, Saudi Aramco is studying the desulphurisation of crude oil and refined products using biotechnology, and advanced fuel formulations, including on-board reforming of gasoline into hydrogen.

Last year, during the Third OPEC Summit, King Abdullah announced a new initiative to protect the global environment, with a commitment to provide \$300 million for research into reducing the environmental impact of using fossil fuels. This initiative has received considerable international support, with Kuwait, the United Arab Emirates and Qatar providing an additional \$450 million.



### ● **Human element**

Without a doubt the greatest resource our industry has is the intelligence, creativity and vision of its people. We in Saudi Arabia fully appreciate the vital role of the human element in our business and the critical importance knowledge plays in the world's future. We also understand that we must expand and nurture both knowledge and our human capital if we are to meet the significant energy and environmental challenges facing mankind.

The energy industry already faces critical shortages across the entire spectrum of skilled positions and our future needs will only grow. We must educate and train tens of thousands of new scientists, engineers, geologists, geophysicists, technicians and other vital workers.

In recognition of these realities, Saudi Arabia is currently building two scientific institutions which will help us meet our twin goals of advancing our knowledge of energy and the environment and training the scientists and technicians of tomorrow who will be critical to the energy industry.

The first of these institutions is the King Abdullah University for Science and Technology, or Kaust, which will focus scientific research at the graduate level.

The second institution is the King Abdullah Centre for Petroleum Research and Studies, which will begin operating before the end of this year. While the work of the centre will focus on scientific and technical issues related to petroleum and energy, it will also encompass energy economics and policy analysis. Environmental issues – and above all – reducing carbon emissions will be a priority of the centre.

Technology can empower us to transform our energy system to ensure continued prosperity while producing a cleaner environment. This is a daunting task, but achievable if governments and industry work together. While government funding of basic scientific research is critical, policy-makers must avoid political pressures for quick fixes or to pick winners and losers. The process of technical innovation is not predictable. No one

knows where and when the next breakthrough will come and it will be necessary to fund multiple approaches.

We in the petroleum industry are experienced investors in technology and we are used to dealing with risk. But as investors, we loathe uncertainty. Unfortunately, government policies can be a major source of uncertainty, slowing or even derailing work on promising new technologies.

In closing, I want to say that I know that our industry possesses the skills, knowledge and ingenuity needed to overcome the world's most daunting energy challenges. Our greatest asset is the talent of our people. From their imagination and hard work will spring the innovations that will allow mankind to produce more energy and consume it efficiently, while protecting this planet we call home.

Increasing and broadening economic prosperity and social development need not harm the environment. I believe this will be the ultimate legacy of our industry. Finding the solutions will require time, effort, partnership, and commitment. We in the petroleum industry can do it and I am confident we will.

#### **Recipients of the Dewhurst Award**

- 1991 **HE Dr Saleh A. Al-Athel**,  
President, King, Abdulaziz University for  
Science and Technology, Saudi Arabia

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- 1994 **Sir Peter Holmes**,  
Former CEO, Royal Dutch Shell

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- 1997 **Kenneth Derr**,  
Chairman and CEO, Chevron Corporation

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- 2000 **Pierre Jacquard**,  
Former President, Institut Français du  
Pétrole (IFP)\*

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- 2002 **Euan Baird**,  
President and CEO, Schlumberger

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- 2005 **Lord Browne of Madingley**,  
Group Chief Executive, BP

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- 2008 **HE Ali I. Al-Naimi**,  
Minister of Petroleum and Mineral Resources,  
Saudi Arabia

\*The Dewhurst Lecture in 2000 was given by Philippe Rogier, Head of International Affairs of the IFP, on Pierre Jacquard's behalf.

