



21 April 2009

Skills needs in the energy sector

Points for consideration

I. Introduction

Energy is an essential motor of growth and development for an ever increasing world population. Social and economic development can be attained only if a secure, reliable and affordable supply of energy is ensured. In its 2008 World Energy Investment Outlook, the International Energy Agency (IEA) estimated that the world primary energy demand is set to increase by 45% between 2006 and 2030.

To meet this growing demand, there is a strong and urgent need to develop sufficient levels of human capital and expertise for both existing and new sources of energy production. Many types of energy production in the energy sector are facing significant skills shortages, and this risks jeopardising plans for energy security going forwards. While this is an ongoing problem, it is further exacerbated by the current economic crisis, in which various parts of the energy sector may experience job-shedding and loss of skilled labour. Thus skills shortages may limit productivity and reduce or delay the pursuit of new energy projects. This could prove detrimental to the energy sector as a whole.

Investing in forward-looking education and training strategies, while taking into account the urgent requirements of the energy sector, will thus be an essential requirement for sustainable energy production. Ensuring a skilled workforce for the energy sector is inseparable from other policy actions towards meeting growing energy demand, and this should therefore be a top priority policy issue in national energy policy strategies, particularly during the current economic crisis.

BIAC encourages the OECD and its sister agencies to turn their attention to the issue of skills needs in the energy sector, and we would welcome new analysis in this field. To provide some initial guidance towards possible future research, this paper outlines points for consideration from the perspective of the OECD business community.

II. Skills needs for the energy sector

Rapidly rising energy demand, the need to build new infrastructure, and the introduction of new technologies designed to address challenges such as climate change, food security, and water shortages, all hold significant consequences for the energy sector. Unless steps are taken now, the strain posed by these factors on energy systems as a whole could diminish industry's ability to deliver reliable, safe, sustainable and competitively priced energy. A shortage of properly trained and skilled labour could have serious repercussions in a number of ways including, for example: reduced reliability; increased cost of production; infrastructure project delays; and decreased safety and productivity. An important means to avoid this potential crisis lies in creating clear strategies to build skilled and adaptable workforces for different types of energy production.

In BIAC's view, individuals should increasingly possess both key generic skills, plus more specialised skills tailored towards their particular position in a particular industry. In the case of the energy sector, the generic skills base largely consists of key competences, taught from an early age, in science, technology, engineering and mathematics (STEM), and certain other cross-disciplinary skills, such as information technology, languages, and knowledge about key environmental issues. This generic skills base presents individuals with the opportunity to remain flexible to changing economic situations and thus enter and re-enter the labour market with greater ease. It moreover enables individuals to be mobile, both geographically and between different energy industries. Specialised job-specific skills, meanwhile, should be increasingly acquired and/or enhanced through training courses provided by the particular industry or company (together with government support if necessary). Job-specific training courses should keep pace with developments in the regulatory and economic environment, and should be adaptable in order to remain relevant and effective.

Ensuring an effective skills base for the energy sector therefore requires action at all education levels, including vocational education and training (VET) and lifelong learning. Partnerships between business, governments and education institutions will be central to this effort, in order to map the current and future skills needs for the energy sector and to ensure that policies and investments are secured towards attracting greater numbers of individuals to STEM and energy issues, while also upskilling the energy sector.

III. Current skills shortages in the energy sector

Recognising the significant human resource challenges facing several parts of the energy sector, governments and industry must increase their efforts to build an effective skills base, ensure trained workers are available and attract and retain skilled foreign workers. This is particularly important in the current economic crisis, in which skilled personnel may be lost across several types of energy production. Moreover, as governments and many national economic stimulus packages have outlined plans for investment in energy efficiency and infrastructure capacity, skilled labour is needed to ensure that these objectives can be

realised and implemented. It should thus be recognised by policy makers that skilled labour will be crucial towards the long-term recovery of the energy sector.

The OECD business community reports, for example, the following challenges with respect to skills shortages in the energy sector:

Nuclear energy

Nuclear energy is faced by a serious problem of skills shortages. On the one hand, many of the nuclear energy experts originally employed during the significant period of nuclear energy expansion (1960s-1980s) are now reaching retirement age. On the other hand, we are witnessing a trend over recent years of declining university enrolment, changing industry personnel profiles, and dilution of university course content. Moreover, the nuclear energy landscape has changed significantly. Due to the strengthening competitiveness of the industry, many countries have announced major plans for nuclear energy new build, requiring large amounts of highly skilled labour. At the same time, increasing numbers of reactors are set to be decommissioned, requiring new types of skilled labour for their safe deconstruction. Raising the attractiveness and public awareness of nuclear energy and related studies should be a top priority for governments where nuclear energy is, or is intended to become, part of their national energy supply mix.

Renewables

According to the 2008 IEA Renewable Energy Outlook, the total cumulative investments in renewable energy supply in 2007/2030 amount to \$5.5 trillion. Although financing is often available, shortages of high-skilled labour, both in science and at the executive level, can lead to significant difficulties. The renewable industries involved are often such early-stage markets that the talent pools of skilled labour simply have not yet come to fruition. However, another challenge is that the technology is so dynamic that it outpaces education and training courses related to many renewable energies. Moreover, some new energy industries can face risks regarding their long-term viability, which may deter individuals from pursuing studies and careers in these industries.

Petroleum sector

It is reported that the petroleum sector tends to experience cyclic periods of investment rather than continuous investment, resulting in loss of skilled personnel in periods when investment dries up. This could potentially become a major problem during the current economic crisis, where the lack of a sound investment environment could lead to lay-offs of competent personnel. In many cases there is an urgent need for more engineers, geologists and geophysicists, as well as drilling and process workers. A lack of skilled labour for the petroleum sector means that new upstream production projects may be delayed. This would create significant added costs and would place ever greater strain on national energy security.

Energy efficiency and infrastructure

In order to meet the challenge of growing energy demand, the IEA World Energy Outlook 2008 rightly states that “hundreds of millions of households and businesses around the world would need to be encouraged to change the way they use energy”¹. Energy efficiency in industry, for example, holds great potential for meeting energy demand (saving between 25 and 37 EJ per year) and reducing carbon dioxide emissions (by 1.9 – 3.2 Gt CO₂)². Such savings will require the large-scale uptake of energy efficient technologies and practices relating to the construction and operations of homes and industries. To meet this demand, skilled labour will be essential in implementing practices for energy efficiency.

At the same time, huge investment will be required for new infrastructure projects and maintenance of existing infrastructure. The IEA World Energy Outlook 2008 “Reference Scenario” projections call for cumulative investment of over USD 26 trillion between 2007-2030³, and the IEA notes that much of the world’s current infrastructure for oil, gas, coal and electricity supply will require replacement by 2030. In addition, with countries’ national stimulus packages outlining sizable investment plans for energy infrastructure, it is apparent that additional skilled labour in construction and engineering industries will be required to meet this new demand and thus take advantage of increasing investment in coming years.

IV. Key issues for consideration

Policy makers have a key role to play in addressing the current workforce issues. Failure to take appropriate steps now will seriously jeopardize the provision of adequate expertise tomorrow. Business encourages policy makers to address the following considerations:

- Document and analyse trends and future needs in the area of human resource requirements in the energy sector, taking into account rising demand and expected changes in energy patterns.
- Include human resource requirements and education needs in both strategic long-term energy planning as well as short-term policy responses to the current economic crisis, to ensure that human resources are available to meet future demands and address outstanding issues.
- Offer support for energy research and development programmes including modernisation of education and research facilities.

¹ IEA (2008) World Energy Outlook, p47.

² IEA (2008) Worldwide Trends in Energy Use and Efficiency: Key Insights from IEA Indicator Analysis, p10

³ IEA (2008) World Energy Outlook, p39.

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- Develop partnerships and “educational networks or bridges” between universities, industry and research institutes and foster public-private cooperation and demand-based responses.
 - Enhance the quality, efficiency and availability of apprenticeships and skills training programmes in the energy sector.
 - Increase career awareness for the range of energy options that will play a role in the present and future energy mix.

V. A role for the OECD and its sister agencies

Human capital is widely known to represent one of the most meaningful economic assets for any country. And it becomes even more important when it comes to the energy sector, which is the motor of social and economic development and an essential ingredient of sustainable growth, the key guarantor of our societies’ future economic and social well-being. We must enhance the necessary skills base for the energy sector by investing in education, skills training and apprenticeships, so that labour market needs in the energy sector are addressed. This is an essential prerequisite for energy security, particularly in this current period of economic crisis.

The energy sector could face serious workforce challenges in the coming years unless all stakeholders work together to find solutions. Governments, in cooperation with industry and other stakeholders, have a leadership role in ensuring that energy supply is in the hands of a skilled, adequate and internationally-competitive workforce.

In BIAC’s view, the OECD and its sister organisations, the International Energy Agency (IEA) and the Nuclear Energy Agency (NEA), can play a central role by documenting and comparing international trends and future demands across different energy industries, thereby advising governments on specific action to be taken based on these needs. Forecasting workforce trends and necessary investment requirements in training and education would be of great help to forecast labour market needs and the skills required in the future to ensure a sustainable energy supply. The OECD business community stands ready to provide cross-sector business input towards such new analysis.