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***From technology  
adopters to  
innovators***

**How R&D can  
catalyze innovation  
in Middle East  
national oil  
companies**

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# Executive summary



**There is a strong recognition among Middle East national oil companies (NOCs) today of the need to build differentiating capabilities through investing in research and development (R&D).** Globally, R&D spending in the oil and gas sector has grown despite volatile oil prices that have affected revenues, thanks to the long-term benefits R&D confers on companies in the sector, enabling them to become innovation leaders rather than simply adopt existing technologies. Traditionally, Middle East NOCs have had a relatively low R&D intensity — the ratio of R&D spending to revenues — compared with their global peers however, they are now taking steps to change this. Their efforts so far have been geared toward establishing research centers and pursuing collaboration opportunities with universities, service providers, and other partners — including international ones — in the innovation ecosystem.

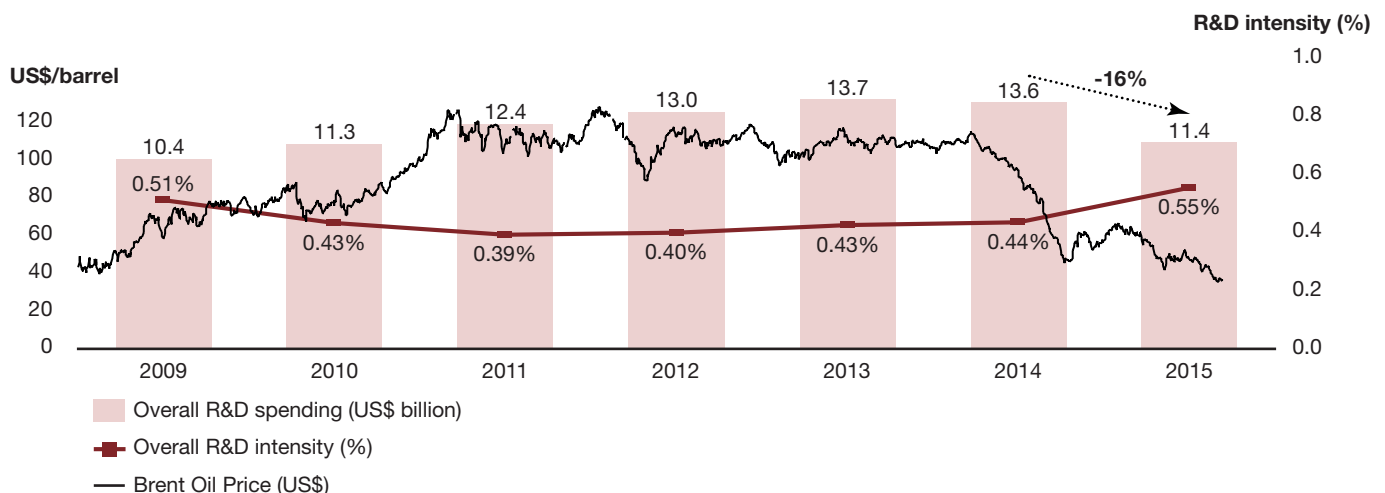
In order to step-change their capability and create a best-in-class R&D setup, Middle East NOCs need to adopt a comprehensive framework that begins with defining a clear strategy covering upstream exploration and production, as well as downstream refining, processing, marketing, and distribution. Depending on their R&D ambitions and priorities, they should determine which technologies to import and which to develop internally. Next, they must build a fit-for-purpose R&D operating model to facilitate the transfer of new technologies from development to deployment. To make full use of their R&D infrastructure, they will need to hire and retain the right talents, whether at home or in affiliated research hubs in Europe or the U.S. In addition, they should consider building strategic or project-based collaborations with innovation partners to develop capabilities in the form of new technological products and services. Given the right commercialization framework, incentives, and support, they could monetize these capabilities. Finally, they should institute a culture of innovation across their organizations to complete their transformation into world-class innovative enterprises.

# Research and development spending has remained healthy

The global oil market has gone through a period of considerable volatility and weak prices which had an adverse impact on companies' overall investment levels. Several oil and gas companies are now geared toward cost reduction in many areas, including spending on R&D. According to Strategy&, global R&D spending dropped by 16 percent between 2014 and 2015. However, despite the decline in oil prices and overall R&D spending, oil and gas companies have bucked this trend, maintaining a relatively higher allocation of investments to R&D as a proportion of their sales. In fact, their overall R&D intensity (the ratio of R&D spending to revenues) has grown (see Exhibit 1). Oil companies need to address specific technical challenges and are already aware of how R&D can act as a differentiating capability with long-term benefits. For example, many firms need to find solutions to improve recovery, increase production, boost operation efficiency, unlock resources, and reduce costs.

## Exhibit 1

### Oil and gas R&D intensity is rising, despite broader falls in R&D spending



Note: R&D intensity is the ratio of R&D spending to revenues.

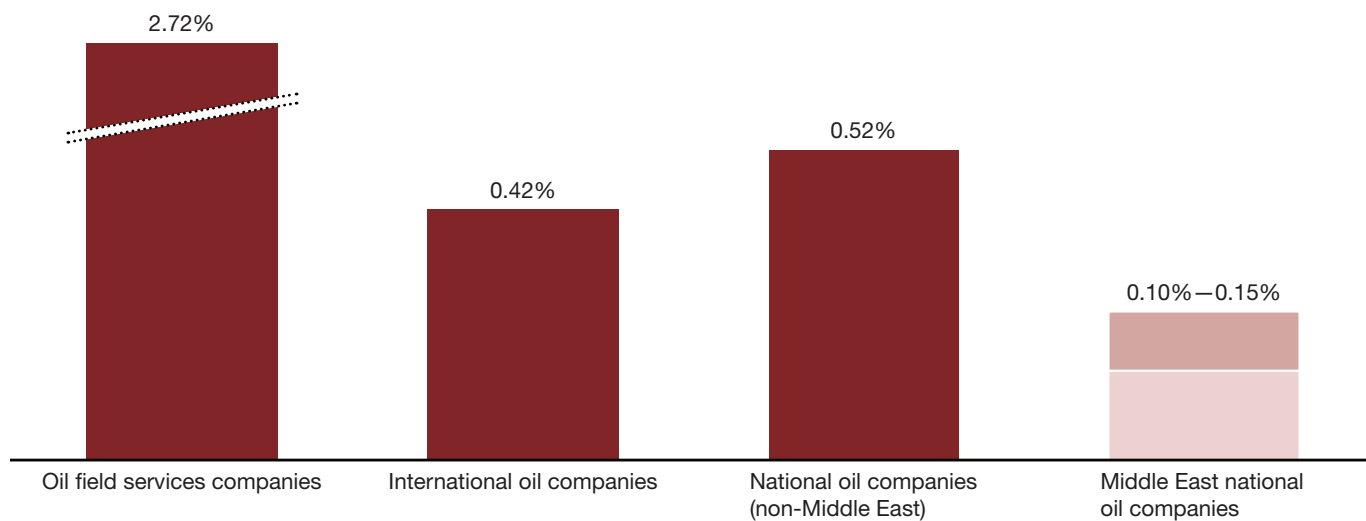
Source: Strategy& 2015 Global Innovation 1000 analysis

# R&D trends in Middle East NOCs

NOCs in the Middle East have not kept up with their global industry peers when it comes to R&D intensity (*see Exhibit 2*). The figures, however, only tell one part of the story: There is a strong recognition among leading Middle East NOCs of the need to build R&D capabilities so that they move from being technology adopters to becoming innovation leaders. NOCs are thus increasingly investing time, efforts, and money in research and technology to enhance in-house research and foster linkages with the innovation ecosystem.

## Exhibit 2

Middle East NOCs lag behind the global industry in research intensity (% , 2015)



Source: Strategy& 2015 Global Innovation 1000 analysis

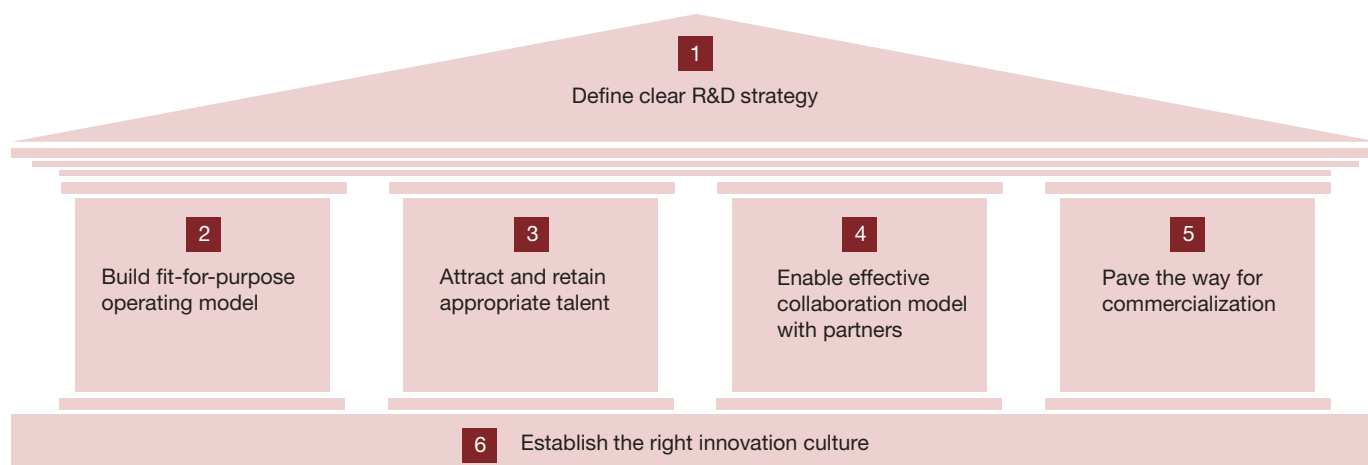
At a national level, NOCs are establishing dedicated oil and gas R&D facilities. For instance, the Abu Dhabi National Oil Company (ADNOC) is in the final stages of inaugurating its Petroleum Institute research center. They are also playing a more significant role in the integration of the oil and gas innovation ecosystem into that of their home economies. Indeed, NOCs are creating effective linkages between their own in-house R&D centers and other research and academic institutions, service companies, and universities. These linkages make the innovation ecosystem work, thereby promoting the NOCs' innovation agenda and meeting their business needs. Moreover, NOCs are taking on a more active role in establishing technology parks to create forums that bring partners and academic institutions closer to their operation sites. Saudi Aramco, for example, is actively shaping the vision of the Dhahran Techno Valley Company to attract major oil and gas players.

At an international level, NOCs are also expanding their investments in physical oil and gas R&D facilities. Saudi Aramco recently opened a research center in Detroit, its eighth satellite research facility and its third in the U.S. Additionally, NOCs are strengthening their portfolio of relationships by establishing large-scale strategic collaboration agreements with external parties. By doing so, they are delivering specific R&D projects, advancing their own capability development, and increasingly participating in shaping the global discussion on oil and gas R&D and innovation. Notable examples include Qatar Petroleum's collaboration with Imperial College London in the Qatar Carbonate and Carbon Storage Research Centre and Saudi Aramco's Aramco Fuel Research Center, created in collaboration with France's Institut Français du Pétrole - Energies Nouvelles (IFPEN).

# Rising to the challenge

Although Middle East NOCs have laid the foundations, building innovation capabilities requires addressing several region-specific challenges. These include the limited nature of local innovation ecosystems in the oil and gas sector, insufficient governmental support for R&D, the scarcity of research talent, weak links between academia and industry, and the predominant workplace culture of sourcing technologies from external suppliers rather than developing in-house solutions. Middle East NOCs can overcome these problems by using a framework that proceeds from defining a strategy to establishing the appropriate innovation culture (see Exhibit 3). Along the way, it is crucial for them to understand that building R&D capabilities is not about creating another cost center. Rather, R&D capabilities offer many opportunities to generate returns in the long term and, very often, in the short term.

## Exhibit 3 Framework for building a best-in-class R&D setup



Source: Strategy&

### **1. Define a clear R&D strategy**

NOCs must start by defining a clear R&D strategy that is tailored to their business needs. The strategy will therefore depend on each NOC's upstream and downstream specificities and aspirations. For instance, upstream R&D tends to focus on country-specific challenges whereas downstream R&D often tackles challenges common to several NOCs and international oil companies. Bearing those specificities in mind, NOCs will require clarity on their R&D mandate, their R&D focus, and their ambitions for R&D capabilities. NOCs need to agree on whether the company's mandate is to promote R&D efforts at a company level or at a broader country level. Once this has been decided, it is essential to identify and prioritize areas that are critical for the success of long-term business strategies and NOCs' agreed national mandates. After that, NOCs should clearly outline their capabilities ambitions. This means specifying in which areas they will simply adopt the best available technologies from external suppliers and in which areas they will develop in-house capabilities and solutions. The R&D strategy then needs to be stress-tested to ensure that it can survive market volatility and uncertainties. Furthermore, and as part of their strategy definition efforts, NOCs need a set of portfolio management tools, systems, and processes that will lead to transparency in the R&D portfolio and proper monitoring of R&D activities. R&D portfolios must address current and future business and technology requirements. In addition, R&D portfolios should possess an optimal risk profile with a mix of lower-risk (often short-term) projects and higher-risk (often longer-term) projects.

### **2. Build a fit-for-purpose operating model**

NOCs must define the right organizational model, governance framework, processes, and decision rights if they are to build a fit-for-purpose R&D operating model. To achieve this, the R&D function must be positioned so that it fosters strong linkages between the development and deployment of new technologies, enhances cross-disciplinary collaboration, and ensures senior management ownership of the R&D agenda. The governance framework should ensure the effective participation of all those directly involved in R&D: the consumers of R&D in the NOC, the broader internal R&D community, and external experts (whether local or international). Such a mix of views is vital to prevent R&D blind spots, facilitate access to research and academic networks, and improve portfolio assurance. Clarifying processes and decision rights is vital to prevent duplication of efforts and overlapping roles and responsibilities.

### **3. Attract and retain appropriate talent**

An R&D strategy is fed by the appropriate talent, which can be difficult to recruit and retain in the Middle East. Indeed, a cardinal risk that NOCs must avoid at any cost is building research centers only to later realize that they cannot populate these facilities with the researcher capabilities that enable them to work. A recent Strategy& R&D talent

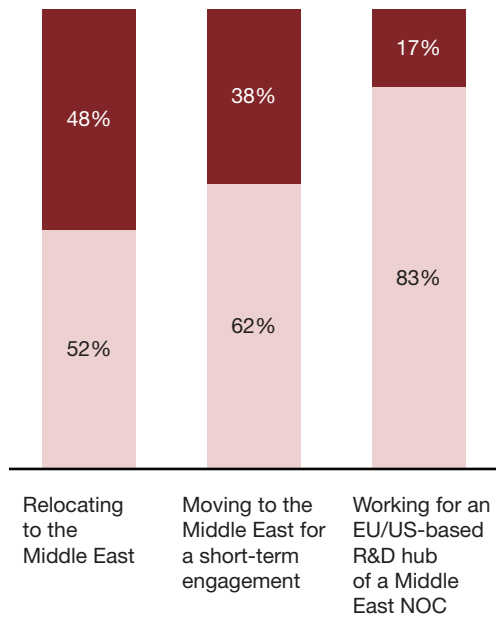


mobility survey found that qualified individuals prefer to work for NOCs either on a short-term basis in the Middle East, or near to EU and U.S. research hubs run by NOCs (see Exhibit 4). Various language, personal, and security considerations dissuade people from moving to the region. In response, Middle East NOCs should improve their talent value proposition. They need to do more than offer attractive compensation and benefits. In addition, they should incorporate other considerations such as a flexible work environment and improved professional and educational support to families. A complementary approach involves looking for researchers with Middle East connections, who may be more open to moving to the region. NOCs can also consider expanding their R&D footprint in the EU and U.S.

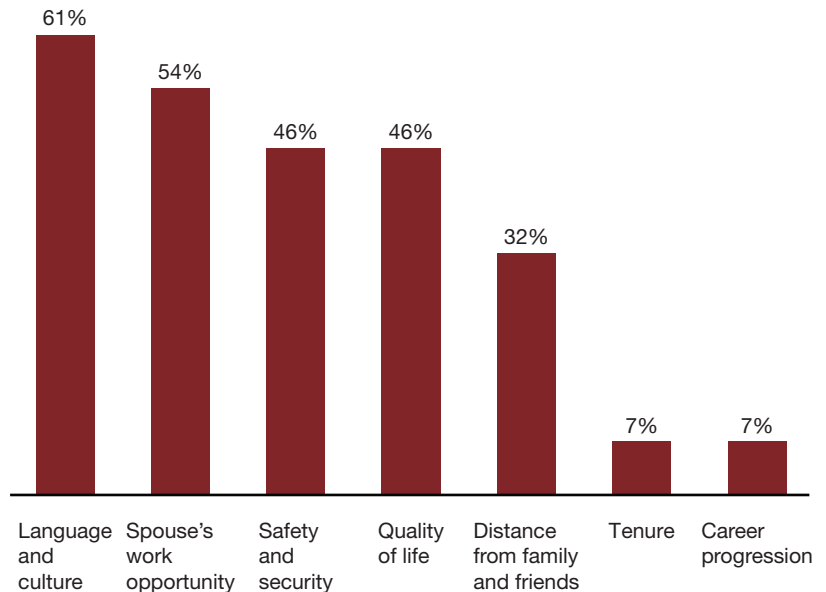
**Exhibit 4**

**Middle East NOCs need to improve their talent value proposition**

Willingness of talent to relocate (% of respondents)



Barriers to working in the Middle East (% of respondents)



■ No  
 ■ Yes/maybe

Source: Strategy& Talent and Mobility Survey

#### **4. Enable an effective collaboration model with partners**

An effective collaboration model with the right external partners is critical to reaching overall R&D objectives. To achieve this, NOCs need to align up front on whether the collaboration's purpose is solely to address technical challenges or also to develop in-house capabilities. NOCs can meet their research and capability requirements by choosing partners with which they have a strong capability fit, and deciding on the right collaboration model (e.g., strategic collaboration versus project-based collaboration). While making these decisions, NOCs need to bear in mind that the motivations for their research partners — be they universities, service providers, or other oil and gas companies — will vary. They need to understand these motivations so that there is agreement on common goals and interests. For example, service providers often want to pilot new technologies and seize future sales opportunities. Universities are often looking for financial support for research and educational activities, along with citations and publications.

#### **5. Pave the way for commercialization**

The major challenge for NOCs is to translate ideas into significant economic outputs such as licenses, jobs, products, and services. The leaders of NOCs need to design a portfolio commercialization framework and have clear views on issues such as intellectual property (IP) protection, patents, and monetization opportunities. Turning ideas into sales also requires an environment in which researchers have the incentives and the technical support (e.g., prototyping, engineering, incubators, etc.) that can lead to effective commercialization. NOCs also need to develop customized processes across the commercialization value chain to push ideas to market. These specially designed processes will assist with technology assessment, IP protection, marketing, and relevant commercialization channels such as licensing and startup formation.

#### **6. Establish the right innovation culture**

Fostering the right innovation culture requires making sure that NOCs' innovation goals, workplace culture, and behaviors are consistent with their overall R&D strategies. An innovation culture will animate the other elements of the framework and help NOCs fully realize commercial value from their R&D activities. Too often, NOCs have workplace cultures that inhibit innovation. There is little encouragement and reward for staff to be innovative and insufficient cross-function/business collaboration to solve technical challenges. NOCs can transform this risk-averse culture. They can promote positive behaviors and change inside the organization. This requires leadership commitment, encouraging the workforce to take pride in its work, empathy with internal and external customers, cultural traits that energize innovative behaviors, and collaboration inside the company as opposed to operating and thinking in silos.

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# ***Conclusion***

Middle East NOCs are ambitious. They want to become technology innovators and solve their country-specific technical challenges themselves. If they can develop the right capabilities, they can build a fully functional R&D setup. This will position them to deal more effectively with the greatest challenges to their long-term business strategy. It will provide global recognition and influence research trends in the oil and gas industry. Most important, it will secure the place of Middle East NOCs in the global oil and gas innovation ecosystem.

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