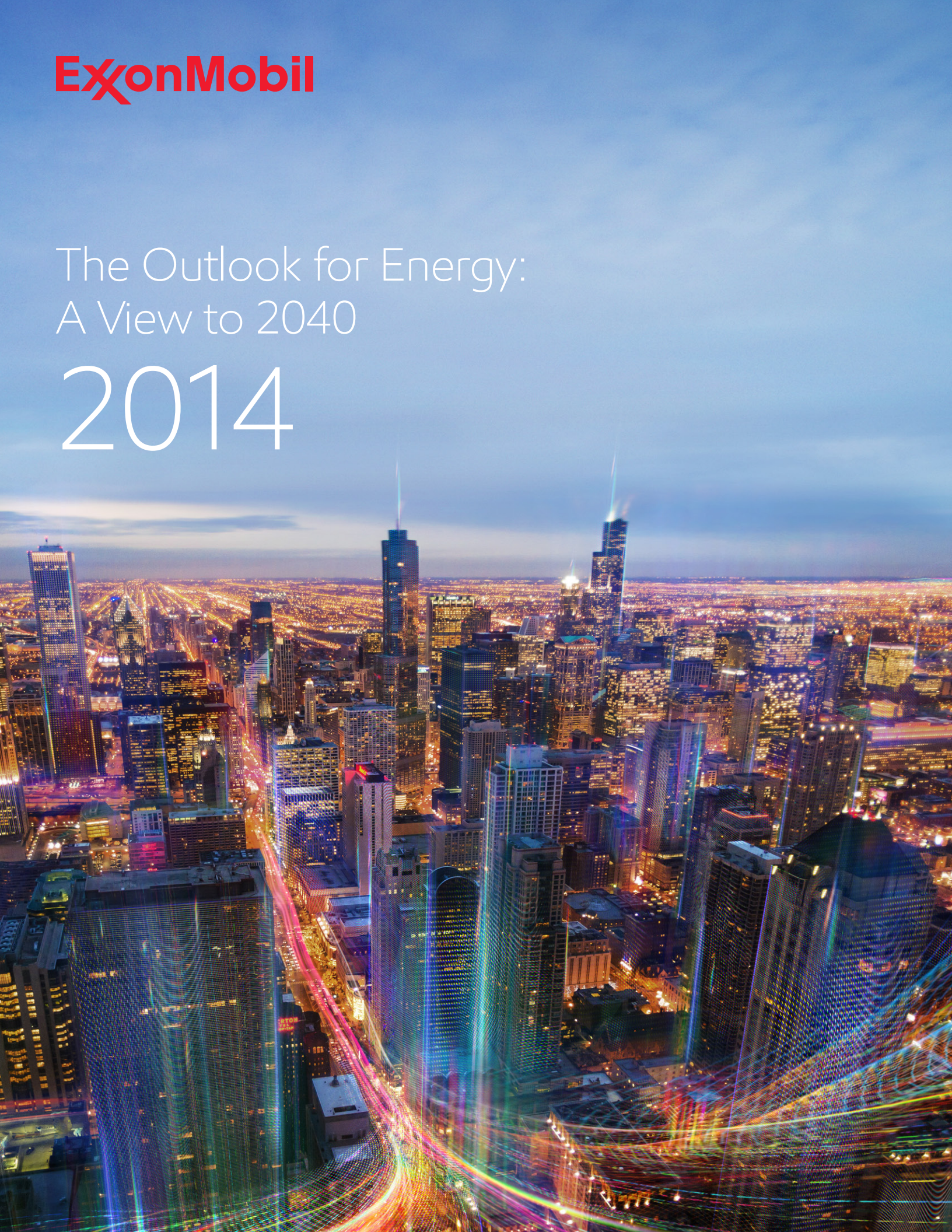
ExxonMobil

The Outlook for Energy: A View to 2040

2014



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The Outlook for Energy: A View to 2040

The Outlook for Energy is ExxonMobil's long-term global view of energy demand and supply. Its findings help guide ExxonMobil's long-term investments, and we share the *Outlook* to help promote better understanding of the issues shaping the world's energy future. Updated each year, this edition covers the period to 2040.

By 2040, we expect to see ...

2 billion more people

on the planet.

130 percent

larger global economy.

about 35 percent

greater demand for energy – which could have more than doubled without gains in efficiency.

non-OECD countries

like China and India lead the growth in energy demand.

about 60 percent

of demand supplied by oil and natural gas.

natural gas surpass coal

as the second-largest fuel source.

90 percent growth

in demand for electricity.

energy-related CO_2

emissions plateau and gradually decline.

Why energy?

Few of us – especially those of us living in advanced economies – ever pause to reflect on the pervasive importance of energy to our lives. That's only natural given the convenience and reliability of the energy we use. Consider electricity, for example. It flows when we flip a switch and suddenly there's light. We turn on a cell phone and instantly connect with others around the world. It happens so automatically, that only disruptions get our attention.

At the same time, few of us ever get a glimpse of the energy being used miles away to produce this electricity for our benefit. Similarly, we expect our local service station will have fuel when we drive our car or truck in for a fill-up. Do we ever consider the energy it took to get the gasoline to the station, let alone the energy used to build our car?

"Energy is a critical part of boosting prosperity and eradicating poverty."

Jim Yong Kim, President, World Bank Group

Why energy?

Energy is everywhere and it transforms everything

Think about it. Energy is all around us. Vital in virtually every aspect of our lives, it's remarkable that the value of energy doesn't get broader recognition.

How are modern energy supplies paired with today's technologies to improve your own life? You're warmed in the winter and cooled in the summer, thanks to energy. Electricity powers your alarm clock, your television, and your cell phone. A refrigerator uses energy to keep your food safe to consume and your oven uses energy to cook it. And before that, your food was grown by farmers, then processed, packaged and transported to the grocery store from another part of the country or the world, using energy at every step along the way. Essentially every task you perform and every product you use throughout the day is made possible because of energy.

It raises the question: **why energy?** The answer is simple. Energy helps us survive and frees us to pursue fuller lives in thousands of ways.

Today, most people are fortunate to have energy supplies and clean water flowing directly to their homes. Modern appliances can handle tasks like cooking and laundry while we read an e-book, watch television, shop online, hit the treadmill, or challenge the kids to a video game, all in a temperature-controlled room.

We have unparalleled travel options. We can use a motorcycle, car, bus, truck, train, boat or plane. We can dash to school, to work or to the grocery store in minutes. We can drive hundreds of miles to see family or fly across an ocean in hours. And we can trade goods with others thousands of miles away. Energy not only powers all of this travel, it helps us build the vehicles and infrastructure that it requires.

When our loved ones are sick, energy is integral to getting them to the doctor and restoring their health. From hospitals and urgent-care facilities, to basic pharmaceutical drugs, to materials that keep equipment sterile, to high-tech diagnostic tools such as MRIs, energy has a hand in producing and powering our health system.

2.6 billion

Today, 2.6 billion people still rely on traditional biomass energy for cooking.

Our lives are also affected by electric-powered devices that are transforming communications and computing. Today, we can be in touch with someone else basically anytime, anywhere in a matter of seconds. And with the Internet, we can transform the education of our children, telecommute to work, capture new trade opportunities, see distant friends and family, or attend online classes to improve our education.

These technologies are widely used today only because they provide practical value to people like

you; value that would not exist without convenient access to modern and reliable energy supplies. This combination of technology and energy provides important synergies that improve human life. We can meet basic needs much more efficiently and in turn pursue more valuable activities, whether it's time with family and friends, furthering our education, inventing a new medical treatment, building a business, playing or simply helping a neighbor.

Energy and human progress

The last two centuries have seen remarkable changes across our world. The global population has increased from 1 billion to 7 billion people. At the same time, living standards have advanced dramatically in many parts of the world, supported by modern technologies and access to energy. People with the freedom to innovate and thrive in an environment of investment risk-and-reward led a burst of human progress, the pace and scale of which has been remarkable. As an indicator, energy consumption worldwide is now about 25 times higher than in 1800.

Expanding use of advanced technologies has also correlated with increasing demand for coal, oil, natural gas and electricity. As technologies and needs have evolved, people have naturally sought practical solutions with energy that are reliable, affordable and convenient. An often unrecognized sign of technology's progress over time is dramatic energy efficiency gains. For example, a steam engine in 1800 at 6 percent efficiency pales in comparison to a modern combined-cycle gas turbine with about 60 percent efficiency. It's no coincidence that people's quest to improve the use of their resources also extends to energy.

Together, technology and energy advances have helped bring about an unprecedented improvement in the key indicators of human well-being, including incomes, literacy rates and average life expectancy in many parts of the world.

Still, this dramatic progress has not been seen everywhere. According to the International Energy Agency (IEA), 1.3 billion people live without access to electricity, while 2.6 billion people rely on traditional biomass energy for cooking.

"The global energy landscape is changing rapidly. And those changes will recast our expectations about the role of different countries, regions and fuels over the coming decades."

Maria van der Hoeven, Executive Director, IEA

As the world's population approaches 9 billion people in 2040, we are challenged to not just meet basic needs, but also to improve living standards throughout the world.

In our view, meeting this challenge will require an increase in energy use worldwide of about 35 percent. The scale of the challenge may seem daunting, but history demonstrates a remarkable ability of people to overcome hurdles to progress. Fortunately, the world not only holds a vast and diverse array of energy resources, but we also possess increasingly advanced technologies that can safely and reliably supply this energy.

Another important aspect to improving standards of living concerns the environment. Perhaps most urgent are needs in many areas of the world for cleaner air and cleaner water. Nations around the world also need to continue to address risks associated with rising greenhouse gas (GHG) emissions. We expect advanced technologies and lower carbon fuels will help energy-related CO_2 emissions plateau around 2030.

In pondering our *Outlook* to 2040, we recognize that people's lives and those of their children are being transformed by access to energy and technology. Going forward, we expect people everywhere will continue to invent, innovate, work and deliver practical solutions to build a brighter future. Now, as always, that path to progress will be powered by human ingenuity and energy.

3 hours

Today, in the United States, it takes less than three hours to produce 100 bushels of wheat, compared to 50 hours a century ago.

Global fundamentals

Energy is about people — individuals and societies using electricity, transportation fuels and other energy to make life better. As economies and populations grow, and as living standards improve for billions of people, the need for energy will continue to rise. Even with significant efficiency gains, global energy demand is projected to rise by about 35 percent from 2010 to 2040.

"Energy is a necessary input to improving quality of life and economic growth. Access to reliable and affordable energy sources can reduce poverty, improve public health, and improve living standards in myriad ways."

Columbia University's Center on Global Energy Policy

Population and progress

People and economies need energy to grow and thrive

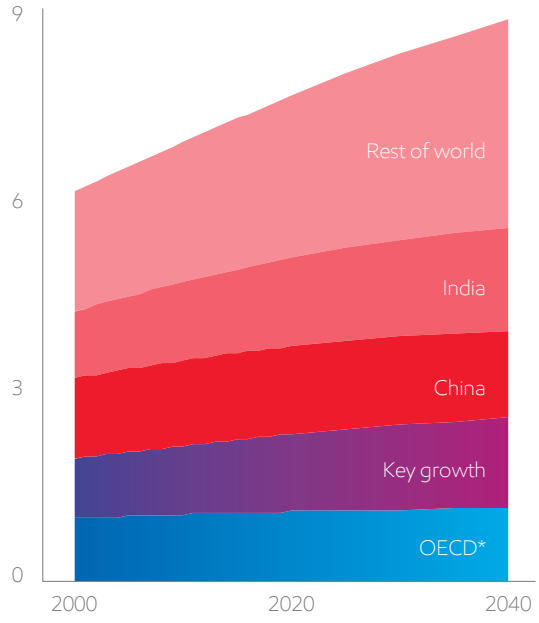
From 2010 to 2040, the world's population is projected to rise from 7 billion to nearly 9 billion, and the global economy will more than double. Over that same period, global energy demand is likely to rise by about 35 percent.

But our world's energy landscape is always more complex than it seems at first glance.

Even a casual assessment reveals that the world is not one homogenous place, but rather many individual countries and regions, each at a different stage of economic and energy development. For example, economic growth in Organisation for Economic Co-operation and Development (OECD) countries will likely average 2.0 percent annually, while non-OECD countries are expected to average 4.4 percent a year through 2040. This growth in gross domestic product (GDP) means improved quality of life for billions of people.

Global population

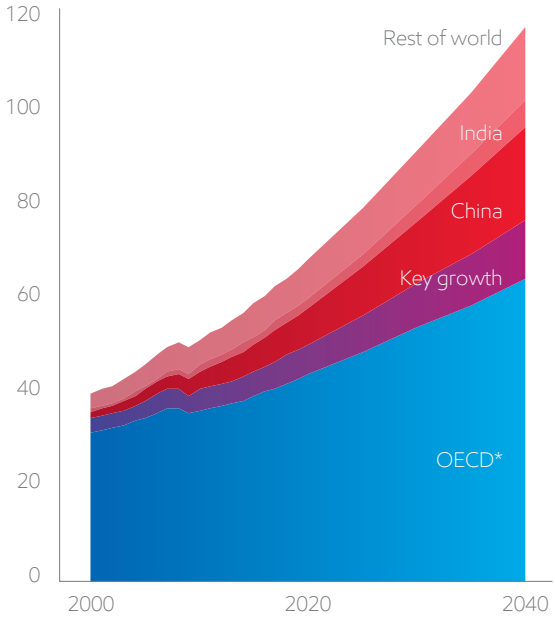
Billions of people



*Mexico and Turkey included in key growth

Economic output (GDP)

Trillions of 2005 dollars



*Mexico and Turkey included in key growth

80 percent

Globally, GDP per capita will grow by about 80 percent from 2010 to 2040.

We can categorize our world in broad groups:

The United States and other OECD member nations. This group already has relatively high living standards, urbanization levels and per capita energy use reflecting well-advanced economies. As OECD economies continue to expand, improvements to energy efficiency and slower population growth will combine to keep overall energy demand essentially flat in these countries through 2040.

China and India. These two countries are the world's most populated, and each is in the process of making broad gains in living standards. By 2040, nine of the world's 20 most populous cities — and one of every three people on the planet — will be in China or India. Together these nations account for half of the projected growth in global energy demand.

China has been a dominant force in energy trends over the past 20 years as its economy grew and living standards rose. China's energy demand will continue to grow substantially, but by 2040, China will have a much more mature economy, with energy demand growth — as well as economic and population growth — slowing to a more temperate pace. India will continue to experience strong growth, with its large population realizing significant gains in living standards. Since 2005, India has surpassed Japan and Russia to become the third-largest energy consumer behind China and the United States – a position it will likely retain through 2040.

Key growth countries and other non-OECD. Economic progress will drive demand for energy in other non-OECD countries, where many more people will be able to afford some or all of the hallmarks of a middle-class lifestyle, such as better homes, air conditioning, appliances, personal vehicles and computers. The biggest gains should be seen in 10 key growth countries: Brazil, Indonesia, Saudi Arabia, Iran, South Africa, Nigeria, Thailand, Egypt, Mexico and Turkey. By 2040, these 10 countries will have energy demand approaching the level of China. Although Mexico and Turkey are OECD members, their significant population, economic and energy demand growth closely resemble that of the other countries in this group.

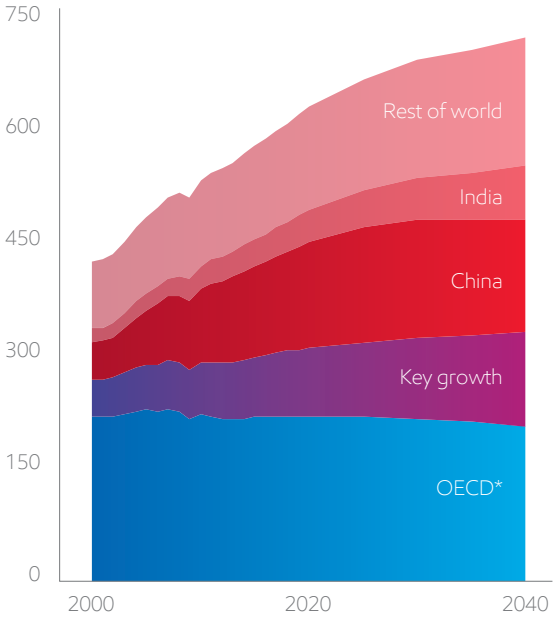
Growing urbanization drives energy demand

As we have seen in developed economies over the previous century, one important fundamental of energy demand is the migration of populations from rural to urban areas. Naturally, the expansion of urban infrastructure creates demand for iron, steel, cement and other industrial goods that are energy intensive.

Urbanization also tends to drive energy demand higher for several other reasons: Average urban income levels are higher than in rural areas; energy-intense manufacturing and other industries cluster around cities; and in developing economies, the number of people per household is usually lower in urban settings, which leads to a higher number of actual households.

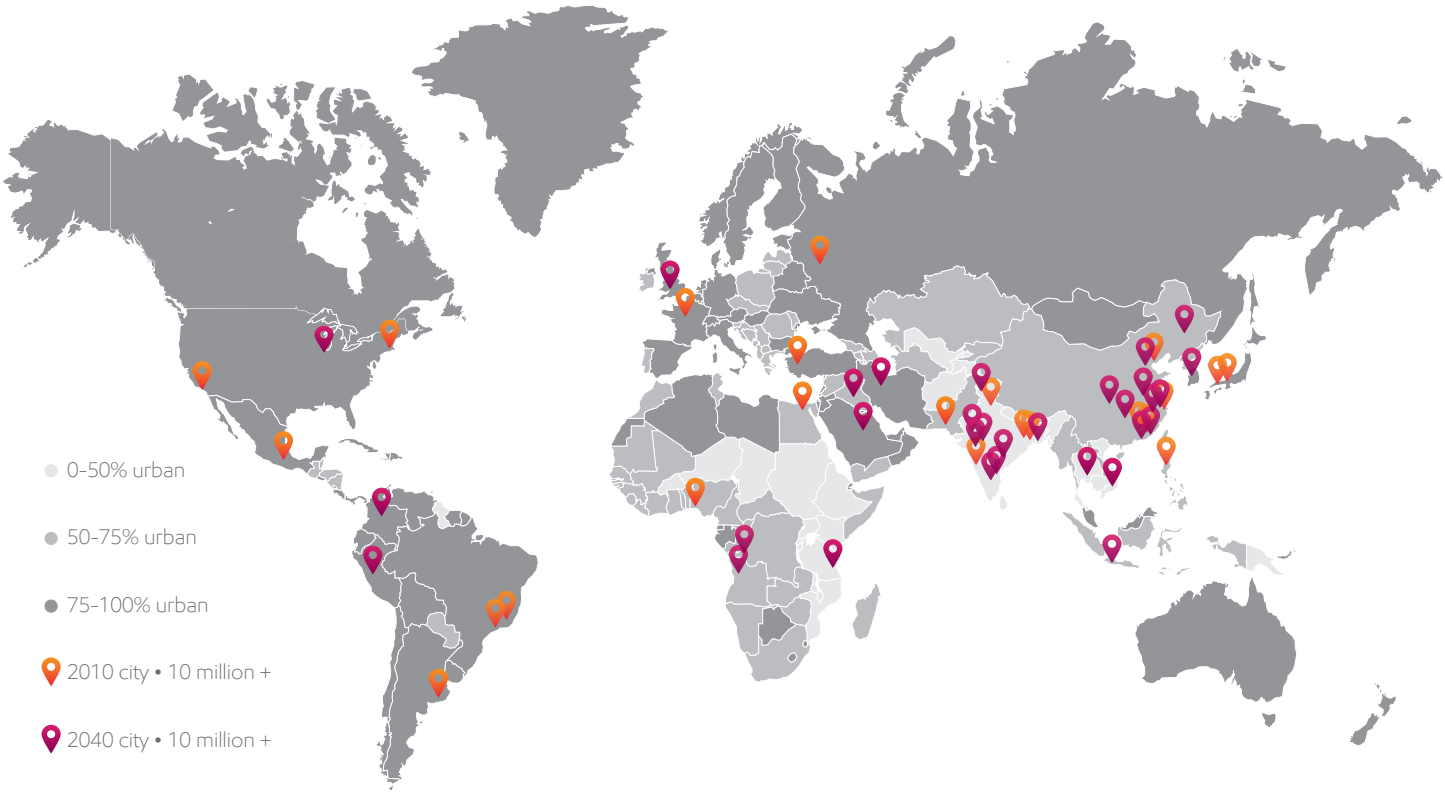
Global energy demand

Quadrillion BTUs



*Mexico and Turkey included in key growth

Global urbanization and major cities in 2040



Source: United Nations and ExxonMobil estimates

All this, combined with an expanding middle class, leads to a higher penetration of consumer electronics, personal vehicles, and other demands for energy.

By 2040, the proportion of people living in urban settings in non-OECD countries is projected to rise to about 60 percent, up from 45 percent in 2010 and 30 percent in 1980. OECD urbanization rates are likely to rise to 85 percent, from about 75 percent.

Even with all of this progress, the growth in global demand for energy is actually slowing down. While the projected rise in energy demand from 2010 to 2040 is substantial, it is only about 80 percent of the growth seen from 1980 to 2010. This is all the more remarkable because the growth in economic output from 2010 to 2040 will be more than double the growth from 1980 to 2010. This means that the world is continuing to become more efficient as prosperity advances.

This shift is due in part to advances in technology; for example, fuel demand for light-duty vehicles is expected to be relatively flat through 2040 as advanced cars with better fuel economy enter the market.

Energy efficiency works in every aspect of the world's economy to offset demand growth. Its importance is illustrated by recognizing that the projected rise in population and GDP through 2040 could have caused global energy demand to rise by more than 100 percent. But much of that demand increase will be avoided because of advances in energy efficiency across all sectors.

Another reason for the slowdown in global energy demand growth is the fact that over time, an increasing percentage of the world's population — including OECD countries and China — will already have achieved a relatively high standard of living, with relatively stable energy needs.

While our economies become more efficient, commercial activities and consumer preferences will still drive global energy needs higher. While worldwide demand for energy that people use directly (in cars and homes) will grow through 2040, there will be even larger increases in demand for energy that serves people indirectly through the broader economy. These needs include fuels for manufacturing, trucking and shipping, as well as energy for power generation to support industrial customers, computers and telecommunications.

All energy sources should be pursued to meet global demand through 2040. New technologies will continue to expand the world's energy options. One prominent example is the rapid growth in the production of tight oil and shale gas that has revitalized North American energy production.

While oil will remain the fuel of choice for transportation, natural gas is emerging strongly as a growing fuel of choice for other sectors. Utilities and other consumers are turning to this abundant, affordable and clean-burning fuel. Half of the growth in demand for natural gas is being driven by the need for electricity around the world, which is expected to increase by 90 percent from 2010 to 2040. Nuclear and renewable energy will also grow to support electricity needs.

500 quadrillion

People around the world will help generate energy savings of about 500 quadrillion BTUs in 2040.

Energy demand

People use energy for home, work and travel. People also use energy indirectly in ways they may not think about — by purchasing goods that took energy to manufacture, package and ship; by making use of hospitals, schools and public safety services; or simply by using the Internet. Through 2040, the largest source of energy demand will be for fuels used to make electricity.

> "The great energy challenge of the future, which will test all sources, is meeting the demand growth of a growing world."

Daniel Yergin, Vice Chairman, IHS

Residential/Commercial

Energy use rises with improved living standards

Three significant drivers of global energy trends — increasing population, urbanization and rising living standards — are clearly evident in the residential and commercial sectors.

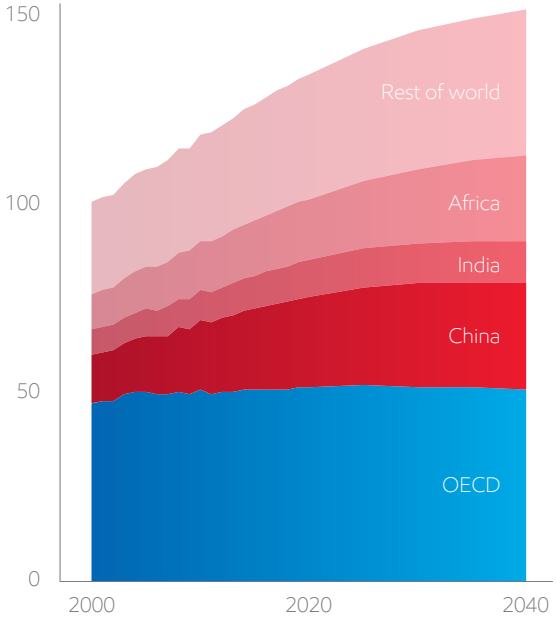
The majority of the growth in energy demand used in buildings is expected to come from the residential sector, although energy for commercial and other public facilities will actually grow at a faster pace. These energy needs reflect rising populations as well as an ongoing shift of people from rural to urban settings. This shift generally leads to greater energy use in homes and other buildings for cooking, indoor temperature control, lighting, appliances and other equipment (e.g., computer/information systems).

Demand in the residential sector is driven by two factors: the number of households and the amount of energy used per household (energy intensity). The total number of households in the world will rise significantly in coming decades; we expect an increase of close to 50 percent, from **1.9 billion households in 2010 to 2.8 billion by 2040,** due to increasing population and urbanization.

At the same time, urbanization and rising incomes — particularly in China, India and the other 10 key growth countries — are driving demand for energy not just for basic needs but also modern uses such as

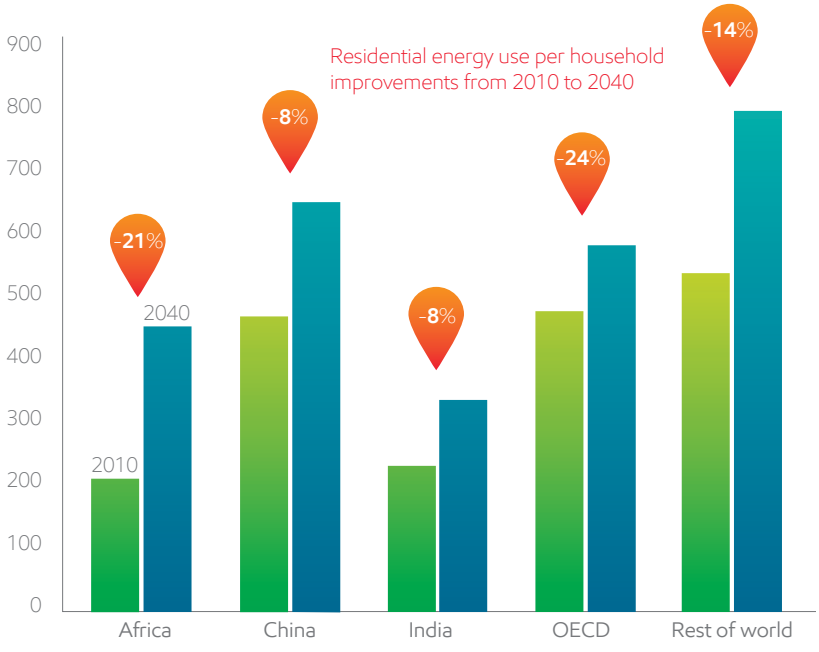
Res/Comm demand by region

Quadrillion BTUs



Households by region

Millions



Energy and the city: Urbanization and its impact on residential energy trends

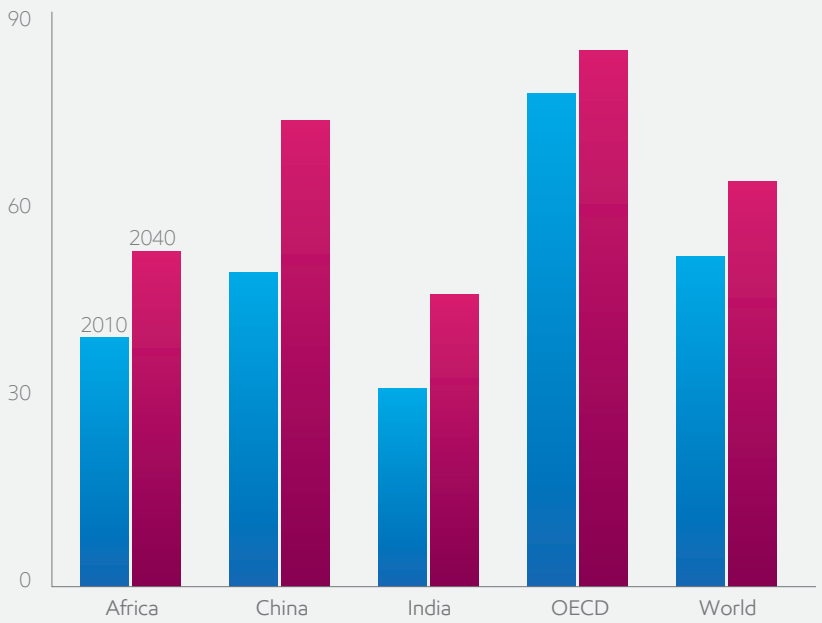
The United States and other highly urbanized economies have reached a point where growth in energy use in homes is flattening. Improvements to efficiency — better windows, for example — are actually beginning to produce a net decline in residential energy demand. But many other countries are in earlier stages of urbanization.

China. In 1990, only about 25 percent of the people in China lived in urban areas; by 2010, that number had grown close to 50 percent. Over that time, residential electricity use per capita had grown about 20 times. By 2040, China's urbanization rate is projected to reach about 75 percent, but its growth in residential energy demand is expected to begin leveling off.

India and Africa. In India, the proportion of people living in urban areas is expected to rise from 30 percent in 2010 to 45 percent in 2040. Africa's urbanization rate is expected to rise from about 40 percent to 50 percent. Demand for energy for residential purposes is expected to grow by about 35 percent in India and 70 percent in Africa over the *Outlook* period.

Urbanization ratio

Percent



Source: United Nations

Urbanization brings a shift away from traditional fuels. In India and Africa, millions of people still get a significant amount of energy from biomass fuels like wood. Growth in the use of these fuels is slowing in favor of modern energy such as natural gas, liquefied petroleum gas (LPG) and electricity. Modern fuels burn much cleaner, and are far more efficient. When used for cooking, modern fuels such as natural gas and LPG are about four times more efficient than wood. The IEA estimates that 2.6 billion people, mostly in Africa and developing Asia, lack access to modern cooking fuels.

air conditioning, appliances and electronics. In rural China, there are only 16 air conditioners for every 100 households; in urban areas, that ratio is 112 per 100.

Much of the underlying growth in residential energy demand, however, will be offset by the fact that **household energy use continues to reflect efficiency gains**. For example, according to the Energy Information Administration (EIA), U.S. homes built after 2000 consume about the same amount of energy as older homes despite being, on average, 30 percent larger.

Globally, residential energy intensity is projected to fall by about 15 percent over the *Outlook* period as homes become better insulated and make greater use of energy-saving lighting and appliances.

Accounting for all of these factors, **energy demand in the residential sector is expected to rise by about 20 percent** from 2010 to 2040, with growth tapering after around 2030 as China's urbanization begins to slow and residential energy demand in mature OECD economies actually declines.

"The 'energy-poor' suffer the health consequences of inefficient combustion of solid fuels in inadequately ventilated buildings, as well as the economic consequences of insufficient power for productive income-generating activities and for other basic services such as health and education. In particular, women and girls in the developing world are disproportionately affected in this regard."

United Nations, *Energy for a Sustainable Future*

Rising living standards and urbanization will also enable many people to change the types of fuel they use in their homes. The world will see a **continued shift toward electricity and natural gas and away from biomass fuels,** like wood, which today still account for approximately 40 percent of global residential energy needs.

By 2040, electricity will likely account for around one-third of residential energy demand, compared to 20 percent in 2010. Another fuel source that should see large growth is natural gas.

The shift away from less-efficient fuels like wood in the residential sector will help people in developing countries improve their quality of life without necessarily increasing their overall energy use.

In fact, one of the great challenges over the *Outlook* period will be extending access to the 1.3 billion people who are without electricity and 2.6 billion people who lack modern cooking facilities.

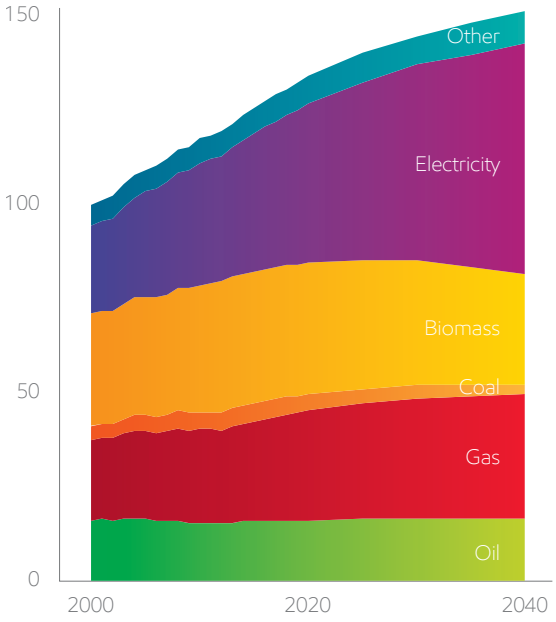
Significant trends are also seen in the commercial sector, which includes energy used in offices, retail stores, hospitals and schools. Globally, commercial demand for energy is rising, with growth projected to gradually slow toward 2040. In addition, a greater share of commercial energy use is likely to come from electricity rather than the direct use of fuels such as oil or coal. Commercial demand should rise by about 50 percent from 2010 to 2040.

Combined, total residential and commercial energy demand is projected to rise by around 30 percent from 2010 to 2040.

The residential/commercial sector is a growing contributor to electricity demand, ultimately leading to greater demand for the fuels used by utilities and other power generators.

Res/Comm demand by fuel

Quadrillion BTUs



90 percent

Residential/commercial electricity demand will increase by close to 90 percent over the *Outlook* period.

Transportation

The "fleet" expands as many more people can afford cars

Light-duty vehicles — the cars, pickup trucks and sport utility vehicles (SUVs) that people use in their daily lives — represent one of the most visible demand sectors.

Demand for fuel for these personal vehicles, which is met nearly exclusively from oil, is expected to rise slowly over the next decade before gradually trending downward over the remainder of the *Outlook* period.

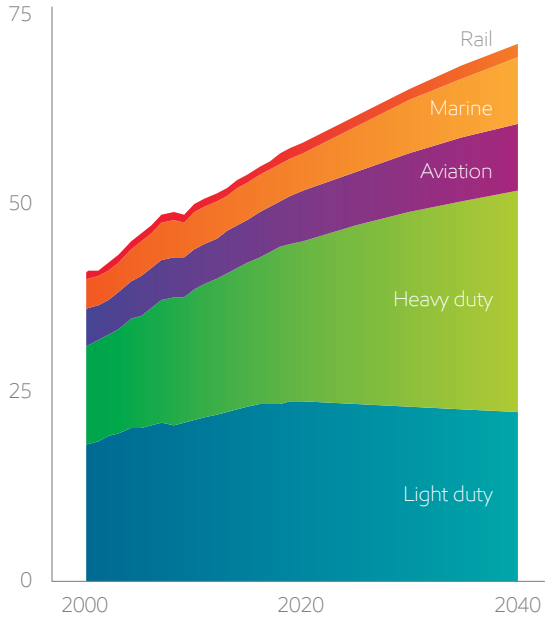
This shift in demand won't be because of fewer vehicles in the world. In fact, from 2010 to 2040, the number of light-duty vehicles **— the global "fleet" — is expected to more than double from about 800 million to about 1.7 billion**, as the world's population grows and more people in developing economies are able to afford cars.

In 2010, about 75 percent of the world's vehicles were in OECD countries. However, looking ahead, about 80 percent of the growth in the global fleet will come from non-OECD countries.

For example, it is estimated that in 2010 China had only about five light-duty vehicles per 100 people, while India had fewer than two per 100 people; this compares to about 75 vehicles for every 100 people in the United States. However, by 2040, China and India are expected to increase their levels by more than 500 percent. In fact, by 2030, we expect China will have surpassed the United States as the country with the largest number of personal vehicles, even though China's vehicles per capita will be about one-third the level of the United States at that time.

Transportation demand by sector

Millions of oil-equivalent barrels per day



Significant growth will also come from countries in Latin America, Africa and the Middle East, which together will account for about 15 percent of the growth in the global fleet. Collectively, these countries are likely to increase their vehicle ownership by about 80 percent as their total number of cars nearly triples.

Importantly, the increase in the number of light-duty vehicles in the world through 2040 will likely be nearly offset by the fact that **the vehicles themselves will be far more fuel efficient**. As a result, the average efficiency of the world's vehicle fleet is

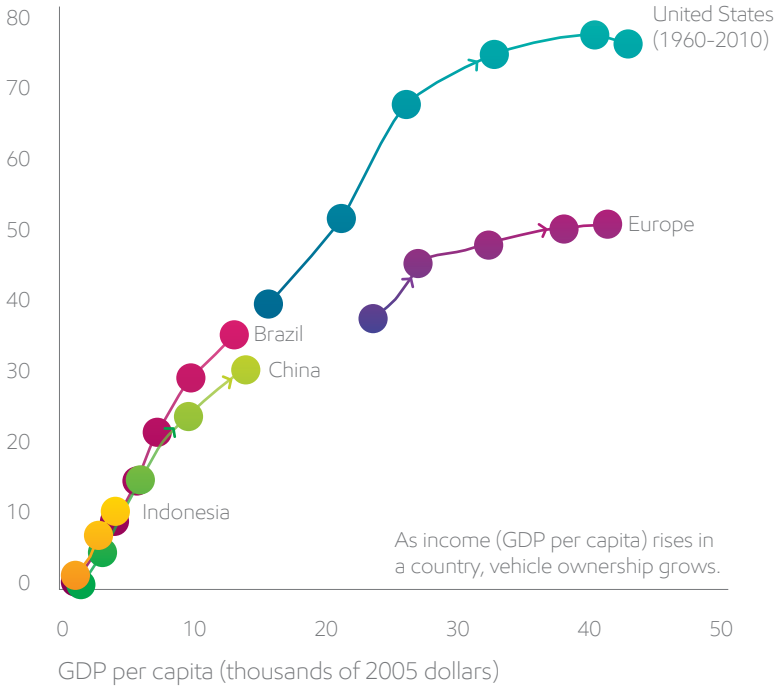
projected to reach about 46 mpg (about 5.1 liters per 100 km) compared to 24 mpg (9.8 liters per 100 km) in 2010.

This unprecedented improvement in global fuel economy is expected to reflect a surge in hybrid vehicle sales. Hybrids, which combine an internal combustion engine and an electric motor, are expected to account for about half of global new-car sales by 2040, as they become increasingly cost competitive compared to conventional vehicles.

By 2040, hybrids are expected to account for about 35 percent of the global light-duty vehicle fleet, up from less than 1 percent in 2010. Over the same period, electric and plug-in vehicles are expected to grow to about 70 million cars, or less than 5 percent of the total fleet. This slower growth is attributed to the relatively higher cost of the vehicles, driven by the cost of batteries.

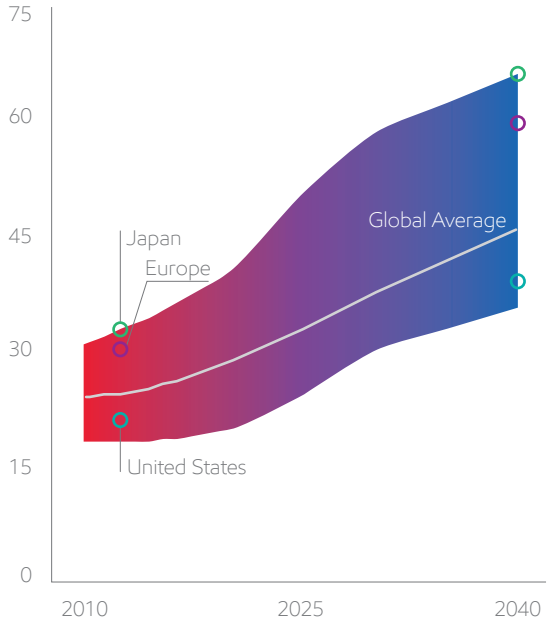
Vehicle penetration 2000 to 2040

Cars per 100 people



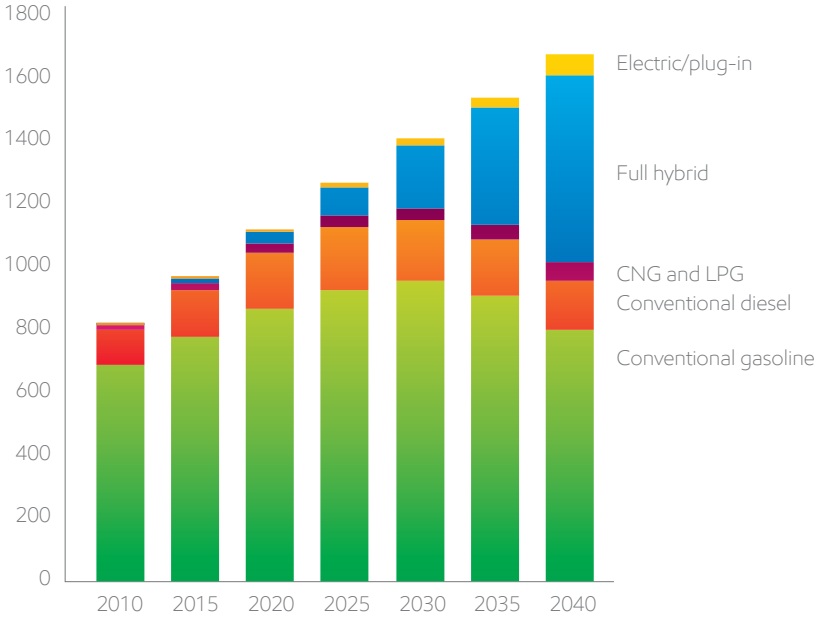
Range of average vehicle efficiency

On-road miles per gallon



Light-duty fleet by type

Million cars



Demand climbing for commercial transportation fuels

While global energy demand for personal transportation is expected to be relatively flat over the next few decades, demand for energy for commercial transportation — trucks, planes, ships and trains — will continue to grow significantly as economies expand and evolve.

Global demand for energy for commercial transportation is expected to rise by 70 percent from 2010 to 2040, driven by the projected increase in economic activity and the associated increase in movement of goods and freight.

Nearly every country will see an increase in commercial transportation energy demand through 2040, but China will see the largest increase — more than 4 million oil-equivalent barrels per day. In 2010, China trailed Europe, the United States and the Middle East in terms of energy demand for commercial transportation. By 2040, China is expected to be in the No. 1 spot. India and Brazil will also see large increases, with India having the highest growth rate globally.

75 percent

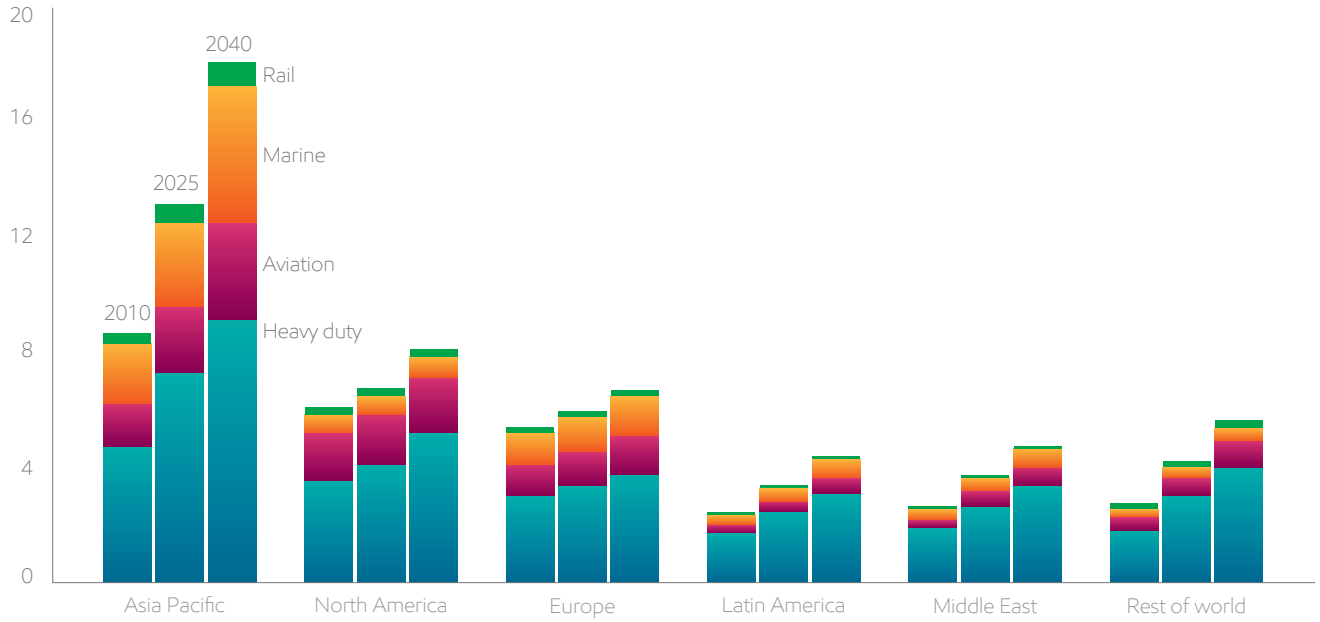
Demand for diesel and jet fuel is expected to increase by 75 percent from 2010 to 2040.

The increase in energy demand in the commercial transportation sector is likely to be partially offset by significant improvements to fuel efficiency. For example, more efficient truck, aviation, marine and train fleets, along with logistical system improvements such as intermodal shipping, will help slow the growth in transportation energy demand in many countries.

The largest driver in commercial transportation energy demand will come from heavy-duty vehicles such as trucks and buses. Demand for fuel for heavy-duty vehicles is projected to rise by about 70 percent, and account for about 60 percent of the total increase. In fact, by 2040, the world will be using about the same amount of energy in heavy-duty vehicles as the total energy demand in all of Africa today.

Commercial transportation demand by region

Millions of oil-equivalent barrels per day



Over the next few decades, we expect the mix of fuels used for transportation to continue to evolve

Liquid fuels — gasoline, diesel, jet fuel and fuel oil — will remain the energy of choice for most types of transportation, because they offer a unique combination of affordability, availability, portability and high energy density.

We expect global demand for gasoline (including ethanol) to be relatively flat from 2010 to 2040, largely because cars and other light-duty vehicles will become much more efficient. On the other hand, demand for diesel (including biodiesel) will grow sharply — by about 75 percent — to power the rise in activity in trucks and other commercial transportation. Diesel will also play a more significant role in the marine sector in the latter half of the *Outlook* period, in response to stricter marine emissions standards. Demand for jet fuel will also grow close to 75 percent.

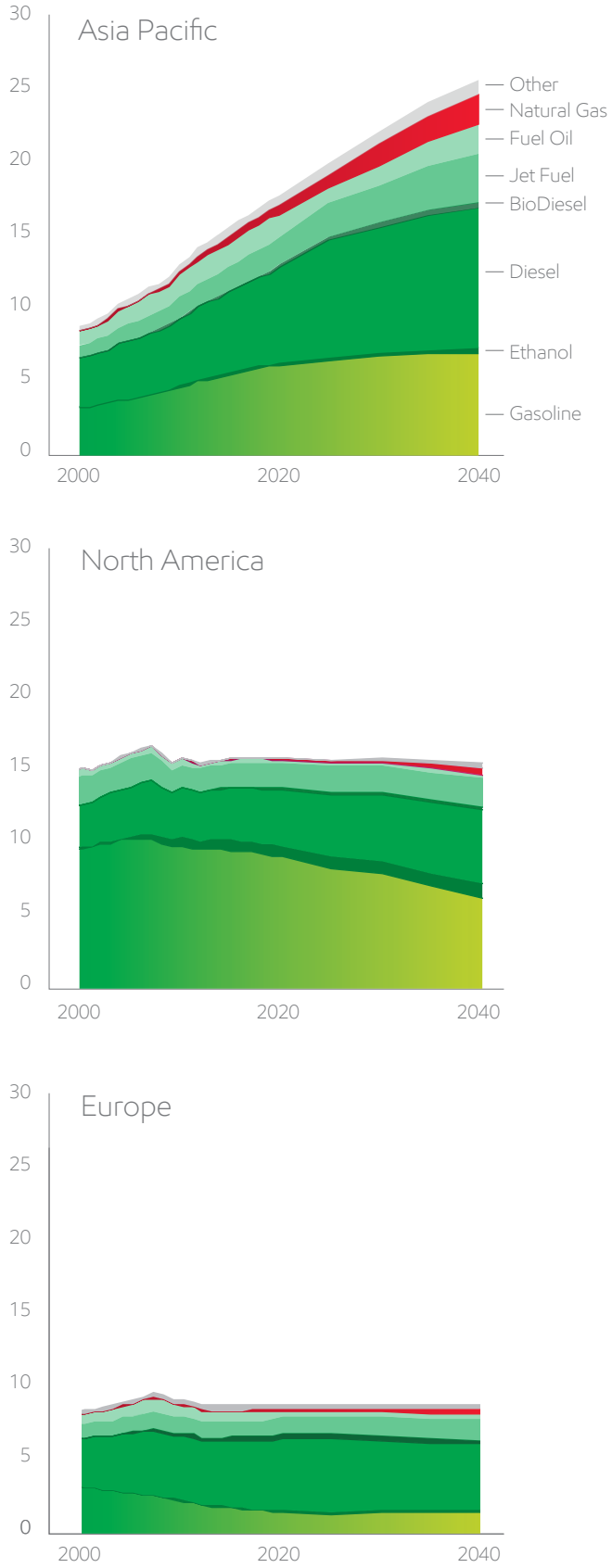
Natural gas is likely to grow in use as a transportation fuel, with its attractiveness enhanced by its relatively low emissions and its affordability relative to oil in many parts of the world.

We expect that growth in natural gas as a transportation fuel will be seen mainly in commercial vehicles — mostly fleet trucks that can run on compressed natural gas (CNG) and long-haul trucks that can use liquefied natural gas (LNG). (See next page.) Lower-sulphur fuel regulations for marine vessels expected over the next decade may attract some shipping companies to invest in LNG capability.

In 2010, natural gas accounted for about 1 percent of all transportation fuels, with about 45 percent of that demand concentrated in Asia Pacific. By 2040, the share of natural gas will likely rise to 5 percent, with growth driven by Asia Pacific and North America.

Transportation fuel mix by region

Millions of oil-equivalent barrels per day



Natural gas as a transportation fuel

The rise in production of abundant natural gas in North America and other regions has led to heightened interest in natural gas as a transportation fuel. The outlook for growth in natural gas in the transportation sector differs widely by mode of transportation and by region.

Around the world, the biggest interest in natural gas as a transportation fuel is coming from owners of heavy-duty commercial vehicles. Globally, and particularly in the Asia Pacific region, compressed natural gas (CNG) is already a popular fuel choice for transit buses and delivery and refuse truck fleets. In the United States, equipping a truck to run on CNG costs about $30,000 more than a diesel truck, but potential fuel cost savings could enable a five-year payback time.

Long-haul trucks may favor liquefied natural gas (LNG) because of its higher energy density than CNG and the ability to travel up to 750 miles between fill-ups while pulling heavy loads. Fuel cost savings could recoup the higher investment costs for an LNG truck ($70,000 to $90,000 compared to diesel) within about three years.

In terms of light-duty passenger vehicles like cars and SUVs, several countries currently have conditions that favor CNG vehicles, such as air pollution concerns in large urban areas or an ample supply of natural gas relative to refined oil products. These include Argentina, Brazil, Iran, Pakistan and India, which together account for around 80 percent of the global CNG passenger fleet.

However, ExxonMobil expects that outside of these countries, growth in natural gas as a transportation fuel for light-duty vehicles will be limited. While natural gas prices may be lower than gasoline prices, fuel cost is just one dimension of a consumer's decision about which vehicle to purchase. Other dimensions include the fact that natural gas vehicles are more expensive.

In the United States today, CNG cars can cost about $8,000 more than comparable gasoline-powered cars. CNG vehicles have fuel economy similar to conventional gasoline engines, so a typical driver would take more than five years to recoup the extra purchase cost.

Consumers looking to save fuel costs are more likely to choose hybrid vehicles, which are slightly more expensive than conventional vehicles but have far higher fuel economy. CNG vehicles also have a shorter driving range — up to 40 percent less than comparable vehicles using liquid fuels — due to CNG's lower energy density and the fact that an adequately sized fuel tank is sometimes challenging to fit into a car.

In all sectors and regions, development of a fueling infrastructure is one of the largest hurdles to natural gas vehicle (NGV) penetration. Fleets of vehicles that return to base each day can economically benefit from a single, highly utilized CNG fueling station. Trucks that travel on established long-haul corridors also have the potential for highly utilized, and therefore economic, LNG fueling stations.

Most challenging is building the fueling infrastructure for passenger vehicles, including a large network of easily accessible refueling stations, particularly because of the shorter driving range of NGVs. In the United States, only about 1 percent of fueling stations are equipped for natural gas. Home refueling is an option, but the equipment cost can be as high as $4,000.

Ultimately, consumers — individuals and businesses — will assess their needs and the costs of various options when deciding if natural gas as a transportation fuel is right for them. Markets will determine which transportation sectors can benefit most from natural gas and a fueling infrastructure will develop around those markets.

Industrial

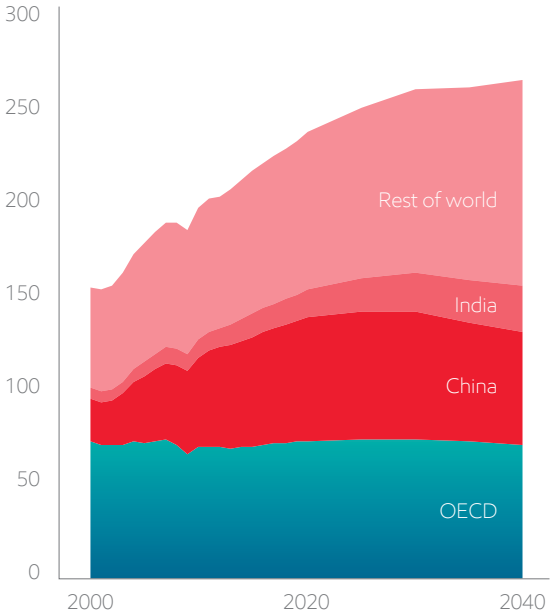
Urbanization helps fuel industrial demand

The industrial sector is a major consumer of energy, accounting for about half of all the electricity consumed around the world — and about 30 percent of primary energy use.

Urbanization and rising living standards continue to drive industrial demand for energy. The expansion of urban infrastructure creates new demand for steel, cement and other energy-intensive industrial goods. Growing middle-class populations will also increase demand for consumer goods – appliances, apparel and electronics – that require energy to manufacture.

Industrial energy demand by region

Quadrillion BTUs



Urbanization is one reason why **global industrial energy demand is projected to rise by one-third** through 2030, with almost all of the growth concentrated in non-OECD countries. Global demand then flattens, however, as rising demand in India and other leading growth countries is offset by a major development in the industrial sector: **declining industrial demand in China post 2030**.

China is the world's largest industrial energy user and is projected to remain so over the *Outlook* period. But China's industrial energy demand will likely peak around 2030, reflecting efficiency improvements and the natural maturing of its economy after decades of rapid growth. In 2010, China produced almost 50 percent of the world's iron, steel and cement; after 2020, we expect China's market share of these heavy industries to decline as its economy shifts toward higher-value manufacturing and services that have lower energy intensity.

By 2040, China's industrial demand is expected to be just 25 percent higher than in 2010; in contrast, Brazil's will be nearly double and India's about 2 1/2 times the 2010 level.

"Around the world, more than 300 million people are employed in manufacturing, accounting for some 14 percent of global employment."

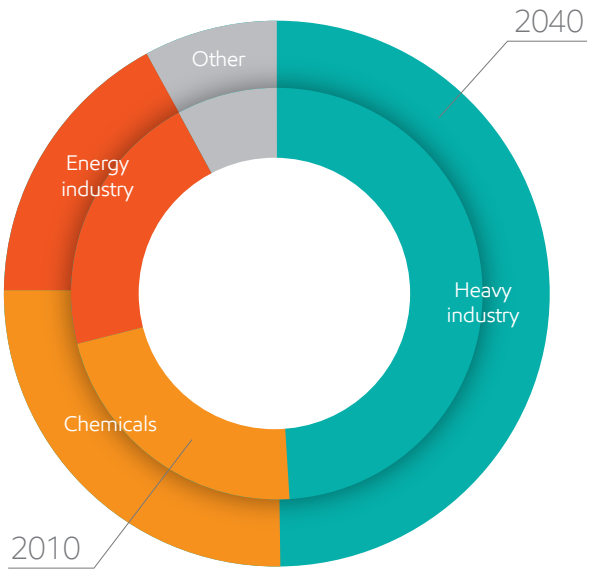
World Economic Forum, Global Agenda Council on Advanced Manufacturing, 2013

Global industrial energy use also is driven by the chemicals sector, where demand for energy is rising about 50 percent faster than overall energy demand. Chemical companies use energy in two ways: as a fuel and as a feedstock to make plastics and other products essential to manufactured goods (see page 27). Demand for these goods — from consumer electronics to medical equipment — goes hand-in-hand with rising living standards. The global production of petrochemicals is expected to more than double from 2010 to 2040. At the same time, fertilizer production will grow by about 25 percent, keeping pace with population growth.

The energy industry itself accounted for about 20 percent of industrial energy demand in 2010, but its share is declining as the industry continues to improve efficiency. More efficient energy extraction and processing, along with reductions in natural gas flaring, are likely to limit the growth in the energy industry's demand to only 30 percent of the total fossil-fuel growth rate.

Industrial energy demand by sector

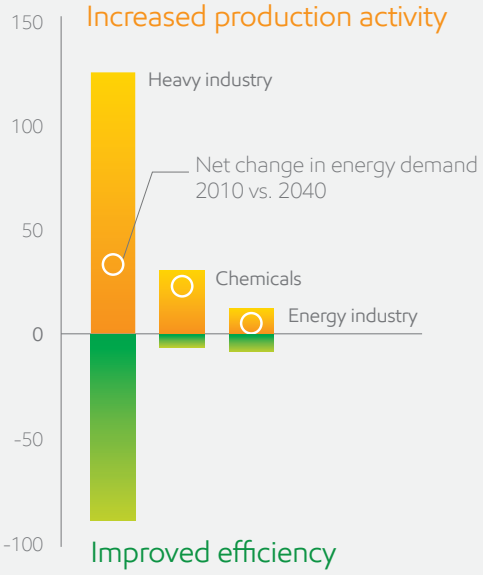
Percent



Industrial efficiency saves energy

Efficiency offsets production growth

Quadrillion BTUs



Industrial demand for energy is a function of production activity – such as the manufacturing of steel, automobiles and chemicals – and energy intensity, or the amount of energy needed to produce each unit of output.

Production activity (yellow bars) is expected to rise with increased urbanization and expanded global prosperity. At the same time, continued improvements in energy efficiency (green bars) are expected to reduce energy intensity. Because of this improved efficiency, growth in industrial energy demand will be well below the growth in global production activity.

For chemicals, energy demand includes both fuel and feedstock. Improvements to energy efficiency can reduce only the fuel portion – about 40 percent of the chemicals sector's energy demand. This is why chemicals' efficiency improvements appear modest relative to the improvements in heavy industry and the energy industry.

"By significant investments in new steelmaking technologies, and through the innovation of the women and men working on the plant floor, America's steel industry has reduced energy intensity per ton of steel shipped by 30 percent since 1990."

American Iron and Steel Institute

Two other elements of the industrial sector are the demand for fuel for agriculture, which will rise to support a growing population, and growth in asphalt demand for road construction.

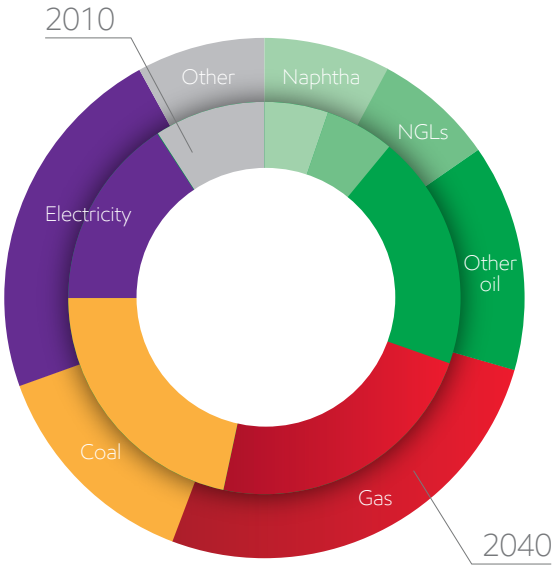
Increased industrial activity is one reason for the projected strong growth in demand for energy for trucks and other forms of commercial transportation through 2040 (see page 21). This is especially true for China, India and other leading growth countries, where rising domestic consumption and exports drive robust industrial growth.

Through 2040, there are likely to be significant changes in the types of energy used in the industrial sector. Growth in unconventional sources of oil and natural gas is **helping the industrial sector shift away from coal** and curb direct CO_2 emissions. By 2040, the industrial sector is projected to get only about 15 percent of its direct energy from coal, compared to over 20 percent in 2010. At the same time, natural gas and electricity are likely to increase their shares of industrial energy.

In the chemicals sector, rising demand for chemical products will drive increased demand for the liquids that are used as chemical feedstocks: oil-based feedstocks like naphtha and natural gas liquids (NGLs) such as ethane.

Industrial energy demand by fuel

Percent



50 percent

Globally, demand for energy from the chemicals sector is rising about 50 percent faster than overall energy demand.

"The transition from agriculture to manufacturing is still the route to higher productivity and rising living standards for developing countries. In advanced economies, manufactured goods stand as the tangible expression of innovation and competitiveness."

McKinsey Global Institute, *Manufacturing the future: The next era of global growth and innovation.* November 2012

Chemicals demand – more than just fuel

One aspect of global oil and natural gas demand that is not always obvious is the link to the plastics and other petrochemicals that are integral to many of today's manufactured products.

The chemicals industry is unique among energy consumers because it uses energy in two ways. Only about 40 percent of the industry's energy consumption is used for typical purposes like heat and power. The remainder is the oil and natural gas liquids (NGLs) that chemical companies use as raw materials to make the building blocks for a wide range of essential products. NGLs such as ethane, propane and butane are the valuable byproducts of production from natural gas wells.

The products of oil and NGL feedstocks include consumer goods such as plastics, rubber, paint, ink, electronics, pharmaceuticals, packaging and personal care products. They also include industrial products like solvents, resins and coatings. And they include manufactured products such as auto parts, furniture, flooring, appliances, medical equipment and surgical supplies. Natural gas itself can also be a feedstock for products such as fertilizers.

At a chemical plant, steam cracking is one of the main processes used to turn feedstocks into intermediate chemical products such as ethylene and propylene, which are further processed to form plastics and other end-use products. About 70 to 80 percent of the energy consumed in steam cracking is due to the raw materials that are not combusted as fuels but rather transformed into other materials.

Rising natural gas production, particularly in North America, has reshaped the chemicals industry by shifting the economics of chemical production in favor of North American manufacturers. Aside from the Middle East, North America is the only region of the world where most steam cracking facilities are designed to use NGLs rather than the more expensive oil-based feedstocks used in Europe and Asia Pacific.

The twofold advantage of access to an abundant supply of affordable natural gas (for fuel) and NGLs (for feedstocks) is leading to a resurgence in the North American chemicals industry and positioning the region to help meet rising global demand for chemicals.

Energy demand from the chemicals industry is projected to grow faster than the overall growth in energy demand as rising standards of living, particularly by the middle class in developing parts of the world, drive growth for goods made from chemical products.

Global chemicals energy demand is expected to rise by about 55 percent from 2010 to 2040, and will account for 35 percent of the growth in the industrial sector. Most of the growth in energy demand in the chemicals sector will be for the feedstocks to make manufactured goods; fuel demand will grow more slowly as improvements to efficiency reduce demand growth.

Today, natural gas and electricity already account for more than half of the energy used for fuel purposes in chemical plants. That percentage will continue to grow over the *Outlook* period, as solid fuels like coal decline over time.

Power generation

Power generation is the fastest-growing major demand sector

Only a century ago, electricity was just emerging for general use. It's remarkable, then, that power generation today is the world's single-largest source of energy demand. Worldwide electricity use is projected to increase by 90 percent from 2010 to 2040, with developing countries accounting for the overwhelming majority of that increase.

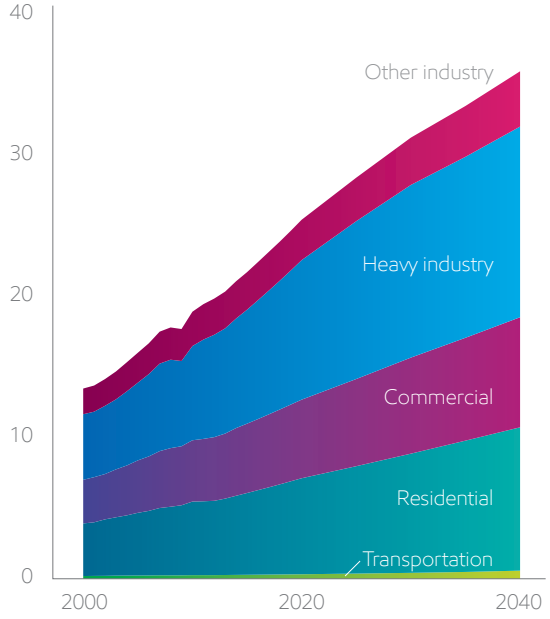
Improved living standards are one reason for this projected growth in electricity demand. Urbanization and rising incomes lead to increases in household and industrial electricity consumption, including wider penetration of electronics, appliances and other modern conveniences. Other contributors to the growth in electricity demand include expanding use of the Internet, wireless communications and other information technologies.

As a result, electricity is expected to capture a significant share of the overall growth in final energy needs in the residential/commercial and industrial sectors, continuing a trend of the last 20 years.

In the residential/commercial sector, electricity is expected to account for about 85 percent of the

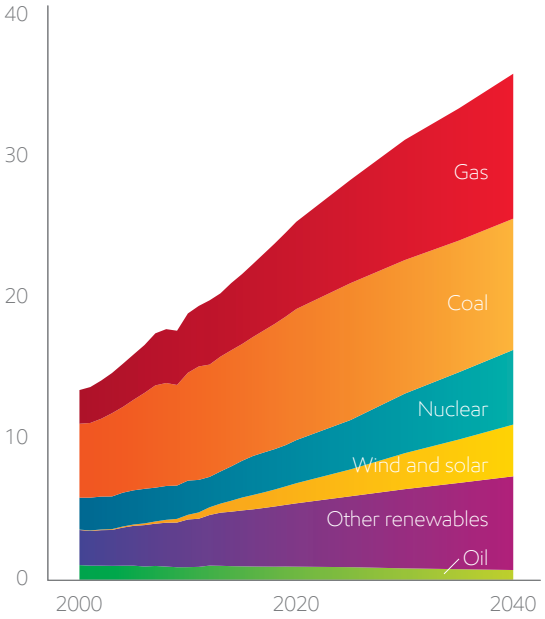
Global electricity demand by sector

Thousands of terawatt hours



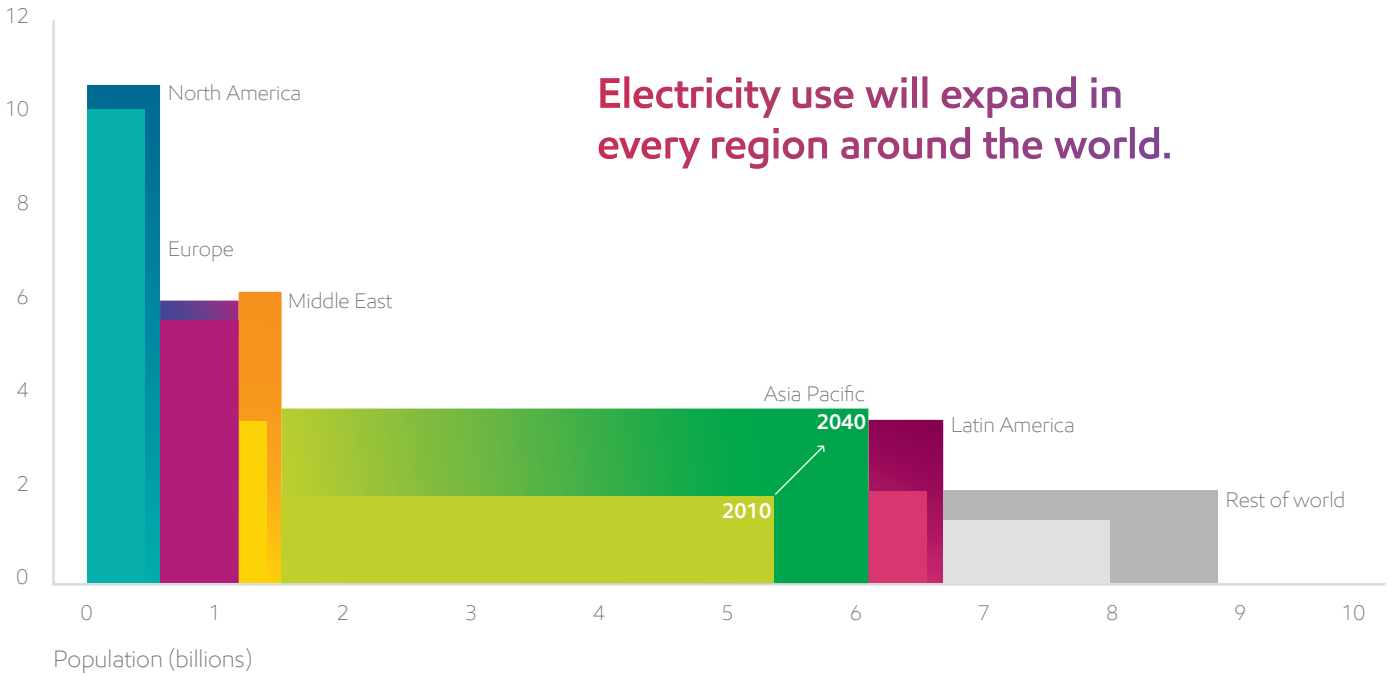
Global electricity supply by fuel

Thousands of terawatt hours



Electricity use by region

Megawatt hours per capita



Electricity use will expand in every region around the world.

growth in energy needs and help displace biomass fuels like wood, which are far more labor intensive, much less efficient and potentially harmful to human health.

In the industrial sector, electricity usage will likely increase about 90 percent and account for approximately 40 percent of the growth in energy needs.

Electricity use for transportation is also an area of significant interest. However, while this demand is likely to more than double by 2040, transportation's share of global electricity demand will remain small – at about 2 percent in 2040.

The same fundamentals that have contributed to higher electricity usage in OECD countries are increasingly driving higher electicity demand in other parts of the world.

For example, the Asia Pacific region's electricity usage per capita is expected to double over the *Outlook* period, after already having risen about 1.5 times over the past 20 years in conjunction with urbanization and rising living standards. China and India are expected to play an important role in this growth, with China's per capita electricity consumption more than doubling, and India's nearly quadrupling.

Even by 2040, the Asia Pacific region's per capita electricity usage will likely only be about one-third of North America's level. Electricity use per capita in China is expected to be about half that of the United States, while India is expected to be about 15 percent that of the United States in 2040.

1.3 billion

About 1.3 billion people lack access to electricity. Africa accounts for about half of this total, with roughly 55 percent of its population lacking access.

Natural gas to overtake coal as largest source of electricity

Utilities and other power producers around the world can choose from a variety of fuels to make electricity. They typically seek to use energy sources and technologies that enable reliable and relatively low-cost power generation while meeting environmental standards. Over the *Outlook* period, we anticipate that public policies will continue to evolve to place tighter standards and/or higher costs on emissions – including CO_2 – while also promoting renewables. As a result, we expect the power sector to adopt combinations of fuels and technologies that reduce emissions but also raise the cost of electricity.

At the same time, the sector will also need to manage reliability challenges associated with increasing penetration of intermittent renewables, like wind and solar. These renewables have a cost, which is often overlooked, related to reliablility for times when the wind is not blowing and the sun is not shining.

Fuel input to power generation is projected to rise by more than 50 percent, faster than any other sector, over the *Outlook* period.

In 2010, coal was the world's No. 1 fuel for power generation, accounting for about 45 percent of fuel demand. Though coal use will likely increase by about 55 percent in developing countries by 2040, it continues to lose ground in developed countries – primarily to natural gas and renewables such as wind and solar.

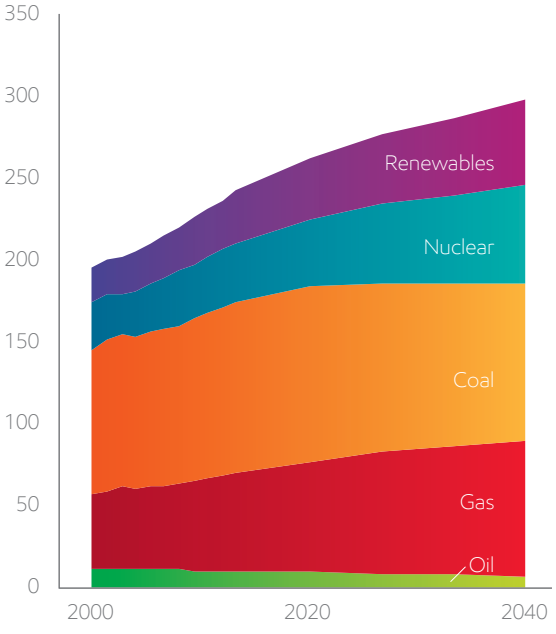
By 2040, demand for natural gas in the power generation sector is expected to rise by close to 80 percent. At that time, natural gas will be approaching coal as the world's largest energy source for power generation, and coal's share will have dropped to about 30 percent. Natural gas will actually produce more electricity than coal, reflecting efficiency advantages of gas-fired versus coal-fired power plants.

Increased local natural gas production in North America and elsewhere, along with expanded international trade, is expected to supply the gas for power generation.

By 2040, we expect that the use of nuclear power will approximately double and renewables will increase by about 150 percent, led by wind and hydroelectric power.

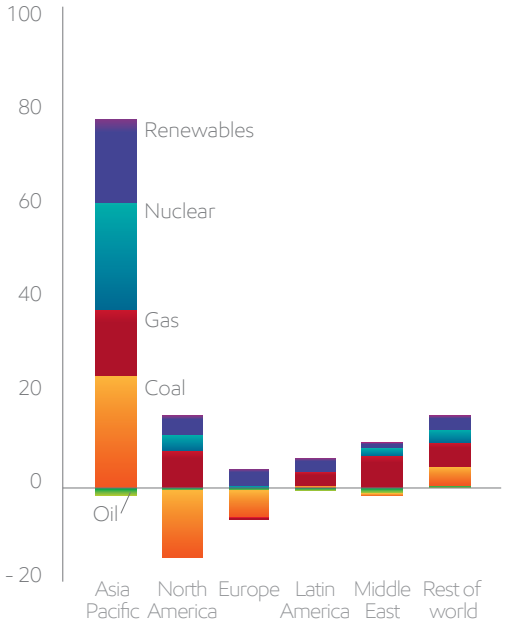
Fuel input to power generation

Quadrillion BTUs



Growth in fuel for power generation

2010-2040 in quadrillion BTUs



The shift away from coal and toward natural gas, nuclear and renewables in the power generation sector is an important contributor to the projected slowdown in global energy-related CO_2 emissions over the *Outlook* period (see page 32).

Trends vary by region. In China, the world's largest consumer of fuels for power generation, demand for coal will likely continue to climb through 2025, but then begin to decline as the country advances its efforts to improve air quality and diversify its energy sources. By 2040, coal is likely to account for only about 45 percent of energy used for power generation in China, compared to about 85 percent in 2010.

The use of coal for power generation will likely continue to rise in many developing countries, such as India and much of Southeast Asia.

As with any decision about energy usage, economics play an important role. In the power generation sector, cost-benefit analyses are influenced by policies that seek to reduce CO_2 emissions by effectively imposing a "cost of carbon." Natural gas and coal are, in general, the lowest-cost options for power generation. But when a significant cost of carbon is imposed, coal-fired plants become less competitive with lower-emission alternatives like natural gas, nuclear and renewables.

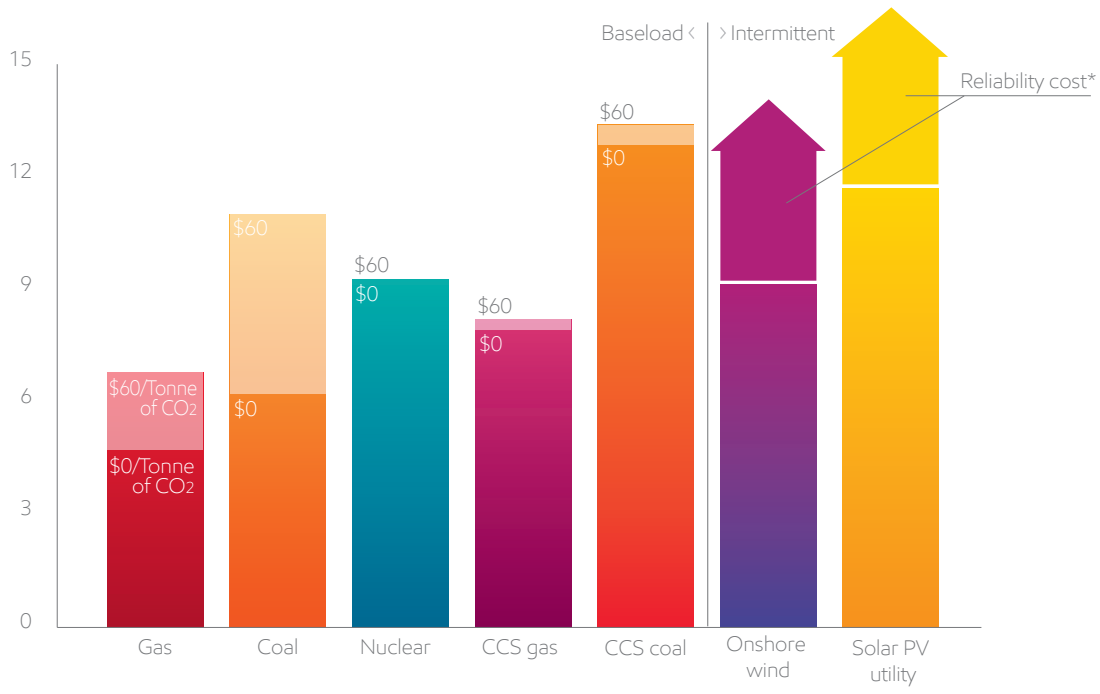
85 percent

About 85 percent of the growth in electricity generation is expected in developing countries.

To reduce CO_2 emissions associated with power generation using natural gas and coal, one technology often discussed is carbon capture and storage (CCS). Since new gas-fired power plants are likely to generate about 50 percent fewer CO_2 emissions than new coal-fired plants, we expect gas-fired CCS plants will provide lower-cost electricity than coal-fired CCS plants. However, CCS technology in any case faces substantial economic and practical hurdles, which are expected to continue to limit its significant deployment over the *Outlook* period.

Average U.S. cost of electricity generation in 2030

Cost per kilowatt hour in 2013 cents



*Reliability cost includes integration, backup capacity and additional transmission costs.

Emissions

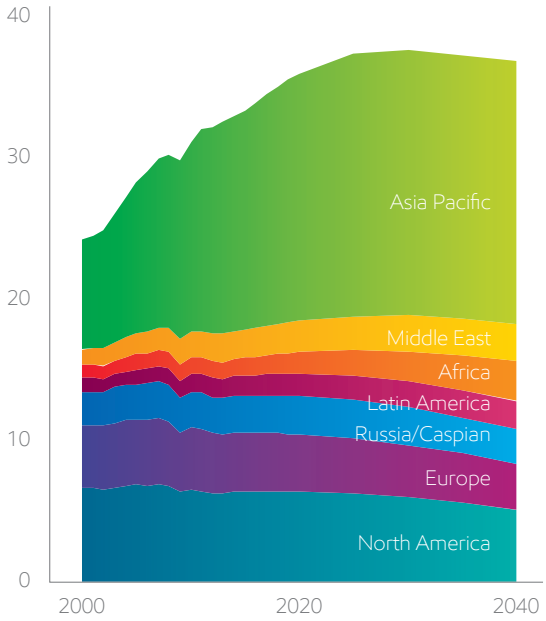
Markets, technology and public policies affect energy choices and emissions

In recent years, many nations have begun to identify and address climate risks associated with rising GHG emissions. Since energy use is a significant contributor to GHG emissions, climate policies that target these emissions are likely to play a significant role in the world's energy future by directly and indirectly affecting people's energy choices.

Since energy use is pervasive in every aspect of life around the world, and since policies to address GHG – and more specifically CO_2 – emissions will tend to raise the cost of energy and related activities, many countries are taking care in structuring both the nature and the pace of GHG policy initiatives. This approach is understandable as a way to manage climate risks associated with GHG emissions while also minimizing related policy impacts on local economies, industrial competitiveness, energy security and the people's ability to pay higher costs.

Energy-related CO_2 emissions

Billion tonnes



Although climate policies remain uncertain today, for purposes of the *Outlook* to 2040, we assume that governments will continue to gradually adopt a wide variety of more stringent policies to help stem GHG emissions.

Over time, as these policies advance and people respond to rising energy costs, we anticipate greater adoption of energy-saving technologies and practices, as well as lower CO_2 emissions per unit of energy consumed. For example, **in the power generation sector, policies to stem GHG emissions will likely raise electricity costs for consumers, slowing demand growth. Power producers will also seek to utilize more efficient electricity-generating technologies, and shift from coal toward lower-emission fuel sources like natural gas, nuclear and renewables.**

To help model the potential impacts of a broad mosaic of future GHG policies, we use a simple cost of carbon as a proxy mechanism. For example, in most OECD nations, we assume an implied cost of CO_2 emissions that will reach about $80 per tonne in 2040. OECD nations are likely to continue to lead the way in adopting these policies, with developing nations gradually following, led by China.

Greenhouse gas emissions related to energy use are projected to plateau by 2030

Market forces as well as emerging public policies are already having an impact on energy-related CO_2 emissions in many parts of the world. After decades of growth, we expect worldwide energy-related CO_2 emissions will plateau around 2030 before gradually declining toward 2040, despite a steady rise in overall energy use.

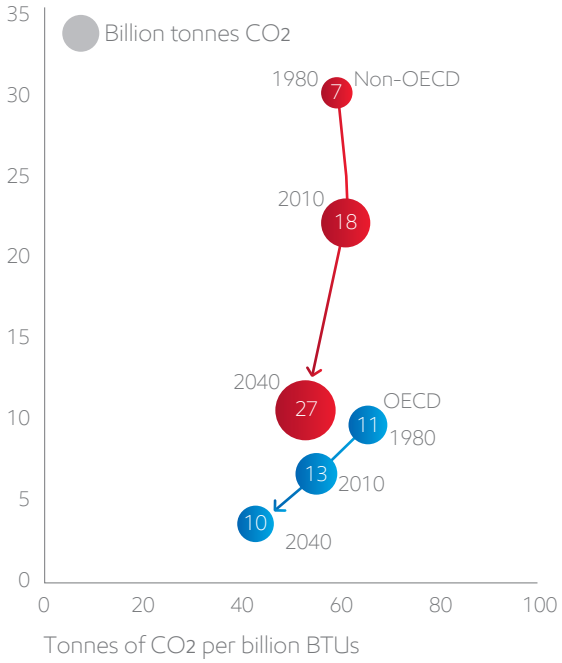
Regionally, we see a variety of emission patterns through 2040, reflecting the different stages of economic development and varying degrees and types of energy used at a national level. Increasingly, the world's CO_2 emissions will be driven by developing nations. Overall, non-OECD emissions are likely to rise about 50 percent, as energy demand rises by about two-thirds. Over the same period, OECD emissions are likely to decline approximately 25 percent and approach a 25 percent share of global emissions – down from about 40 percent in 2010.

While emissions in non-OECD nations will play a more significant role going forward, some historical perspective is appropriate. First, in 1980, the OECD accounted for about 60 percent of global emissions. Since then, both OECD and non-OECD nations have made progress in slowing the growth of CO_2 emissions by improving the energy efficiency of their economies. In addition, OECD nations have gradually reduced the carbon intensity of their energy use by switching to lower-carbon fuels, namely natural gas and renewables. Together, these factors have helped enable the decline in CO_2 emissions that has already begun in the OECD.

Non-OECD emissions surpassed OECD emissions in 2004, largely due to significant economic progress and a carbon-intensive energy mix heavily dependent on coal. Looking ahead to 2040, we anticipate non-OECD nations will continue to improve the energy-efficiency of their economies, but also shift toward less carbon-intensive energy sources. Together, these factors will help global CO_2 emissions peak around 2030. Even then, emissions on a per capita basis in non-OECD nations will remain about half the level of OECD nations.

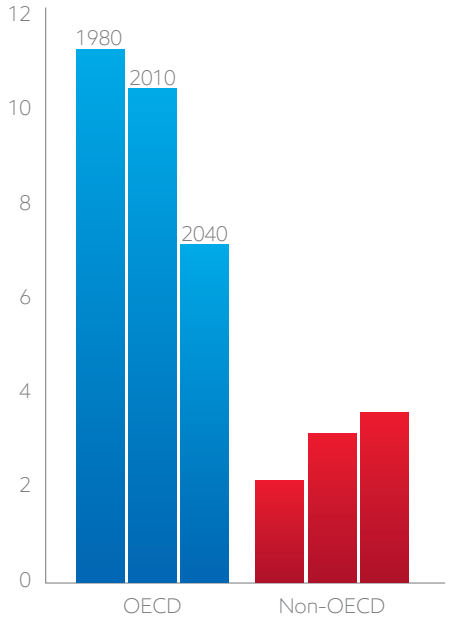
CO_2 emissions relative to energy efficiency and fuel mix changes

Thousands of BTUs per dollar of GDP (2005$)



Energy-related CO_2 emissions

Tonnes per capita



Energy supply

Advances in technology continue to make a wide range of energy supplies available to consumers. At the same time, the fuels that people and businesses choose to meet their needs continue to evolve. These choices are based not just on price, but also on attributes like convenience, performance and environmental effects. Natural gas is expected to be the fastest-growing major fuel through 2040.

"Instead of asking if the world will run out of oil and gas, many people are starting to wonder what other frontier energy sources we will be able to access as technology progresses."

Center for Strategic and International Studies,
The Shifting Geopolitics of Natural Gas, July 2013


MÆRSK DEVELOPER

Oil and other liquid supplies

Oil resource base continues to expand

Over the coming decades, energy sources will continue to evolve and diversify, driven by changes in technology, consumer needs, and public policies. But liquid supplies — primarily crude oil — are projected to remain the single biggest source of energy and vital to transportation.

Ongoing advances in exploration and production technology continue to expand the size of the world's recoverable crude and condensate resources. Despite rising liquids production, we estimate that by 2040, about 65 percent of the world's recoverable crude and condensate resource base will have yet to be produced.

Even as global oil production rises, the estimated size of the global recoverable resource base continues to increase as a result of advancements in science and technology that have enabled the production of new sources of liquid fuels. In the early 1980s, the U.S. Geological Survey estimated that there were 55 years of crude and condensate supply given the demand at that time. In 2012, that estimate had risen to 125 years with current increased production.

Globally, while conventional crude production will likely decline slightly over the *Outlook* period, this decline will be more than offset by rising production from supply sources enabled by new technologies — including tight oil, deepwater and oil sands.

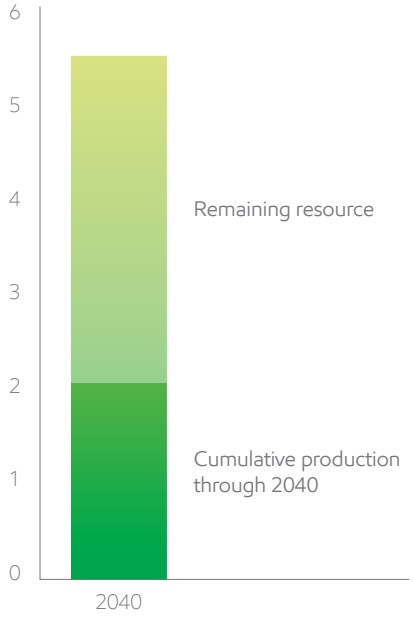
North American liquids production is expected to rise by more than 40 percent from 2010 to 2040, boosted by gains in oil sands, tight oil and NGLs. With production rising and demand falling,

65 percent

By 2040, about 65 percent of the world's recoverable crude and condensate resource will have yet to be produced.

Crude and condensate resource

Trillion barrels of oil



Source: IEA

North America is expected to shift from a significant crude oil importer to a fairly balanced position by 2030.

Latin American liquids production will nearly double through 2040 with the development of the Venezuelan oil sands, Brazilian deepwater and biofuels.

The Middle East is expected to have the largest absolute growth in liquids production over the *Outlook* period — an increase of more than 35 percent. This increase will be due to conventional oil developments in Iraq, as well as growth in NGLs and rising production of tight oil toward the latter half of the *Outlook* period.

In Africa, large deepwater developments are expected to result in the continent seeing about a 10 percent rise in liquids production from 2010 to 2040.

Rise in tight oil, NGLs and other emerging sources

For decades, the vast majority of the world's oil came from conventional sources — wells drilled on land or not far offshore. But that will change significantly over the next few decades. As conventional production declines, more of the world's oil demand will be met by emerging sources that only recently became available in significant quantities — oil sands, tight oil, deepwater, NGLs and biofuels.

Growth in these emerging sources is largely due to advancements in science and technology; the exception is biofuels, which in most countries is linked to government policies that mandate the use of these fuels derived from agricultural products like corn, sugar, seeds or palm oil.

By 2040, emerging supplies will account for more than 40 percent of global liquids supply, as technology enables increased development of these resources (see page 39).

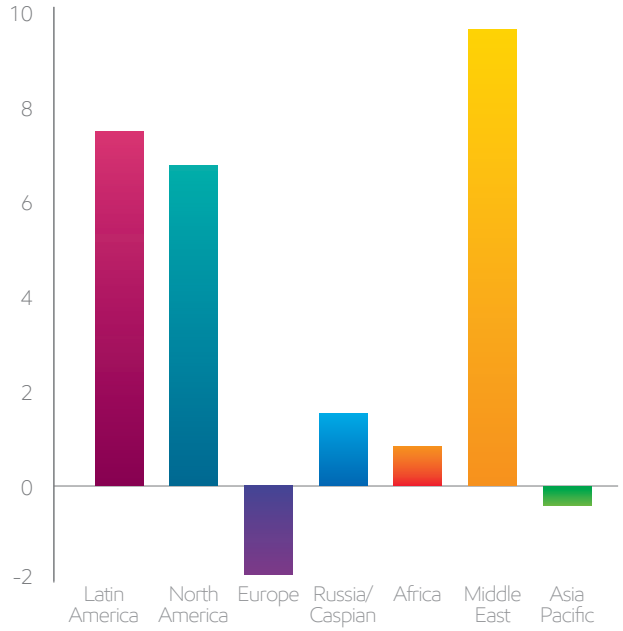
45 percent

By 2040, about 45 percent of liquids supply will be from sources other than conventional crude and condensate production.

The largest contribution comes from NGLs, which should grow by 80 percent from 2010 to 2040. NGLs — such as ethane, propane and butane — are extracted from natural gas. NGLs are expected to approach 15 percent of global liquids supply in 2040 amid rising production in North America and the Middle East. The projected strong growth in natural gas production, driven in part by unconventional drilling activity, means rising output of NGLs too. Like some oil-based liquids, NGLs can be used as feedstocks to manufacture plastics and other chemical products, as heating fuels or as additives to engine fuels.

Change in liquids production

2010-2040 in millions of oil-equivalent barrels per day



10 times

Tight oil supply grows more rapidly than any other liquid supply source, more than 10 times the 2010 level.

Deepwater supplies will grow by more than 150 percent from 2010 to 2040. Deepwater production, which refers to wells drilled in more than 400 meters (1,312 feet) of water, is concentrated in Angola, Nigeria, the Gulf of Mexico and Brazil. Globally, deepwater drilling is expected to plateau near the end of the *Outlook*.

Another rapidly emerging source is tight oil. These are liquids extracted from low permeability rock formations, which until recently were not economic to produce. Tight oil production is projected to rise by more than 1,000 percent from 2010 to 2040, when it will account for 5 percent of global liquids production. Tight oil production will be led by North America, followed by Russia and then other areas. To put this in perspective with OPEC producers, North American tight oil supply in 2015 will likely surpass any other OPEC nation's current oil production — with the exception of Saudi Arabia.

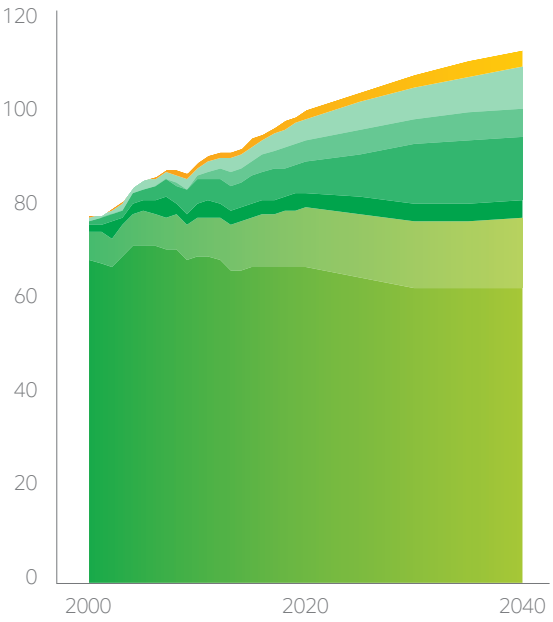
Oil derived from oil sands will rise by almost 300 percent over the *Outlook* period. These liquid supplies are concentrated in Canada and Venezuela.

North America will see a dramatic rise in technology-enabled supplies. Canada, for example, is expected to see more than 200 percent growth in oil sands production from 2010 through 2040. In North America, tight oil and NGLs will account for almost 35 percent of liquids production by 2040.

Liquids production from recently emerging sources is expected to grow fastest in non-OPEC countries, where conventional production is declining fastest. But OPEC member nations will also expand their production of liquids. By 2040, about 45 percent of the world's liquids supply will come from OPEC countries, compared to about 40 percent in 2010.

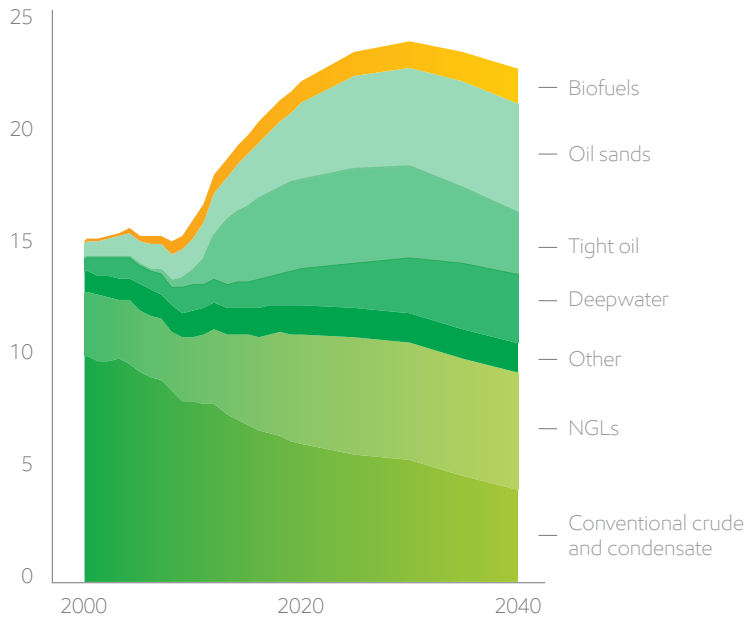
Global liquids supply by type

Millions of oil-equivalent barrels per day



North America liquids supply by type

Millions of oil-equivalent barrels per day



High-impact drilling and completion technologies

Advances in technologies used for well drilling and completion have enabled the energy industry to reach new sources of oil and natural gas to meet rising demand around the world. New technologies have also helped reduce the environmental impact of energy production by allowing more oil and gas to be produced with fewer wells.

For example, the Gorgon Jansz development offshore northwest Australia will include wells that deliver natural gas at rates in excess of 300 million cubic feet per day. Just one of these wells could meet the residential gas demand of more than 40 million households in China every day.

Advances in technologies will play a critical role in meeting global energy demand because they enable the discovery of new resources, access to harsh or remote locations and the development of challenged reservoirs that previously were not economic to produce.

The Arctic is the world's largest remaining frontier of undiscovered oil and gas resources. With its remote location, harsh weather and dynamic ice cover, the Arctic presents extraordinary challenges. Technology solutions include ice-resistant and iceberg-resistant platforms, iceberg surveillance research to characterize the hazards associated with icebergs and simulation capabilities to predict the potential magnitude of ice impacts.

For example, at the Sakhalin-1 project offshore eastern Russia, advances in drilling technologies have enabled several fields far offshore to be reached by a land-based drilling rig, improving production rates and reducing environmental risk.

These fields have been developed with the Yastreb rig, one of the world's largest and most sophisticated land-based drilling rigs. Since 2007, ExxonMobil has drilled 19 of the world's 30 longest extended-reach wells, including the Z-44 well drilled at the Chayvo field. This well extended for a total length of 12,376 meters (40,604 feet) — more than 7 miles. Because of the application of other proprietary technologies, these Sakhalin-1 wells were also the fastest-drilled extended-reach wells in the world.

Well completion is the final step of the drilling process, where the connection to hydrocarbon-bearing rock is established. Here again, advances in technology have enabled more oil and natural gas to be recovered from the length of each well, improving production and reducing the environmental footprint of energy production.

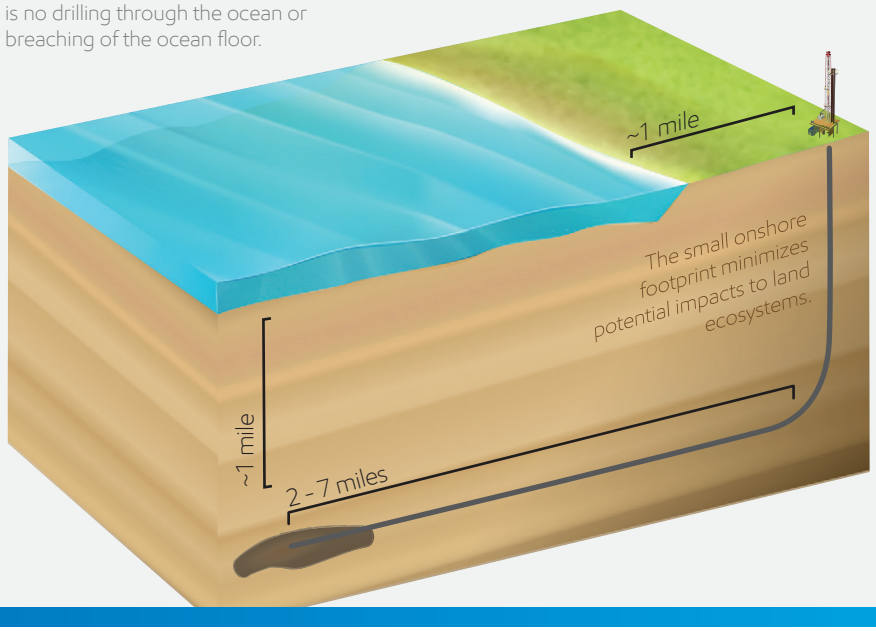
For example, by combining extended-reach drilling capability with advanced stimulation technology, operators can optimize how and where stimulation fluid interacts with rock, allowing sustained production rates along the length of the wellbore. Companies are pushing completions in excess of 3,000 meters (9,842 feet) in length, compared to a typical completion of 30 meters a couple of decades ago.

These types of drilling and completion technologies have also enabled the recent growth in production from shale and other unconventional oil and gas reservoirs in North America, using a combination of hydraulic fracturing and horizontal, extended-reach drilling. ExxonMobil's Piceance project in Colorado pioneered the capability to place multiple hydraulic fractures in a single well, and was first to use efficient pad drilling operations that now characterize all unconventional oil and gas production.

An illustration of land-based extended reach technology

State-of-the-art proven technology safely reaches and develops offshore oil resources

Marine habitats are undisturbed, as there is no drilling through the ocean or breaching of the ocean floor.



Natural gas

The world has about 200 years of natural gas at current production levels

Natural gas will continue to play an increasingly important role in meeting global energy needs. Utilities, industries and other consumers are choosing this fuel because it is versatile, affordable and produces relatively low emissions.

Natural gas will be the world's fastest-growing major energy source through 2040. Global demand is projected to rise by close to 65 percent from 2010 to 2040 — and account for about 40 percent of the growth in global energy needs. **By roughly 2025, natural gas is expected to overtake coal as the second-largest energy source, behind oil.**

Non-OECD countries drive 80 percent of the projected global growth in natural gas demand. **About 50 percent of the growth is expected to come from Asia Pacific, with China accounting for half that increase.** In OECD countries, demand for natural gas is expected to rise through 2035, then plateau. About two-thirds of the increase in OECD demand will likely occur in North America, supported by abundant domestic resources.

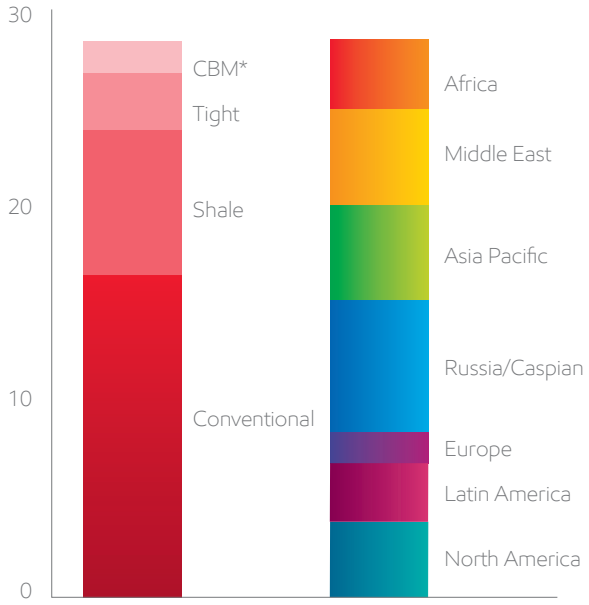
Natural gas resources are plentiful. The IEA estimates the remaining recoverable natural gas resource worldwide to be about 28,600 trillion cubic feet (TCF) — about 200 times the natural gas the world currently consumes in a year.

Estimates of recoverable gas have doubled in the last 10 to 15 years as hydraulic fracturing and horizontal drilling technologies have unlocked the prospect of recovering unconventional gas — the natural gas found in shale and other dense rock formations that only recently became economic to produce.

Gas resources also are geographically diverse; six of seven regions each hold 10 percent or more of the world's remaining recoverable resource. Conventional gas constitutes approximately 60 percent of the world's remaining recoverable gas resource, of which about 55 percent is in the Middle East and Russia/Caspian.

Remaining recoverable natural gas resource

Thousand trillion cubic feet



Source: IEA
*Coalbed methane

Natural gas production will expand and diversify over the coming decades. While **North America and Russia/Caspian will continue to be the two leading natural gas-producing regions**, other regions will also see strong growth. **Asia Pacific, Africa and Latin America are each expected to more than double their gas production over the *Outlook* period.** This growth will be spurred by both strong regional demand and export projects.

215 billion

Global demand for natural gas will rise by 215 billion cubic feet per day over the *Outlook* period. That is equal to adding more than three times the natural gas consumed in the United States in 2010.

Shale, LNG continue to reshape natural gas market

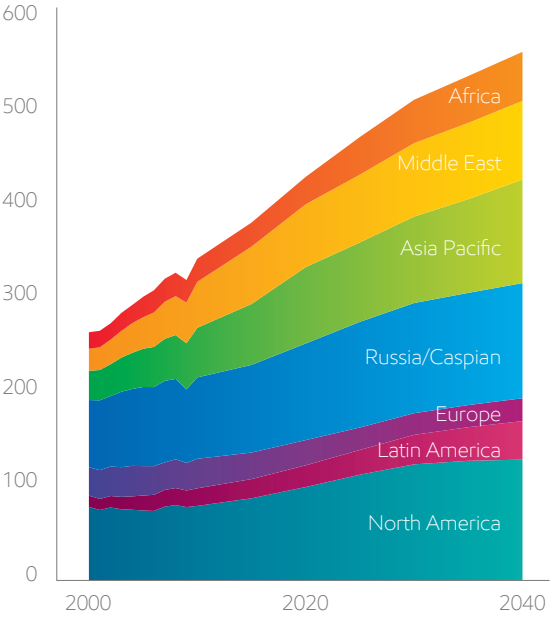
Two significant developments in natural gas — shale gas production in North America and the growth of the global LNG market — are likely to play a major role in expanding and reshaping natural gas supplies over the coming decades.

Unconventional gas — including shale gas, tight gas and coalbed methane — accounts for about 40 percent of the world's remaining recoverable gas resource, according to IEA estimates. Unconventional development is expected to play an increasing role in the global gas supply.

Advances in technology and favorable market conditions have unlocked North America's vast resources of shale gas and other unconventional sources such as tight gas and tight oil. From 2010 to 2040, unconventional gas production in North America is expected to grow by around 65 billion cubic feet per day, which is about the size of total U.S. gas production today. This abundant supply is expected to enable **North America to shift from a net importer to a net exporter of natural gas by 2020** as production outpaces demand.

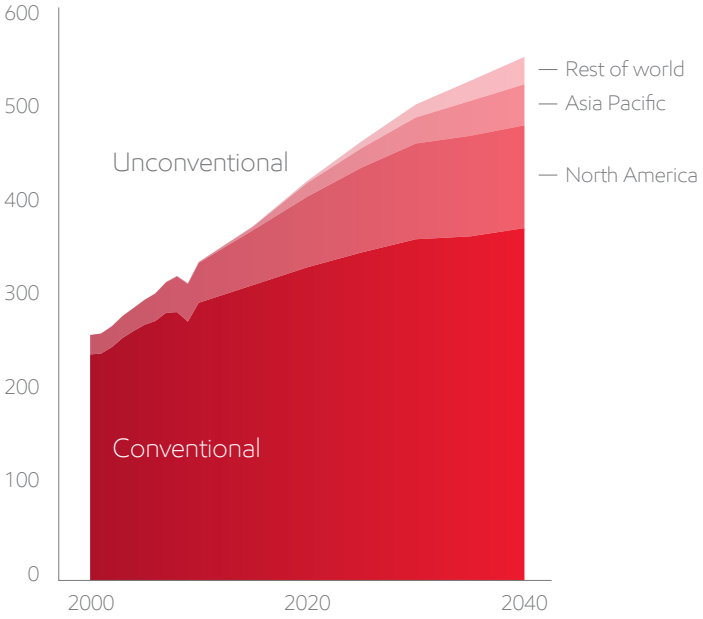
Natural gas production by region

Billion cubic feet per day



Natural gas production by type

Billion cubic feet per day



There is also large potential for unconventional gas production in other parts of the world, notably Asia Pacific. Australia, China and Indonesia, along with Argentina and other nations, are actively promoting exploration and development of their unconventional gas resources, aspiring to replicate North America's success. In each country, the pace of development will depend on geology, appropriate technology adaptations, governing policies and development economics.

About 65 percent of the growth in natural gas supplies through 2040 is expected to be from unconventional sources, which will account for one-third of global production by 2040. North America will lead unconventional gas production, accounting for more than half the growth through most of the *Outlook* period.

Like oil, natural gas is often found in remote areas, far from large, urban energy demand centers. LNG, or liquefied natural gas, can be transported by ship, enabling gas to be delivered economically to more distant markets than can be reached by pipeline.

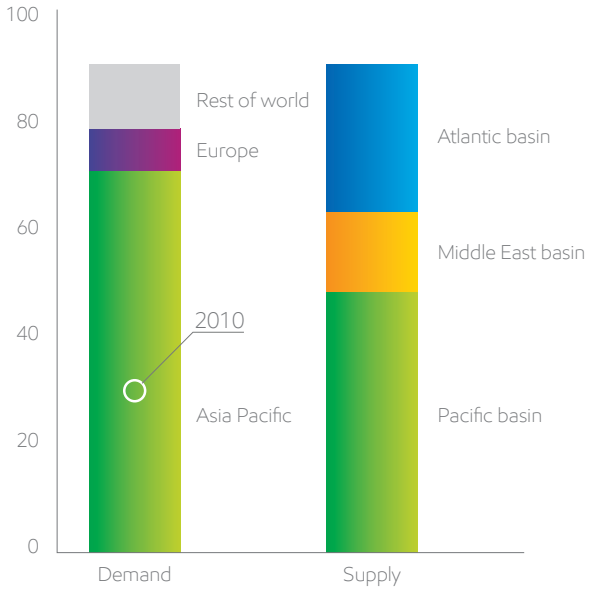
All around the world — from the highlands of Papua New Guinea, to the deep water off east Africa, to frigid far east Russia, to the U.S. Gulf Coast — LNG projects are in various stages of planning and development to produce gas destined for faraway ports. These projects will bring jobs and economic opportunity to gas-rich regions, while supplying much-needed cleaner energy to burgeoning cities. An increasing share of global natural gas demand through 2040 is expected to be met by gas imported as LNG.

LNG volume is expected to triple over the *Outlook* period to meet approximately 15 percent of global gas demand. The growth of the LNG market will facilitate trade between regions, helping to balance global supply and demand of natural gas.

Overall, international trade of natural gas in 2040 is expected to be 2.5 times the 2010 level, growing from about 15 percent of gas demand in 2010 to 25 percent by 2040. Most of this traded volume will be LNG, particularly in Asia Pacific. **By 2040, about 40 percent of Asia Pacific's natural gas demand will be satisfied by LNG,** with another 10 percent supplied by pipeline imports. Europe's regional gas imports are also likely to increase from about 45 to 60 percent as local production declines.

LNG in 2040

Billion cubic feet per day



"Natural gas is poised to enter a golden age, but this future hinges critically on the successful development of the world's vast unconventional gas resources. North American experience shows unconventional gas — notably shale gas — can be exploited economically. Many countries are lining up to emulate this success."

International Energy Agency

Global energy supplies

Over the *Outlook* period, we see several major trends in energy supplies

Oil remains the top global energy source and the fuel of choice for transportation. Demand for oil is projected to rise by approximately 25 percent through 2040, led by increased commercial transportation activity. A growing share of this demand will be met by sources such as deepwater, oil sands and tight oil, which are increasing as a result of advances in technology.

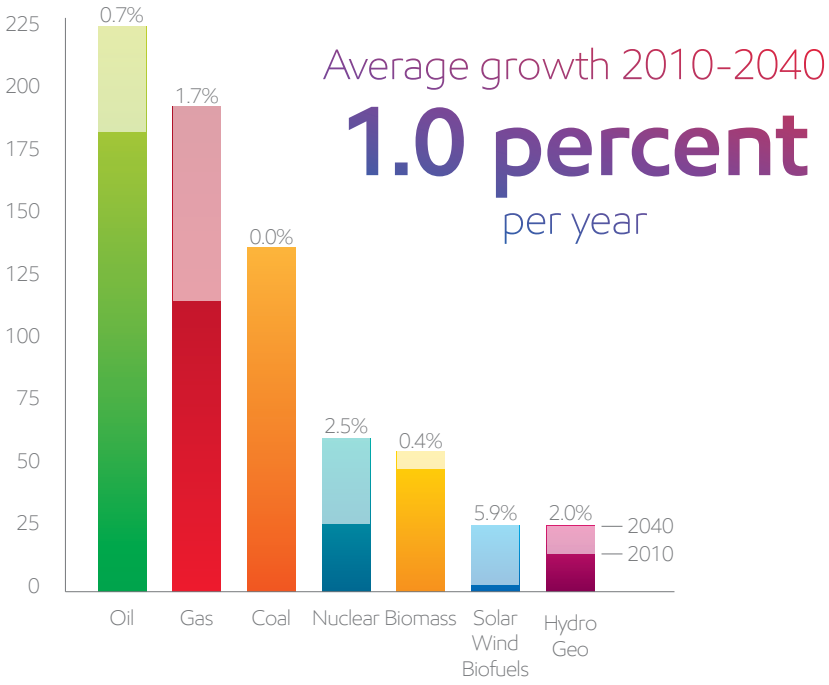
Natural gas will contribute the biggest growth in energy supplies. Natural gas is affordable, widely available, extremely versatile, and emits up to 60 percent less CO_2 than coal when used for power generation. With abundant resources unlocked by continuing technology advances, natural gas is expected to become more important in the global energy mix, accounting for more than 25 percent of global energy needs by 2040, as natural gas demand rises by about 65 percent.

Coal is currently the top fuel for power generation and accounts for the second-largest share of energy supplies today. We expect demand will continue to rise until around 2025 and then decline – despite the existence of a huge resource base. Driving this decline will be demand reductions in OECD countries as well as in China, which today consumes approximately half of the world's coal production. By 2040, we anticipate that coal's share of the global energy mix will fall from approximately 25 percent in 2010 to below 20 percent.

Nuclear energy will see solid growth. While some countries scaled back their nuclear expansion plans in the wake of the 2011 Fukushima incident in Japan, many other countries are expected to expand the use of this energy source to meet electricity needs while reducing emissions. Growth will be led by the Asia Pacific region, where nuclear output is projected to rise from 3 percent of total energy in 2010 to close to 9 percent by 2040.

Energy mix continues to evolve

Quadrillion BTUs



Average growth 2010-2040

1.0 percent

per year

Renewable energy supplies — including traditional biomass, hydro and geothermal as well as wind, solar and biofuels — will grow by close to 60 percent, led by increases in hydro, wind and solar. Wind, solar and biofuels are likely to make up about 4 percent of energy supplies in 2040, up from 1 percent in 2010. We foresee wind and solar providing about 10 percent of electricity generated in 2040, up from about 2 percent in 2010.

Expanding energy will require trillions of dollars in investment. The IEA estimates that meeting the world's energy needs will require expenditures on the energy-supply infrastructure of approximately $1.6 trillion per year on average through 2035. About half of the investments relate to projected oil and natural gas needs, while approximately 45 percent relate to expected power generation requirements.

Global marketplace

What does a family in Shanghai preparing their dinner have in common with a taxi driver in New York City? How is a computer service company in Mumbai similar to an automobile manufacturer in Germany?

They each are connected to the global energy marketplace. Every consumer, every economy is linked in some way to the worldwide energy network and the global growth and international trade it enables. Maintaining a robust energy marketplace is critical to meeting world energy demand now and in the future.

> "Energy powers the movement of goods and people across borders. Without energy, there is no international trade."
>
> Pascal Lamy, former Director-General, World Trade Organization

Energy and trade

Free trade benefits producers and consumers

Today's global economy is made possible by free trade. Trade is not a simple one-dimensional link between producers and consumers. It's an extensive web of buyers and sellers, all at various stages of the global value chain. At the micro level, producers/sellers are also consumers/buyers, because they exchange what they produce for all other goods and services they need. At the macro level, worldwide imports and exports balance each other out. As global citizens, we consume what we produce.

Now more than ever, producers utilize whichever resources are most abundant and suitable, and specialize in providing products and services that offer the best opportunities to add value and meet the needs of customers worldwide. Meanwhile, consumers enjoy unprecedented access to a wide range of products and services from around the world at affordable prices — from raw materials and intermediate goods to capital equipment, technology devices and final consumer goods. Trade improves both the quantity and quality of products and services. And the entire global trade network relies on energy.

The link between energy and trade

Traditionally, the goods and services that a country or company provides to the global marketplace are considered either labor intensive (such as textiles and shoes) or capital intensive (such as automobiles and machinery). In recent decades, knowledge-intensive goods and services (such as computer software and financial services) have grown in prominence. But no matter how a product or service is classified, it always has an essential component: energy.

"The most important single central fact about a free market is that no exchange takes place unless both parties benefit."

Milton Friedman, Nobel Laureate in Economics

This is the first major link between energy and trade: All goods and services traded on the global market embody energy in their production or creation. Whether used as a direct input or as an ingredient embedded in capital, labor and technology, energy plays a vital role in the global "production function," even as continued advances in technology enable all segments of society to use energy more efficiently.

In addition, delivering goods and services across national borders and vast distances requires efficient transportation and communication, which both rely on energy. Since the first ancient trading routes, advances in transportation and communication technologies have helped people overcome natural barriers to trade, such as distance and geography.

32 percent

In 2012, global goods and services exports were valued at 32 percent of world GDP, up from 22 percent in 1980.

Throughout history, advances in transportation have aligned with the changing ways in which the world harnesses energy: from horse power and sailboats; to coal-fired steam-engine trains and ocean liners; to tractor-trailers, mega ships and airplanes that use the latest engine and fuel technologies.

The same is true of advances in communication, which not only support the trading of goods, but also the increasingly important service trade. Today, services are exchanged at all times of day around the world — from information systems to call centers, from cross-border banking to foreign tourism. Whether transacted via cell phones, fax or the Internet, all of these services fundamentally rely on electricity and other forms of energy.

The last and perhaps most visible link between energy and trade is the trading of various energy forms themselves. Every economy relies on energy, but energy resources are unevenly distributed around the world. As a result, trading of energy is essential to global economic development. It enables both energy exporters and energy importers to realize economic benefits that would otherwise be impossible to attain.

Unobstructed energy trade helps countries improve economic security by offering diverse supplies to supplement their indigenous resources. Over time, energy trade minimizes the impact of market disruptions and encourages investment in energy exploration and production. More generally, a healthy world energy market makes a crucial contribution to fostering global political, social and economic progress.

Exports and imports of energy

Maintaining a robust global energy marketplace is critical to meeting rising global energy demand. The backbone of the global energy marketplace is free trade, which enables energy to move across various boundaries by pipeline, ship, railway – or in the case of electricity, by transmission lines. Oil and natural gas are the most widely traded energy sources, but other forms of energy — including coal, electricity and some renewable fuels — are also actively traded on the international market.

Trade has always been an important aspect of world energy markets. It will be even more important in the future.

"We have seen that when governments allow access to resources ... promote international cooperation ... and support strong partnerships, nations benefit through expanded trade that creates economic value and enhances energy diversity."

Rex W. Tillerson, Chairman and CEO, ExxonMobil

In terms of oil, the world's single biggest energy source, we expect that about half of global liquid fuels demand will continue to be met via international trade by 2040. However, on the regional level, there will be some important changes in trends over that time period:

- In the Americas, North America is expected to shift from a significant importer of petroleum supplies to a fairly balanced position by about 2030 as its domestic production rises substantially. Latin America, already a net exporter, will see strong growth in exports by 2040 even as local demand increases.

- Europe is expected to remain a significant importer of liquid fuels. The Russia/Caspian region will remain a net exporter, even as its production gradually declines after 2030.

- The Middle East is expected to expand oil exports as its production increases through 2040. Africa, another significant exporter today, is expected to see its exports decline over the coming decades as local demand rises but production remains steady.

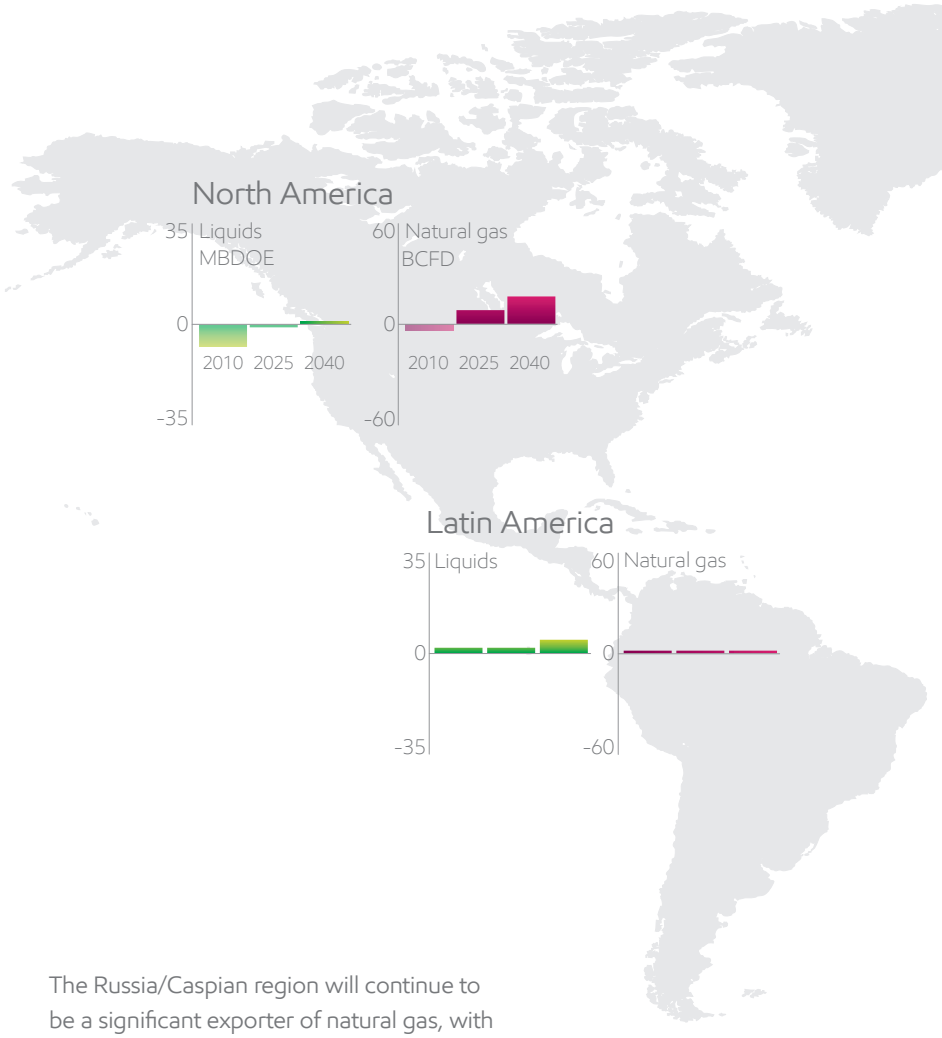
- The Asia Pacific region already relies on imports for about 70 percent of its liquid fuels demand; this proportion is expected to grow even higher through 2040 as local demand grows by about 50 percent. Net imports are likely to rise by roughly 75 percent.

International trading will play an increasingly important role in meeting global demand for natural gas. Traded volumes of natural gas in 2040 are expected to be 2 1/2 times the 2010 level, with most of this growth coming from LNG.

- North America is expected to shift from a net importer of natural gas to a net exporter by 2020, as production growth from shale and other unconventional sources outpaces demand. Latin America is expected to remain fairly well balanced through 2040 as local demand absorbs local production.

- Europe, which imports about 45 percent of its gas requirements today, is likely to see that percentage rise to about 60 percent by 2025 as local production continues to decline.

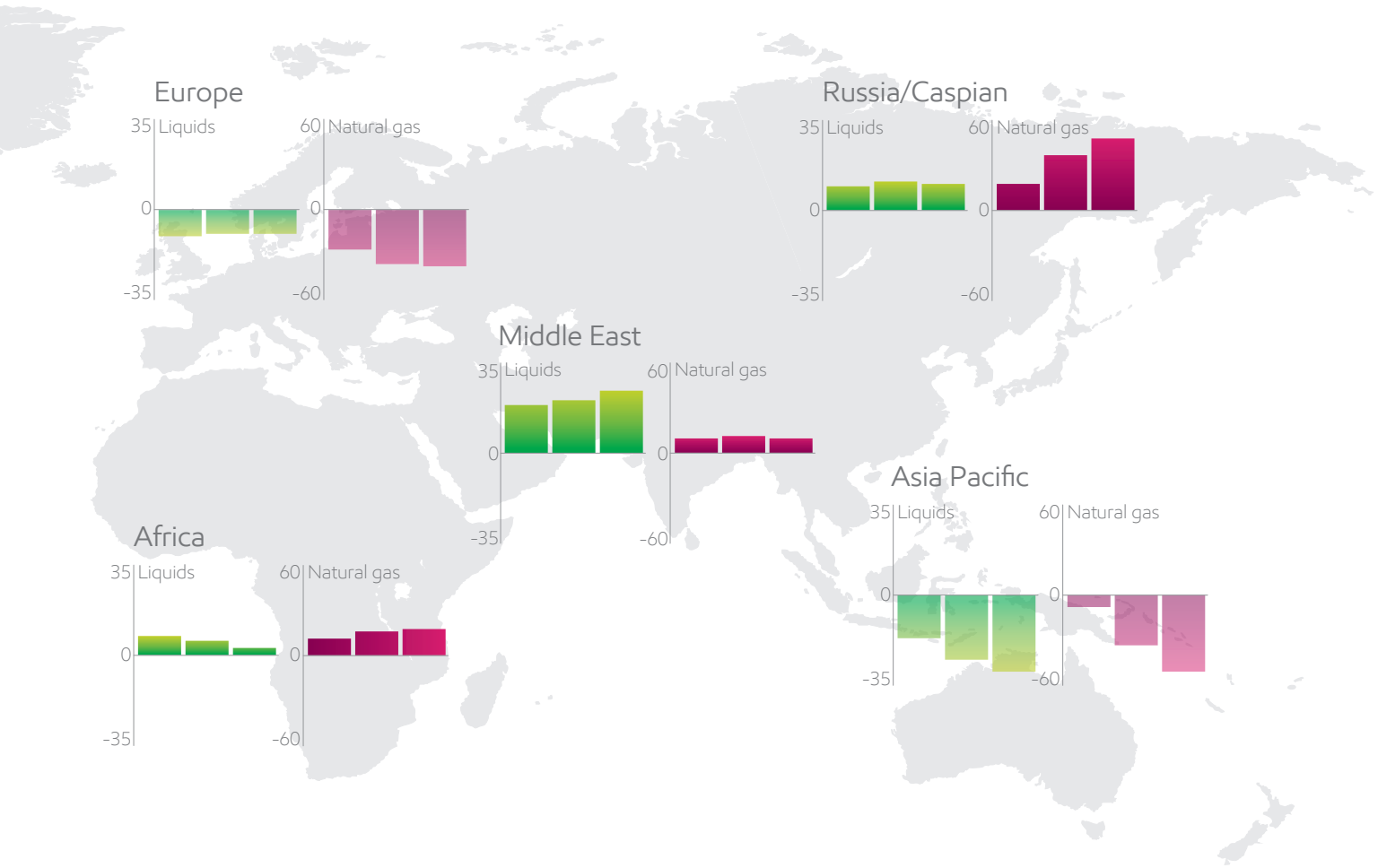
Liquids and natural gas net exports by region



The Russia/Caspian region will continue to be a significant exporter of natural gas, with flows likely to grow by 170 percent as production rises by about 40 percent through 2040.

- The Middle East and Africa will continue to be natural gas exporters. Middle East gas exports are likely to change only marginally through 2040, as production grows by roughly 70 percent while demand grows by about 85 percent. On the other hand, Africa is likely to see its exports grow from 2025 as production increases exceed growth in local demand.

- The largest shift in net imports is likely to be seen in the Asia Pacific region, where the percentage of natural gas demand met by imports from outside the region is expected to rise from 15 percent today to 35 percent by 2040. Net gas imports into Asia Pacific are expected to rise by about 300 percent through 2025 and by about 500 percent by 2040.



It is interesting to note that for both oil and natural gas, Europe and Asia Pacific will remain the two key importing regions, while the Middle East and the Russia/Caspian region remain the two largest exporters to world markets.

Ensuring reliable energy trading

Modern technology and infrastructure — from transmission lines to LNG tankers — have overcome many of the natural obstacles to energy trading. However, trading can still be hindered by less-recognized artificial barriers such as excessive regulations and government restrictions. By impeding trade, such barriers also impede the ability of people around the world to jointly create and share the value from new economic opportunities.

Because energy is so integral to the global marketplace and to every modern economic activity, what impacts energy trade also impacts trade of any other commodity, good or service. As people have learned over time, limiting trade leads to scarcities, fewer choices and lower overall value for the entire global economy. On the other hand, more opportunities to trade mean more value, wealth and jobs for everyone.

All regions benefit from access to the global market and expanded trade opportunities. These benefits can be enhanced by trade rules and policies that facilitate open markets, support infrastructure development and promote international cooperation.

Unraveling the meaning of the trade balance

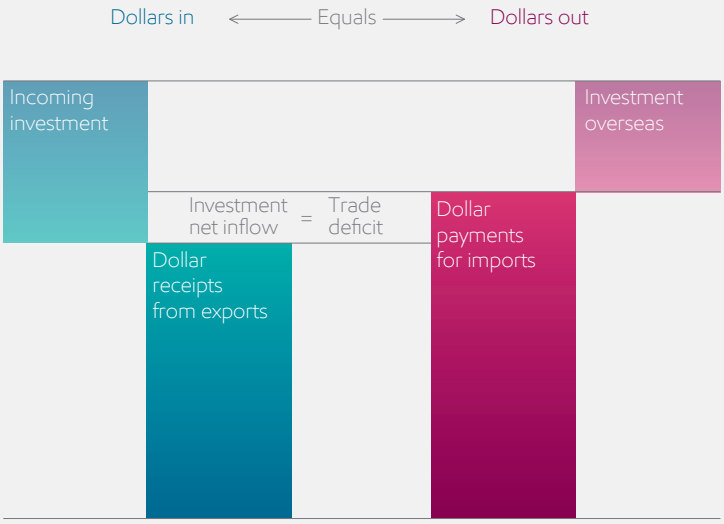
Nations — like people — do not prosper in isolation. And when a country engages in international trade, it will generally be a net exporter or a net importer of particular goods and services, including those related to energy. A trade occurs because it adds value to both the buyer and the seller. Taking all of a nation's trades into account results in what is commonly referred to as its trade balance, reflecting the difference in value between its exports and its imports.

In principle, a country's trade balance is no different from a household's or a business' budget balance. If we buy more from others than we sell, we run a deficit and need to borrow money or sell assets to cover it. On the contrary, if we sell more than we buy, we run a surplus, which we can save and invest. However, the story doesn't just stop there.

Imagine a two-country world where the United States runs a trade deficit and China a surplus. In this case, the U.S. is buying more than it sells, meaning more dollars are going out than coming in. So what happens to those "extra" dollars that China receives? It turns out to be in China's interest to "recycle" its surplus dollars by investing in U.S. stocks and bonds, as well as physical assets. From a U.S. perspective, this means that any "extra" dollars leaving the country due to trade will return as a positive source of investment funds. Essentially, this completes the entire cycle of dollar circulation in the world economy.

Of course, in reality, the world consists of multiple countries and the relationships among them are more complicated than this simple U.S.-China example. However, the same principle still applies: the flow of funds related to a country's trade and cross-border investment always offset each other in any given year. This relationship is called the "balance of payments."

Balance of payments example



Why is it important to recognize this relationship? In practical terms, a nation needs constant investments to support stronger economic growth. The investments by both private and public sectors (including financing related to government deficit spending) have to be supported first by savings (households, businesses and government) within a country. When national savings are not enough to cover national investments, and if a country is not willing to either reduce investments or boost savings, it has to seek investments from other nations. This, as illustrated earlier, means it will simultaneously run a trade deficit. Again, this situation is similar to budget challenges that individuals and businesses face every day.

Just as business results can vary from year to year, a country's exports and imports will fluctuate over time, affected by sometimes transient factors. But fundamentally, it is important to keep in mind that a nation's trade balance is ultimately determined by the differences between its national savings and investment, which in turn reflect more deeply rooted dynamics in demography, industrial composition, market structure, fiscal liabilities and general economic development.

The links between trade, investment and savings hold for every country in every year. Artificial barriers to trade not only threaten the obvious value created by free trade, but also endanger the free flow of investment funds that are important to economic prosperity.

Over time, achieving a more balanced trade position is synonymous with narrowing the gap between national savings and investments. In the end, only nations that promote free trade while also maintaining a sound savings-investment balance, including a solid fiscal foundation, can naturally strengthen their economic well-being and sustain long-term prosperity.

Practical energy choices

This year's *Outlook* highlights the ubiquitous nature of energy. Like no other commodity, energy touches every aspect of modern life, providing tremendous benefits to individuals and businesses around the world.

The convenience and reliability of modern energy are often taken for granted. But providing energy wherever and whenever people need it is not easy or automatic. The benefits we get from every flip of a light switch — or turn of an engine key or push of an "on" button – reflect decades of scientific advancement and enormous levels of investment.

Over the past century, advances in technologies have fundamentally changed our world. There has also been a dramatic evolution of energy needs and energy supplies. In recent decades, even as global energy needs reached unprecedented levels of scale and complexity, technology enabled consumers to choose from an increasingly diverse set of energy sources.

In this lies a simple fact: good, practical options to meet people's energy needs continue to expand.

The need for energy will continue to grow as economies expand, living standards rise and the world's population grows by more than 25 percent through 2040. Global demand for energy is projected to rise by about 35 percent from 2010 to 2040.

To meet this demand in the most effective and economic way, none of our energy options should be arbitrarily denied, dismissed, penalized or promoted. And free trade opportunities should be facilitated – not curtailed.

Governments must continue to foster the innovation and free markets that have always been the source of benefits for individuals and societies. Both public and private institutions can assist this process by promoting information sharing, sound cost/benefit analysis, and transparent legislative and regulatory processes. These elements are important for promoting economic growth, competitiveness, energy security and environmental protection.

Free markets supported by reliable public policies remain essential to creating economic opportunities and encouraging the private-sector investments that are critical to meeting people's energy needs. According to the IEA, energy investments worldwide will need to total about $37 trillion over 2012 to 2035.

Individuals will also continue to play a major role in shaping the energy future as they make choices in pursuing their personal needs and ambitions.

One of the significant choices being made by energy consumers is their continued adoption of energy-saving behaviors and technologies. Whether that choice is a more advanced wood-burning stove, LED lighting, a next-generation laptop computer, lightweight materials or a hybrid vehicle, gains in efficiency are one of the most effective ways to ensure the continued flow of reliable and affordable energy as our population grows and prosperity expands.

Since everyone needs energy, it is important that everyone understands the challenges related to these energy needs. Deepening public understanding of energy issues is our goal in publishing the *Outlook* for Energy each year. Ensuring that people have access to the energy they need to improve their lives motivates our work.

Meeting the world's energy challenges means helping billions of people raise their living standards, while also reducing the impact of energy use on the environment.

The scale of our world's energy challenges is enormous, but so is human capacity for innovation and the will to succeed. By expanding technology and energy options – and by creating the political and fiscal environments that allow innovation and market solutions to thrive – we are optimistic that the world will be able to safely and responsibly expand prosperity and security.

2014 Outlook data

Energy Demand (quadrillion BTUs)						Average Annual Change			% Change					
						2010	2025	2010	2010	2025	2010	Share of Total		
Regions	1990	2000	2010	2025	2040	2025	2040	2040	2025	2040	2040	2010	2025	2040
World	361	418	523	654	710	1.5%	0.5%	1.0%	25%	9%	36%	100%	100%	100%
OECD	190	226	230	232	222	0.1%	-0.3%	-0.1%	1%	-5%	-4%	44%	36%	31%
Non OECD	170	193	292	421	488	2.5%	1.0%	1.7%	44%	16%	67%	56%	64%	69%
Africa	17	22	29	43	60	2.7%	2.2%	2.4%	48%	38%	105%	6%	7%	8%
Asia Pacific	91	128	200	289	321	2.5%	0.7%	1.6%	45%	11%	60%	38%	44%	45%
China	34	48	96	148	147	2.9%	-0.0%	1.4%	53%	-1%	52%	18%	23%	21%
India	13	19	28	49	68	3.8%	2.3%	3.0%	76%	40%	146%	5%	7%	10%
Europe	74	78	81	79	74	-0.2%	-0.4%	-0.3%	-3%	-6%	-9%	16%	12%	10%
European Union	68	72	73	69	63	-0.4%	-0.6%	-0.5%	-6%	-8%	-13%	14%	11%	9%
Latin America	15	20	27	37	46	2.1%	1.5%	1.8%	37%	25%	72%	5%	6%	6%
Middle East	11	18	30	42	52	2.3%	1.4%	1.9%	42%	23%	74%	6%	6%	7%
North America	95	114	113	117	112	0.2%	-0.3%	-0.0%	3%	-4%	-1%	22%	18%	16%
United States	81	96	94	93	88	-0.1%	-0.3%	-0.2%	-1%	-5%	-6%	18%	14%	12%
Russia/Caspian	58	38	42	47	45	0.7%	-0.2%	0.2%	10%	-3%	7%	8%	7%	6%
Energy by Type — World														
Primary	361	418	523	654	710	1.5%	0.5%	1.0%	25%	9%	36%	100%	100%	100%
Oil	137	158	178	206	221	1.0%	0.5%	0.7%	15%	7%	24%	34%	31%	31%
Gas	72	89	115	159	190	2.2%	1.2%	1.7%	38%	19%	64%	22%	24%	27%
Coal	86	93	133	158	133	1.1%	-1.1%	0.0%	19%	-16%	0%	26%	24%	19%
Nuclear	21	27	29	40	59	2.3%	2.6%	2.5%	41%	47%	109%	5%	6%	8%
Biomass/Waste	35	40	48	56	55	0.9%	-0.1%	0.4%	15%	-2%	13%	9%	9%	8%
Hydro	7	9	12	17	21	2.4%	1.5%	2.0%	43%	26%	80%	2%	3%	3%
Other Renewables	1	3	7	18	30	6.3%	3.5%	4.9%	151%	68%	322%	1%	3%	4%
End-Use Sectors — World Residential/Commercial														
Total	87	98	115	137	148	1.2%	0.5%	0.8%	19%	8%	28%	100%	100%	100%
Oil	13	16	15	16	16	0.4%	-0.0%	0.2%	6%	-1%	6%	13%	12%	11%
Gas	17	21	24	30	33	1.4%	0.6%	1.0%	23%	9%	35%	21%	22%	22%
Biomass/Waste	26	29	33	34	28	0.1%	-1.1%	-0.5%	2%	-15%	-14%	29%	25%	19%
Electricity	16	23	32	46	60	2.5%	1.8%	2.1%	44%	30%	88%	28%	34%	41%
Other	15	10	11	11	11	0.3%	-0.4%	-0.0%	5%	-6%	-1%	9%	8%	7%
Transportation														
Total	65	81	99	121	140	1.4%	1.0%	1.2%	23%	15%	42%	100%	100%	100%
Oil	64	79	94	111	122	1.1%	0.6%	0.9%	18%	10%	30%	95%	92%	87%
Biofuels	0	0	3	5	8	4.3%	3.3%	3.8%	89%	62%	206%	3%	4%	6%
Gas	0	0	1	3	7	8.9%	5.3%	7.1%	260%	117%	681%	1%	3%	5%
Other	1	1	1	1	2	1.8%	2.7%	2.3%	31%	49%	95%	1%	1%	1%
Industrial														
Total	139	151	193	245	260	1.6%	0.4%	1.0%	27%	6%	35%	100%	100%	100%
Oil	46	50	58	69	76	1.1%	0.7%	0.9%	18%	10%	31%	30%	28%	29%
Gas	31	37	44	59	68	1.9%	1.0%	1.4%	33%	15%	54%	23%	24%	26%
Coal	29	28	42	48	36	1.0%	-1.9%	-0.5%	16%	-26%	-14%	22%	20%	14%
Electricity	18	22	30	48	58	3.0%	1.3%	2.2%	57%	22%	91%	16%	19%	22%
Other	15	14	17	21	21	1.1%	0.0%	0.5%	17%	0%	18%	9%	8%	8%
Power Generation — World														
Primary	118	144	192	258	294	2.0%	0.9%	1.4%	34%	14%	53%	100%	100%	100%
Oil	15	12	11	9	7	-0.9%	-2.3%	-1.6%	-13%	-29%	-39%	6%	4%	2%
Gas	24	31	46	67	81	2.5%	1.4%	1.9%	46%	22%	78%	24%	26%	28%
Coal	48	62	87	106	95	1.3%	-0.7%	0.3%	22%	-10%	9%	45%	41%	32%
Nuclear	21	27	29	40	59	2.3%	2.6%	2.5%	41%	47%	109%	15%	16%	20%
Hydro	7	9	12	17	21	2.4%	1.5%	2.0%	43%	26%	80%	6%	7%	7%
Wind	0	0	1	5	10	10.6%	4.3%	7.4%	351%	87%	744%	1%	2%	3%
Other Renewables	3	4	7	14	20	4.5%	2.6%	3.6%	95%	48%	188%	4%	5%	7%
Electricity Demand (Terawatt Hours)														
World	10135	13212	18548	27854	35242	2.7%	1.6%	2.2%	50%	27%	90%	100%	100%	100%
OECD	6657	8604	9678	11105	11881	0.9%	0.5%	0.7%	15%	7%	23%	52%	40%	34%
Non OECD	3478	4608	8870	16749	23361	4.3%	2.2%	3.3%	89%	39%	163%	48%	60%	66%
Energy-Related CO_2 Emissions (Billion Tonnes)														
World	21.4	23.9	30.6	36.8	36.3	1.2%	-0.1%	0.6%	20%	-1%	19%	100%	100%	100%
OECD	11.3	12.8	12.8	11.8	9.7	-0.6%	-1.2%	-0.9%	-8%	-17%	-24%	42%	32%	27%
Non OECD	10.1	11.1	17.8	25.0	26.6	2.3%	0.4%	1.4%	41%	6%	50%	58%	68%	73%
GDP (2005$, Trillion)														
World	30	40	51	79	117	2.9%	2.7%	2.8%	54%	48%	128%	100%	100%	100%
OECD	25	32	38	51	68	2.0%	1.9%	2.0%	35%	33%	80%	74%	65%	58%
Non OECD	5	7	13	28	49	5.0%	3.8%	4.4%	107%	75%	263%	26%	35%	42%
Africa	1	1	1	2	4	4.1%	3.8%	3.9%	83%	74%	219%	2%	3%	3%
Asia Pacific	6	9	14	26	43	4.2%	3.4%	3.8%	86%	66%	209%	27%	33%	37%
China	1	1	4	10	19	6.8%	4.3%	5.5%	167%	88%	403%	7%	13%	16%
India	0	1	1	3	6	5.9%	4.9%	5.4%	136%	106%	386%	2%	4%	5%
Europe	11	14	16	20	26	1.6%	1.7%	1.7%	28%	29%	65%	31%	26%	22%
European Union	10	13	14	18	23	1.5%	1.6%	1.6%	25%	27%	59%	28%	23%	20%
Latin America	1	2	2	4	6	3.5%	2.9%	3.2%	68%	54%	158%	5%	5%	5%
Middle East	1	1	1	2	4	3.8%	3.1%	3.5%	76%	58%	178%	3%	3%	3%
North America	9	13	15	22	31	2.5%	2.3%	2.4%	45%	40%	103%	30%	28%	26%
United States	8	11	13	19	26	2.4%	2.2%	2.3%	43%	39%	99%	26%	24%	22%
Russia/Caspian	1	1	1	2	3	3.7%	2.8%	3.2%	71%	52%	160%	2%	3%	3%
Energy Intensity (Thousand BTU per $ GDP)														
World	11.9	10.5	10.2	8.3	6.1	-1.4%	-2.1%	-1.7%	-19%	-27%	-41%			
OECD	7.7	7.0	6.1	4.6	3.3	-1.9%	-2.2%	-2.1%	-25%	-28%	-47%			
Non OECD	31.3	26.2	21.8	15.1	10.0	-2.4%	-2.7%	-2.6%	-30%	-34%	-54%			

Rounding of data in the Outlook may result in slight differences between totals and the sum of individual components.

Energy Demand (quadrillion BTUs)						Average Annual Change			% Change					
OECD						2010	2025	2010	2010	2025	2010	Share of Total		
Energy by Type	1990	2000	2010	2025	2040	2025	2040	2040	2025	2040	2040	2010	2025	2040
Primary	190	226	230	232	222	0.1%	-0.3%	-0.1%	1%	-5%	-4%	100%	100%	100%
Oil	85	98	94	87	79	-0.5%	-0.6%	-0.6%	-7%	-9%	-15%	41%	37%	36%
Gas	35	47	54	65	69	1.3%	0.4%	0.8%	21%	6%	28%	23%	28%	31%
Coal	42	43	42	30	15	-2.3%	-4.3%	-3.3%	-29%	-48%	-63%	18%	13%	7%
Nuclear	18	23	24	26	29	0.8%	0.6%	0.7%	12%	10%	23%	10%	11%	13%
Biomass/Waste	6	7	9	10	9	1.0%	-0.6%	0.2%	16%	-9%	6%	4%	4%	4%
Hydro	4	5	5	5	5	0.7%	0.3%	0.5%	11%	4%	15%	2%	2%	2%
Other Renewables	1	2	4	10	15	5.4%	3.0%	4.2%	121%	55%	242%	2%	4%	7%
End-Use Sectors														
Residential/Commercial														
Total	39	46	50	51	50	0.1%	-0.1%	-0.0%	1%	-2%	-0%	100%	100%	100%
Oil	9	9	7	5	4	-2.3%	-2.3%	-2.3%	-29%	-30%	-50%	15%	10%	7%
Gas	12	16	17	17	17	0.2%	-0.3%	-0.0%	4%	-5%	-1%	34%	34%	33%
Biomass/Waste	2	2	3	2	2	-0.4%	-1.7%	-1.1%	-6%	-23%	-27%	5%	5%	4%
Electricity	12	17	21	23	25	0.7%	0.6%	0.6%	11%	9%	20%	42%	45%	50%
Other	4	2	3	3	3	0.4%	0.2%	0.3%	6%	3%	9%	5%	5%	6%
Transportation														
Total	45	55	58	56	55	-0.2%	-0.2%	-0.2%	-3%	-2%	-5%	100%	100%	100%
Oil	44	54	55	52	49	-0.4%	-0.5%	-0.4%	-6%	-7%	-12%	96%	93%	89%
Biofuels	0	0	2	3	4	3.1%	2.0%	2.5%	58%	34%	111%	3%	5%	7%
Gas	0	0	0	1	2	11.9%	6.3%	9.0%	440%	149%	1242%	0%	1%	3%
Other	0	0	0	0	1	0.6%	3.3%	1.9%	9%	62%	76%	1%	1%	1%
Industrial														
Total	64	72	69	72	70	0.3%	-0.2%	0.1%	5%	-3%	2%	100%	100%	100%
Oil	26	29	28	27	26	-0.2%	-0.3%	-0.2%	-3%	-4%	-7%	41%	38%	37%
Gas	15	18	17	21	22	1.4%	0.1%	0.7%	23%	1%	25%	25%	29%	31%
Coal	10	8	7	5	3	-2.9%	-3.0%	-3.0%	-36%	-37%	-59%	10%	6%	4%
Electricity	10	12	12	14	15	1.3%	0.2%	0.8%	22%	3%	25%	17%	20%	21%
Other	3	4	4	5	5	0.7%	-0.4%	0.2%	11%	-5%	6%	6%	7%	7%
Power Generation														
Primary	67	84	90	94	90	0.3%	-0.3%	-0.0%	4%	-4%	-0%	100%	100%	100%
Oil	6	5	3	2	1	-1.4%	-6.4%	-3.9%	-19%	-63%	-70%	3%	3%	1%
Gas	8	13	20	25	29	1.8%	0.9%	1.3%	30%	14%	48%	22%	27%	32%
Coal	30	35	34	24	12	-2.2%	-4.7%	-3.4%	-28%	-51%	-65%	38%	26%	13%
Nuclear	18	23	24	26	29	0.8%	0.6%	0.7%	12%	10%	23%	26%	28%	32%
Hydro	4	5	5	5	5	0.7%	0.3%	0.5%	11%	4%	15%	5%	5%	6%
Wind	0	0	1	3	6	8.7%	4.1%	6.4%	250%	83%	540%	1%	3%	7%
Other Renewables	2	3	4	7	8	2.9%	0.9%	1.9%	54%	14%	76%	5%	7%	9%
Non OECD														
Energy by Type														
Primary	170	193	292	421	488	2.5%	1.0%	1.7%	44%	16%	67%	100%	100%	100%
Oil	53	59	85	119	142	2.3%	1.2%	1.7%	41%	19%	68%	29%	28%	29%
Gas	37	42	62	94	121	2.9%	1.7%	2.3%	53%	28%	96%	21%	22%	25%
Coal	44	50	91	128	118	2.3%	-0.6%	0.9%	40%	-8%	29%	31%	30%	24%
Nuclear	3	4	5	14	30	7.2%	5.4%	6.3%	183%	119%	519%	2%	3%	6%
Biomass/Waste	30	33	40	45	45	0.9%	-0.0%	0.5%	15%	-0%	15%	14%	11%	9%
Hydro	3	4	7	12	16	3.3%	2.0%	2.7%	64%	35%	122%	2%	3%	3%
Other Renewables	0	1	3	9	16	7.5%	4.1%	5.8%	196%	83%	441%	1%	2%	3%
End-Use Sectors														
Residential/Commercial														
Total	48	52	65	86	98	1.9%	0.8%	1.4%	33%	13%	50%	100%	100%	100%
Oil	5	6	8	11	12	2.3%	0.8%	1.5%	40%	13%	58%	12%	13%	13%
Gas	4	5	8	13	16	3.5%	1.7%	2.6%	67%	28%	115%	12%	15%	17%
Biomass/Waste	24	27	30	31	27	0.2%	-1.1%	-0.4%	3%	-15%	-12%	47%	36%	27%
Electricity	3	6	11	23	35	5.0%	2.8%	3.9%	106%	52%	213%	17%	27%	36%
Other	12	8	8	9	8	0.3%	-0.6%	-0.2%	5%	-9%	-5%	13%	10%	8%
Transportation														
Total	20	26	41	65	85	3.1%	1.8%	2.5%	58%	31%	107%	100%	100%	100%
Oil	19	25	39	59	74	2.9%	1.5%	2.2%	53%	24%	90%	94%	91%	87%
Biofuels	0	0	1	2	5	6.2%	4.6%	5.4%	148%	96%	386%	2%	4%	5%
Gas	0	0	1	3	5	8.3%	5.0%	6.6%	230%	109%	588%	2%	4%	6%
Other	1	0	1	1	1	2.5%	2.4%	2.4%	45%	43%	106%	2%	1%	2%
Industrial														
Total	76	79	124	173	190	2.2%	0.6%	1.4%	39%	10%	53%	100%	100%	100%
Oil	20	21	30	42	50	2.2%	1.2%	1.7%	39%	20%	66%	24%	24%	27%
Gas	16	19	27	38	47	2.2%	1.4%	1.8%	40%	24%	73%	22%	22%	25%
Coal	19	19	35	44	33	1.6%	-1.8%	-0.1%	26%	-24%	-4%	28%	25%	18%
Electricity	8	9	19	33	43	4.0%	1.8%	2.9%	79%	31%	134%	15%	19%	23%
Other	12	10	13	16	16	1.2%	0.1%	0.7%	19%	2%	21%	11%	9%	8%
Power Generation														
Primary	51	60	102	164	204	3.2%	1.5%	2.3%	61%	24%	100%	100%	100%	100%
Oil	9	7	8	7	6	-0.7%	-1.3%	-1.0%	-11%	-18%	-27%	8%	4%	3%
Gas	17	17	26	41	53	3.1%	1.6%	2.3%	57%	28%	100%	26%	25%	26%
Coal	18	27	53	81	83	2.9%	0.1%	1.5%	53%	2%	57%	52%	50%	41%
Nuclear	3	4	5	14	30	7.2%	5.4%	6.3%	183%	119%	519%	5%	8%	15%
Hydro	3	4	7	12	16	3.3%	2.0%	2.7%	64%	35%	122%	7%	7%	8%
Wind	0	0	0	2	4	15.1%	4.5%	9.7%	723%	94%	1499%	0%	1%	2%
Other Renewables	1	1	3	7	12	6.7%	4.1%	5.4%	165%	82%	381%	3%	4%	6%

2014 Outlook data

Energy Demand (quadrillion BTUs) unless otherwise indicated						Average Annual Change			% Change					
Regions						2010	2025	2010	2010	2025	2010	Share of Total		
AFRICA	**1990**	**2000**	**2010**	**2025**	**2040**	**2025**	**2040**	**2040**	**2025**	**2040**	**2040**	**2010**	**2025**	**2040**
Primary	17	22	29	43	60	2.7%	2.2%	2.4%	48%	38%	105%	100%	100%	100%
Oil	4	5	7	12	18	3.7%	2.6%	3.1%	73%	47%	153%	24%	28%	30%
Gas	2	4	5	8	12	3.6%	2.6%	3.1%	69%	47%	149%	16%	18%	20%
Coal	3	3	4	6	9	2.3%	3.4%	2.9%	41%	66%	135%	14%	13%	16%
Nuclear	0	0	0	0	1	4.5%	11.1%	7.7%	93%	386%	838%	0%	1%	2%
Biomass/Waste	8	10	13	16	17	1.4%	0.5%	1.0%	23%	8%	33%	45%	37%	29%
Hydro	0	0	0	1	2	7.6%	3.3%	5.4%	200%	63%	387%	1%	2%	3%
Other Renewables	0	0	0	0	1	12.9%	5.8%	9.3%	517%	134%	1347%	0%	1%	1%
End-Use Demand (including electricity)														
Total End-Use	16	20	25	37	48	2.4%	1.9%	2.2%	43%	33%	90%	100%	100%	100%
Residential/Commercial	7	9	13	18	22	2.2%	1.5%	1.9%	40%	25%	74%	49%	48%	45%
Transportation	2	3	4	7	10	3.7%	2.7%	3.2%	73%	49%	157%	15%	18%	20%
Industrial	7	8	9	12	17	2.1%	2.0%	2.1%	36%	35%	84%	36%	34%	34%
Memo: Electricity Demand	1	1	2	4	9	5.5%	4.6%	5.1%	124%	96%	339%	8%	12%	18%
Power Generation Fuel	3	4	6	11	20	4.6%	4.0%	4.3%	97%	79%	253%	19%	26%	33%
CO_2 Emissions, B Tonnes	0.7	0.9	1.1	1.8	2.8	3.2%	2.8%	3.0%	59%	52%	142%			
ASIA PACIFIC														
Primary	91	128	200	289	321	2.5%	0.7%	1.6%	45%	11%	60%	100%	100%	100%
Oil	29	43	57	75	85	1.8%	0.8%	1.3%	31%	13%	48%	28%	26%	26%
Gas	6	11	21	41	57	4.6%	2.2%	3.4%	95%	39%	171%	11%	14%	18%
Coal	32	45	88	120	107	2.1%	-0.8%	0.7%	37%	-11%	22%	44%	41%	33%
Nuclear	3	5	6	15	28	6.3%	4.3%	5.3%	151%	88%	371%	3%	5%	9%
Biomass/Waste	19	20	22	25	23	0.8%	-0.5%	0.1%	12%	-8%	3%	11%	9%	7%
Hydro	1	2	4	7	9	3.8%	2.3%	3.0%	75%	40%	145%	2%	2%	3%
Other Renewables	0	1	2	7	12	7.8%	3.7%	5.7%	209%	72%	429%	1%	2%	4%
End-Use Demand (including electricity)														
Total End-Use	76	101	151	212	231	2.3%	0.6%	1.4%	40%	9%	53%	100%	100%	100%
Residential/Commercial	28	33	41	54	59	1.8%	0.6%	1.2%	30%	9%	42%	27%	25%	25%
Transportation	11	18	27	40	52	2.8%	1.7%	2.3%	52%	29%	96%	18%	19%	23%
Industrial	36	50	83	118	120	2.4%	0.2%	1.3%	42%	2%	45%	55%	56%	52%
Memo: Electricity Demand	7	12	24	44	58	4.0%	1.9%	2.9%	81%	32%	139%	16%	21%	25%
Power Generation Fuel	23	41	77	125	151	3.3%	1.3%	2.3%	63%	21%	98%	38%	43%	47%
CO_2 Emissions, B Tonnes	5.3	7.7	13.1	18.3	18.3	2.2%	0.0%	1.1%	39%	0%	40%			
EUROPE														
Primary	74	78	81	79	74	-0.2%	-0.4%	-0.3%	-3%	-6%	-9%	100%	100%	100%
Oil	30	32	31	27	25	-0.8%	-0.5%	-0.7%	-12%	-7%	-19%	38%	34%	34%
Gas	13	17	20	21	21	0.3%	0.1%	0.2%	5%	1%	6%	24%	26%	28%
Coal	19	14	13	10	5	-1.3%	-4.2%	-2.8%	-18%	-48%	-57%	15%	13%	7%
Nuclear	8	10	10	10	10	-0.2%	0.3%	0.1%	-3%	4%	2%	12%	12%	13%
Biomass/Waste	2	3	5	6	5	1.1%	-0.5%	0.3%	17%	-8%	9%	6%	7%	7%
Hydro	2	2	2	2	2	-0.1%	0.2%	0.0%	-2%	2%	1%	3%	3%	3%
Other Renewables	0	0	2	4	6	5.6%	2.4%	4.0%	126%	43%	222%	2%	5%	7%
End-Use Demand (including electricity)														
Total End-Use	57	61	64	62	60	-0.2%	-0.2%	-0.2%	-3%	-4%	-6%	100%	100%	100%
Residential/Commercial	17	18	21	21	20	0.1%	-0.3%	-0.1%	1%	-4%	-3%	33%	34%	34%
Transportation	14	17	19	18	18	-0.2%	-0.0%	-0.1%	-3%	-0%	-4%	29%	29%	30%
Industrial	26	25	24	23	22	-0.4%	-0.4%	-0.4%	-5%	-5%	-11%	38%	37%	36%
Memo: Electricity Demand	9	10	12	13	13	0.6%	0.2%	0.4%	9%	3%	13%	18%	21%	22%
Power Generation Fuel	27	29	32	32	30	0.1%	-0.6%	-0.3%	1%	-8%	-7%	39%	41%	40%
CO_2 Emissions, B Tonnes	4.5	4.3	4.3	3.9	3.2	-0.7%	-1.3%	-1.0%	-10%	-18%	-26%			
LATIN AMERICA														
Primary	15	20	27	37	46	2.1%	1.5%	1.8%	37%	25%	72%	100%	100%	100%
Oil	8	10	12	16	18	1.8%	0.7%	1.3%	31%	11%	45%	46%	44%	39%
Gas	3	4	6	9	13	2.9%	2.7%	2.8%	53%	49%	127%	22%	24%	29%
Coal	1	1	1	1	1	1.6%	0.5%	1.0%	27%	7%	36%	3%	3%	3%
Nuclear	0	0	0	0	0	3.5%	1.6%	2.5%	68%	26%	112%	1%	1%	1%
Biomass/Waste	3	3	4	5	5	0.7%	0.5%	0.6%	11%	9%	20%	16%	13%	11%
Hydro	1	2	2	3	4	2.3%	1.3%	1.8%	41%	21%	71%	9%	9%	9%
Other Renewables	0	0	1	2	4	5.4%	4.5%	5.0%	120%	94%	326%	4%	6%	9%
End-Use Demand (including electricity)														
Total End-Use	14	18	24	32	41	2.1%	1.5%	1.8%	37%	26%	72%	100%	100%	100%
Residential/Commercial	3	4	4	6	6	1.7%	1.0%	1.4%	29%	17%	51%	18%	17%	16%
Transportation	4	5	7	11	13	2.6%	1.3%	2.0%	48%	21%	79%	31%	33%	32%
Industrial	7	9	12	16	21	1.9%	1.8%	1.9%	33%	32%	75%	51%	50%	52%
Memo: Electricity Demand	1	2	3	5	7	3.1%	2.3%	2.7%	58%	41%	123%	13%	15%	17%
Power Generation Fuel	3	4	6	9	12	2.6%	1.9%	2.3%	48%	33%	97%	23%	25%	27%
CO_2 Emissions, B Tonnes	0.7	0.9	1.2	1.7	2.0	2.0%	1.3%	1.6%	35%	21%	63%			

Energy Demand (quadrillion BTUs) Regions						Average Annual Change			% Change					
						2010	2025	2010	2010	2025	2010	Share of Total		
MIDDLE EAST	**1990**	**2000**	**2010**	**2025**	**2040**	**2025**	**2040**	**2040**	**2025**	**2040**	**2040**	**2010**	**2025**	**2040**
Primary	11	18	30	42	52	2.3%	1.4%	1.9%	42%	23%	74%	100%	100%	100%
Oil	7	11	16	20	24	1.7%	1.0%	1.4%	29%	16%	50%	53%	48%	46%
Gas	4	7	13	21	25	2.9%	1.2%	2.1%	54%	20%	84%	45%	49%	48%
Coal	0	0	0	0	0	-10.1%	-6.3%	-8.2%	-80%	-62%	-92%	1%	0%	0%
Nuclear	0	0	0	0	2	-	10.8%	-	-	366%	-	0%	1%	4%
Biomass/Waste	0	0	0	0	0	7.4%	6.8%	7.1%	193%	168%	686%	0%	0%	0%
Hydro	0	0	0	0	0	4.8%	3.2%	4.0%	103%	60%	226%	0%	0%	0%
Other Renewables	0	0	0	0	1	12.3%	6.4%	9.3%	469%	152%	1334%	0%	1%	1%
End-Use Demand (including electricity)														
Total End-Use	9	14	23	33	42	2.5%	1.5%	2.0%	44%	26%	81%	100%	100%	100%
Residential/Commercial	1	3	4	7	9	2.8%	1.6%	2.2%	51%	28%	93%	19%	20%	20%
Transportation	3	4	7	9	11	2.0%	1.4%	1.7%	35%	23%	66%	28%	26%	26%
Industrial	5	8	12	18	22	2.6%	1.6%	2.1%	46%	26%	84%	53%	54%	54%
Memo: Electricity Demand	1	1	2	5	7	4.8%	2.2%	3.5%	102%	38%	178%	11%	15%	17%
Power Generation Fuel	3	5	9	14	17	2.8%	1.3%	2.1%	52%	22%	85%	31%	33%	33%
CO_2 Emissions, B Tonnes	0.7	1.1	1.8	2.3	2.6	1.7%	0.7%	1.2%	29%	11%	43%			
NORTH AMERICA														
Primary	95	114	113	117	112	0.2%	-0.3%	-0.0%	3%	-4%	-1%	100%	100%	100%
Oil	42	49	47	46	43	-0.2%	-0.5%	-0.3%	-3%	-7%	-10%	42%	39%	38%
Gas	21	26	28	35	37	1.6%	0.5%	1.0%	26%	7%	36%	24%	30%	33%
Coal	20	23	21	14	6	-2.6%	-5.4%	-4.0%	-32%	-56%	-70%	19%	12%	6%
Nuclear	7	9	10	11	13	0.8%	1.1%	0.9%	12%	18%	33%	9%	9%	11%
Biomass/Waste	3	4	3	4	3	0.4%	-1.1%	-0.4%	7%	-16%	-10%	3%	3%	3%
Hydro	2	2	2	3	3	1.3%	0.3%	0.8%	21%	4%	26%	2%	2%	3%
Other Renewables	1	1	2	5	7	5.0%	3.2%	4.1%	107%	60%	231%	2%	4%	7%
End-Use Demand (including electricity)														
Total End-Use	73	86	86	91	89	0.3%	-0.1%	0.1%	5%	-2%	4%	100%	100%	100%
Residential/Commercial	18	22	23	23	23	0.2%	0.0%	0.1%	3%	1%	3%	26%	26%	26%
Transportation	25	31	32	32	31	-0.0%	-0.1%	-0.1%	-1%	-2%	-3%	37%	35%	35%
Industrial	30	34	32	36	35	0.8%	-0.2%	0.3%	13%	-3%	10%	37%	39%	39%
Memo: Electricity Demand	11	15	16	19	20	1.1%	0.6%	0.9%	19%	9%	30%	18%	21%	23%
Power Generation Fuel	33	42	43	45	43	0.3%	-0.2%	0.0%	4%	-3%	1%	38%	38%	39%
CO_2 Emissions, B Tonnes	5.6	6.6	6.5	6.1	5.0	-0.4%	-1.3%	-0.8%	-6%	-18%	-22%			
RUSSIA/CASPIAN														
Primary	58	38	42	47	45	0.7%	-0.2%	0.2%	10%	-3%	7%	100%	100%	100%
Oil	18	8	9	10	10	0.9%	0.1%	0.5%	14%	1%	14%	20%	21%	22%
Gas	23	20	23	25	25	0.5%	-0.1%	0.2%	8%	-2%	7%	54%	53%	54%
Coal	13	7	7	7	4	0.1%	-2.7%	-1.3%	1%	-34%	-33%	16%	15%	10%
Nuclear	2	2	3	4	5	2.2%	1.3%	1.7%	38%	21%	67%	6%	8%	10%
Biomass/Waste	1	0	0	0	1	0.9%	0.3%	0.6%	15%	5%	21%	1%	1%	1%
Hydro	1	1	1	1	1	0.3%	0.4%	0.3%	4%	6%	10%	2%	2%	2%
Other Renewables	0	0	0	0	0	10.9%	6.0%	8.4%	372%	141%	1036%	0%	0%	1%
End-Use Demand (including electricity)														
Total End-Use	46	29	34	37	36	0.6%	-0.1%	0.2%	10%	-2%	8%	100%	100%	100%
Residential/Commercial	12	9	9	9	9	0.3%	-0.5%	-0.1%	4%	-8%	-4%	27%	26%	24%
Transportation	6	3	4	5	5	1.3%	0.2%	0.8%	22%	3%	26%	12%	13%	14%
Industrial	29	17	20	22	22	0.6%	-0.0%	0.3%	10%	-1%	9%	61%	61%	62%
Memo: Electricity Demand	5	3	4	5	6	2.0%	0.8%	1.4%	34%	13%	51%	12%	15%	17%
Power Generation Fuel	27	19	19	21	20	0.6%	-0.4%	0.1%	9%	-6%	3%	46%	45%	44%
CO_2 Emissions, B Tonnes	3.9	2.3	2.5	2.7	2.4	0.4%	-0.7%	-0.1%	7%	-10%	-4%			

Glossary

Billions of cubic feet per day (BCFD): This is used to define volumes of natural gas. One billion cubic feet per day of natural gas is enough to meet about 2 percent of the natural gas used in homes around the world. Six billion cubic feet per day of natural gas is equivalent to about 1 million oil-equivalent barrels per day.

BTU: British thermal unit. A BTU is a standard unit of energy that can be used to measure any type of energy source. The energy content of one gallon of gasoline is about 125,000 BTUs. "Quad" refers to a quadrillion BTUs.

Millions of oil-equivalent barrels per day (MBDOE): This term provides a standardized unit of measure for different types of energy sources (oil, gas, coal, etc.) based on energy content relative to a typical barrel of oil. One million oil-equivalent barrels per day is enough energy to fuel about 5 percent of the light duty vehicles on the world's roads today.

Primary energy: Includes energy in the form of oil, natural gas, coal, nuclear, hydro, geothermal, wind, solar and bioenergy sources (biofuels, municipal solid waste, traditional biomass). Does not include electricity and market heat, which are secondary energy types reflecting conversion/production from primary energy sources.

Watt: A unit of electrical power, equal to one joule per second. A 1-gigawatt power plant can meet the electricity demand of more than 500,000 homes in the U.S. (Kilowatt (KW) = 1,000 watts; Gigawatt (GW) = 1,000,000,000 watts; Terawatt (TW) = 10^{12} watts). 300 terawatt hours is equivalent to about 1 quadrillion BTUs (Quad).

The Outlook for Energy includes Exxon Mobil Corporation's internal estimates and forecasts of energy demand, supply, and trends through 2040 based upon internal data and analyses as well as publicly available information from external sources including the International Energy Agency. This report includes forward looking statements. Actual future conditions and results (including energy demand, energy supply, the relative mix of energy across sources, economic sectors and geographic regions, imports and exports of energy) could differ materially due to changes in economic conditions, technology, the development of new supply sources, political events, demographic changes, and other factors discussed herein and under the heading "Factors Affecting Future Results" in the Investors section of our website at www.exxonmobil.com.

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