

# Energy intensity: a time bomb for the Middle East?

Policies to reduce energy intensity can be tough to implement, but Middle Eastern economies need to address this thorny issue if they are to meet growing power demand and compete on the world stage, say Justin Dargin and Martin Vladimirov

WHEN discussing sustainable development, energy intensity is a problem that is often neglected. Yet, as a measure of the energy efficiency of a nation's economy, it weighs upon the economic development of many regions in the world.

Energy intensity is calculated in terms of units of energy consumed per unit of GDP, so the higher the energy intensity, the higher the cost of converting energy into each unit of GDP. The Middle East and North Africa (MENA) region is a prime example of an area where much remains to be done in bringing this level down. There, energy intensity has outstripped GDP growth since the beginning of the 21st century, increasing by 14% (see Figure 1). In fact, from 1981-2009 every region in the world had negative energy intensity growth rates except for the MENA region, according to World Bank data.

Energy intensity in MENA is related to energy consumption, which since the 1970s, has risen quite starkly. This is partially due to economic diversification, energy-intensive industry expansion, a rising population and favourable energy pricing policies.

Across MENA, nearly every energy-rich country is attempting to achieve economic growth along the energy-intensive industrialization path. Yet, rising energy intensity has been coupled with low energy efficiency and unsustainable energy consumption. The outcome has been energy deficits, especially in the gas and power sectors, as well as environmental pollution and loss of economic competitiveness. To illustrate the energy-intensive orientation of the MENA economies, the Gulf Cooperation Council (GCC) member states have a per capita electricity consumption of 9.650 terawatt-hours (TWh) – several times higher than the global average of 2.782. TWh.

Even a moderately aggressive energy-efficiency programme could reduce overall energy demand in the region by 25% until 2030. A focused effort could even lead to a 50% cut by 2030. Improving energy efficiency is the single most effective, as well as the least expensive step that energy policymakers could take to combat increasing energy consumption and carbon emissions. These efforts, when successful, would have the benefit of liberating resources

previously consumed domestically for export, as well as producing lower carbon emissions.

MENA governments should institute a robust portfolio of energy-efficiency policies that create a “push-pull” dynamic amongst the various economic sectors. The concept of “pull” means responding to the demands of the consumer. “Push” refers to the promulgation of regulations that serve as “sticks” to enforce technology adoption and upgrade. These policies could cover the residential sector, which constitutes the majority of MENA energy consumption, as well as the commercial and industrial sectors.

### “Push” policies

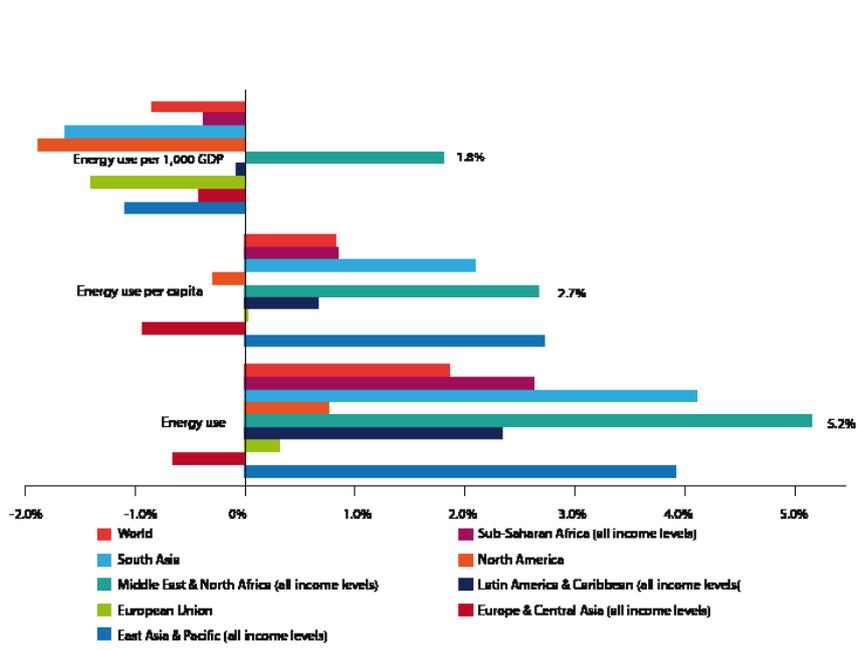
“Push” policies generally include:

- Performance-based regulations: policies and laws that generally take a command and control approach to enforce incorporation of energy efficiency methods
- Market-based incentives: programs that tend to provide fiscal and other types of rewards to encourage energy providers and consumers to adopt energy efficiency measures
- Information-based programmes (education/outreach) that seek to spread awareness about the benefits of energy conservation/efficiency and encourage appropriate behaviour.

Most “push” strategies encompass the implementation of minimum energy performance standards (MEPS) and energy labelling. MEPS are sets of procedures and regulations that legally mandate a minimum energy performance of manufactured products. Products such as home appliances, construction/industrial equipment should meet certain energy efficiency thresholds before they can be legally sold. General requirements should be introduced in national regulations, while specific details for each product, such as energy rating labels, should be set out in the product standards.

Energy efficiency in the MENA commercial sector may also be advanced. The policy in this case should create a regulatory structure to enforce energy efficiency standards for new building construction and renovation. So, for example, MENA governments could require

Figure 1: Source: World Bank world development indicators



Counting down: Governments need to act quickly to meet rising energy demand



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that all new and renovated buildings be covered by national energy building codes and adhere to MEPS to reduce life-cycle costs.

Net zero energy use should also be promoted. This does not mean that there should be no energy consumption on the building site. Instead, it means that a significant amount of the energy consumed is offset by renewable energy generated onsite, from, for example, solar panels or wind turbines. The MENA region is uniquely suited to such construction because of the amount of solar energy that falls on the region. Energy generated onsite is buttressed by an overall reduction in consumption through efficient heating, ventilation and air conditions (HVAC), and lighting technologies, such as LED lights.

Industrial efficiency in the MENA is also possible if governments oblige large energy-intensive industrial consumers to conform to the voluntary international standard, ISO 50001, or a similar energy efficiency management protocol. A governmental funding apparatus could provide financial incentives or loans for factories to invest in energy efficient equipment.

Energy efficiency in the industrial

sector is crucial for MENA if it is to remain competitive with fast-developing Asian economies. From 1949 to 1980, China had a policy similar to that of many MENA countries, promoting large-scale industrialisation by providing low-cost energy. In doing so, it made enormous gains in industrial energy efficiency by instituting mandatory MEPS on large-scale industrial users, hence lowering its energy intensity by 20% between 2005 and 2010. Furthermore, the 2011-15 five-year plan envisages a \$372 billion subsidy to reduce energy consumption to 16% per unit of GDP. A spatial clustering of energy-intensive industries could be an additional energy-efficiency stimulus that fosters the advantages of energy allocation rationalisation, as well as the promotion of economies of scale, with spillovers to the surrounding economy.

There is also an enormous scope to maximize efficiency gains in water desalination, which is a significant power user in the GCC region, accounting for some 4%-12% of total electricity consumption, according to recent research. Energy consumption through water desalination can be lowered through the use of multiple effect distillation (MED) plants, which are much more energy-efficient than

the multistage flash distillation (MSF) ones, typically used in the region. In addition, physically joining a power plant to the MED plant, known as co-generation, would allow access to cooling water, which could both provide a source of water for desalination and thermal and electrical energy.

#### The “pull” effect

If we define “push” policies as supply-driven, the “pull” strategy aims at bringing energy intensity down through market-based policies. By far the most important aspect of this policy is the reformation of energy pricing.

The main reason to reassess energy pricing regimes in much of the region is their impact on growing energy and power consumption, and, as a consequence, the increasing energy shortages experienced across the region. Current energy pricing regimes mean some energy-rich MENA countries face the conundrum of being energy exporters to the world market, while having to import energy at the same time to satisfy domestic power and gas demand.

Energy price reform is not only necessary to enhance energy efficiency. It can also benefit the competitiveness



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of certain sectors of the economy, while also stimulating production of unconventional gas resources.

Price liberalisation is most necessary in the natural gas sector, since gas deficits that result in power shortages are the product of unsustainable energy consumption and the absence of an energy-conservation mentality. As most of the gas in MENA (especially in the Gulf sub-region) is associated gas, once the capital infrastructure is in place, the production cost of each additional unit of natural gas is nearly zero.

The low price of supplying natural gas to the power-producing sector (see Figure 2) allowed the MENA countries, especially those of the GCC, to expand industrial production significantly, thus stimulating energy demand. Yet, once demand began to outstrip the supply of inexpensive associated gas, the pricing structure did not allow companies to engage in exploration for additional conventional or unconventional gas. The latter has an average production cost of between \$4-6 per million British thermal units (BTU), which is well above the average price at which gas is supplied domestically – \$1.50 per million BTU.

Although, regulated energy prices serve an important social role, especially in the poorer MENA countries, they cost the annual budget approximately 7% of the regional GDP. In Iran, before price reform in 2011, as much as 22% of GDP went towards price support mechanisms. But, despite the various macroeconomic externalities associated with energy price supports, the problem is that they support wasteful consumption, which leads to the other symptomatic deficiencies, such as greenhouse gas emissions, high energy intensity, lack of unconventional gas production and investment in power infrastructure.

There should be a dual track pricing reform that aspires to gradual liberalization. It should be constructed in the sense that the most economically productive sectors, such as industry, should have a pricing structure at least at cost of production for the unconventional gas reserves in the relevant country. This pricing structure would, at a minimum, support extraction of the most difficult unconventional gas and encourage international oil companies to invest their capital, time, expertise and technology in its production. In the productive energy intensive sector, allowing the power sector to sell electricity at the cost of generation would also ensure service is uninterrupted. In the residential sector, the price framework should be set at cost-plus, in that it is the cost

of production plus a predetermined mark-up over the basic production cost to guarantee a return on income for the power sector and create incentives for investment in energy efficiency improvement and the building of infrastructure to promote energy access.

### Energy intensity and competitiveness

In the longer term, lowering energy intensity will give an enormous boost to MENA countries' industrial competitiveness. It is true that, in the short-run, they will preserve their comparative advantage in the energy-intensive industrial sectors. Yet the current reality shows that the global drive to produce shale and other unconventional gas, means that other regions will be able to compete with the natural gas-rich MENA countries. For instance, shale gas production in the US is increasing annually, driving down US natural gas prices to an average of below \$3 per million BTU in mid-2011. As a result, some critical industries are relocating to the US or expanding their production to take advantage of inexpensive domestic shale gas.

Further competition is expected to come from China, among other developing Asian countries, as it has plans to increase its shale gas production to 6.5 billion cubic metres a year (cm/y) by 2015, buttressed by a further increase to 60 billion cm/y by 2020, according to recent Financial Times report.

When Asian petrochemical production increases and the MENA region cannot source further low-cost natural gas for its industrial base, the strategic expansion of the MENA petrochemical sector will be at risk.

Therefore it is essential for energy-rich MENA countries to stabilise their competitive advantage by gradually increasing prices to a sustainable level, cutting out waste and installing advanced petrochemical production technology. To be sure, instituting energy price reform in the industrial sector would drive up production costs. Yet, if it is instituted in a phased process, combined with governmental assistance to mitigate structural adjustment, the process may be alleviated with MENA industry perhaps becoming even more competitive in the long term.

### The key to sustainable development

In optimal circumstances, both energy efficiency and price reconfiguration should occur simultaneously in the MENA region. That, as MEPS would allow industry to reduce operating costs, once energy and power tariffs are liberalised." A comprehensive energy-efficiency programme should also mitigate the rolling blackout and brownouts that many large urban areas in the region experience, thereby adding some measure of energy security for large scale industrial enterprises.

Energy efficiency programmes also have innumerable other benefits. They increase technology transfer, creating a spill over into other economic sectors such as technical training for the labour force and enhanced high-skilled job creation. Although it is true that energy efficiency is one of the most difficult policies to implement, it is a "low hanging fruit" that may be implemented at relatively low cost if there is a dedicated and proactive response from both the populace and government. ■

Figure 2: Average domestic gas prices (MENA + Turkey)

