2013

ExxonMobil

Taking on the world's toughest energy challenges.™

THE OUTLOOK FOR ENERGY: A VIEW TO 2040

Contents

This report includes forward-looking statements. Actual future conditions (including economic conditions, energy demand, and energy supply) could differ materially due to changes in 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**. The information provided includes ExxonMobil’s internal estimates and forecasts based upon internal data and analyses as well as publicly available information from external sources including the International Energy Agency.

The Outlook for Energy: A View to 2040

The Outlook for Energy **is ExxonMobil's long-term view of our shared energy future. We develop the *Outlook* annually to assess future trends in energy supply, demand and technology to help guide the long-term investments that underpin our business strategy.**

This year's *Outlook* reveals a number of key findings about how we use energy, how much we will need in the future and what types of fuels will meet demand. For example:

- **Efficiency will continue to play a key role in solving our energy challenges.** Energy-saving practices and technologies, such as hybrid vehicles and high-efficiency natural gas power plants, will help countries in the Organization for Economic Cooperation and Development (OECD) – including those in North America and Europe – keep energy use essentially flat even as OECD economic output grows 80 percent.

- **Energy demand in developing nations (Non OECD) will rise 65 percent by 2040 compared to 2010, reflecting growing prosperity and expanding economies.** Overall, global energy demand will grow 35 percent, even with significant efficiency gains, as the world's population expands from about 7 billion people today to nearly 9 billion people by 2040, led by growth in Africa and India.

- **With this growth comes a greater demand for electricity.** Today, and over the next few decades, electricity generation represents the largest driver of demand for energy. Through 2040, it will account for more than half of the increase in global energy demand.

- **Growth in transportation sector demand will be led by expanding commercial activity as our economies grow.** However, energy consumed by personal vehicles will gradually peak and then begin to fall as our cars, sports utility vehicles (SUVs) and small pickup trucks become much more fuel-efficient.

- **Technology is enabling the safe development of once hard-to-produce energy resources,** significantly expanding available supplies to meet the world's changing energy needs. **Oil will remain the No. 1 global fuel, while natural gas will overtake coal for the No. 2 spot.** Use of nuclear power and renewable energy will grow, while demand for coal peaks and then begins a gradual decline.

- **Evolving demand and supply patterns will open the door for increased global trade opportunities.** Around 2030, the nations of North America will likely transition from a net *importer* to a net *exporter* of oil and oil-based products. The changing energy landscape and the resulting trade opportunities it affords will continue to provide consumers with more choices, more value, more wealth and more good jobs (see page 44).

The *Outlook* provides a window to the future, a view that we use to help guide our own strategies and investments. Over the next five years, ExxonMobil expects to invest approximately $185 billion in energy projects. Given the magnitude of our investments, it's critical that we take an objective and data-driven approach to ensure that we have the most accurate picture of energy trends.

The information contained in the *Outlook* regarding energy markets is also crucial for individuals, businesses and policymakers. We hope that by sharing this *Outlook*, we can enhance understanding of energy issues so that we can all make informed decisions about our energy future.

Global fundamentals

Our world runs on energy – it's fundamental to our way of life and growing our economy. Energy is essential for everything from fueling our cars to heating our homes to powering the appliances we depend on daily. But the world is changing. An expanding population, economic growth, new technology development and changes in the nature and scope of regulations are all transforming the energy landscape. We are becoming more energy-efficient and moving to cleaner fuels. At the same time, modern technology is developing new resources and making energy more affordable, all while creating new jobs and expanding trade around the world.

9 billion

The world's population will rise by more than 25 percent from 2010 to 2040, reaching nearly 9 billion.

2010 2040

Expanding prosperity across a rising population drives global energy demand

An additional 2 billion people worldwide by 2040 means growing mobility requirements, rising electricity needs for homes and other buildings, and increasing energy supplies to power industry

The majority of population growth is increasingly concentrated in Africa, India and most other developing countries, while growth in China and the OECD countries remains relatively modest. We expect global population growth to slow around 2025 as the number of children born per woman declines in the developing world even as life expectancy increases. India's population grows over 300 million between 2010 and 2040, and Africa's population grows by about 800 million people.

Total world households will be up almost 50 percent, with 90 percent of the growth occurring in developing countries. This is a particularly important driver for residential energy demand, as many energy-consuming activities are conducted on a household basis. In the future, more prosperity and improved living standards in the developing world will mean more air-conditioning systems, appliances and electronic devices driving demand.

We also expect urbanization to play a role in the growing energy needs through 2040. Where and how people live impacts energy demand. The population is shifting to cities, with a greater number of homes but fewer people per household. An average urban resident consumes more energy than his or her rural counterpart. At the same time, urban residents likely have easier access to modern, more efficient fuels.

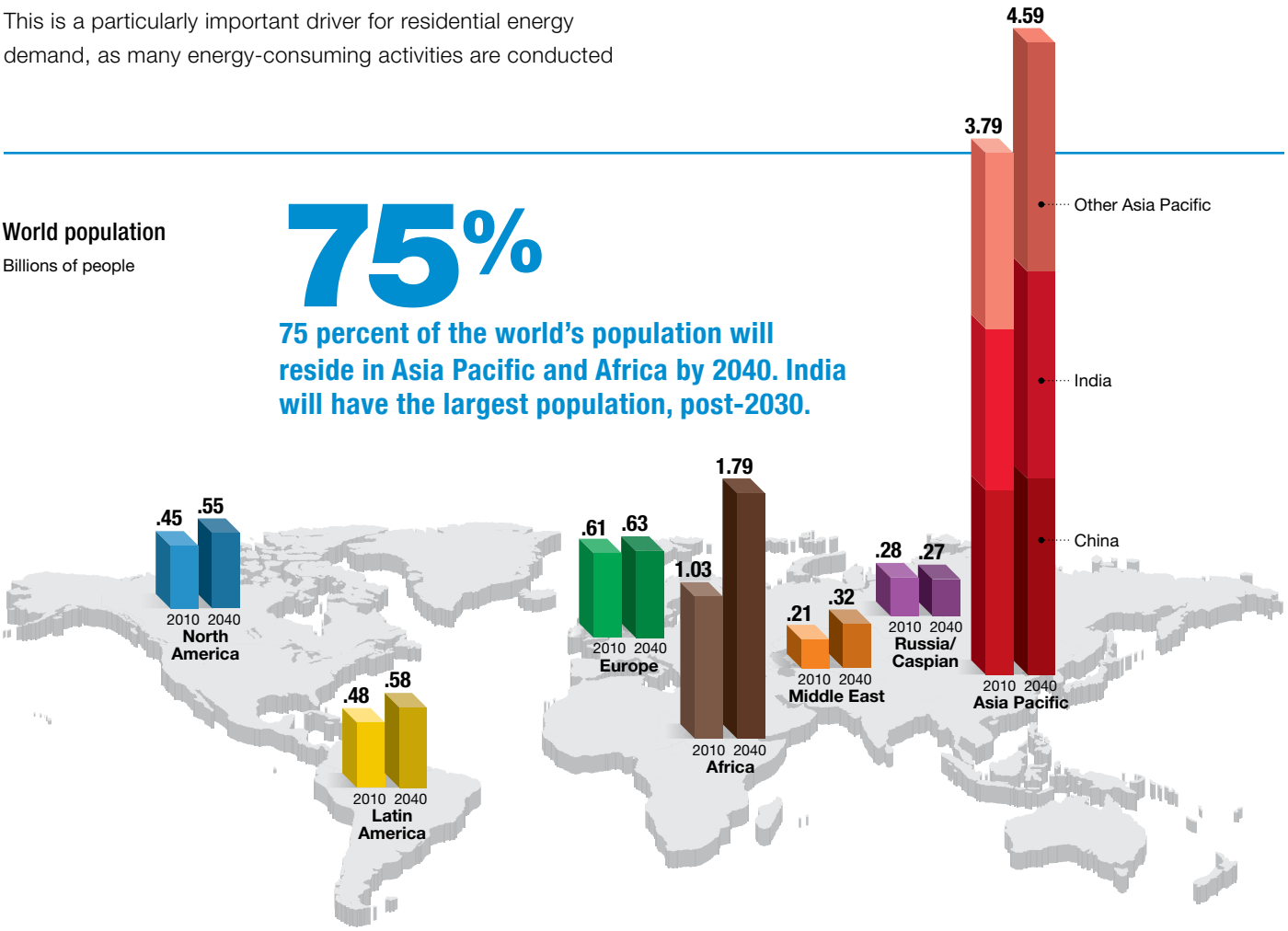
The impact of increased urbanization on energy demand is perhaps most evident in China, where today about half of its 1.3 billion citizens live in cities – a dramatic increase from just

World population

Billions of people

75%

75 percent of the world's population will reside in Asia Pacific and Africa by 2040. India will have the largest population, post-2030.



three decades ago, when only about 20 percent lived in urban areas. China's energy demand increased significantly over this period and now exceeds that of the United States. By 2040, almost 75 percent of China's population will live in cities, nearly a complete reversal compared with 1980.

A country's working-age population – people ages 15 to 64 – represents the engine for its economic growth and its energy demand

Demographics also impact energy demand. A robust working-age population supports a strong economy and drives consumption of energy.

In some places – primarily within the OECD and China – we expect that population will begin to plateau toward 2040, as relatively low birth rates and other factors combine to produce a rising percentage of older citizens. An exception is the United States, which sees continued population growth and thus will maintain a relatively large working-age population.

China's population is projected to peak around 2030 at about 1.4 billion. However, as a result of its policies on family size, China's working-age group is projected to peak much earlier, likely within the next 10 years. This, coupled with an expanding elderly population, will likely have long-term implications for China's economic growth and its energy demand.

India will become the world's most populous country after 2030. And, unlike China, its working-age population will continue to expand, providing a boost to its economic prospects.

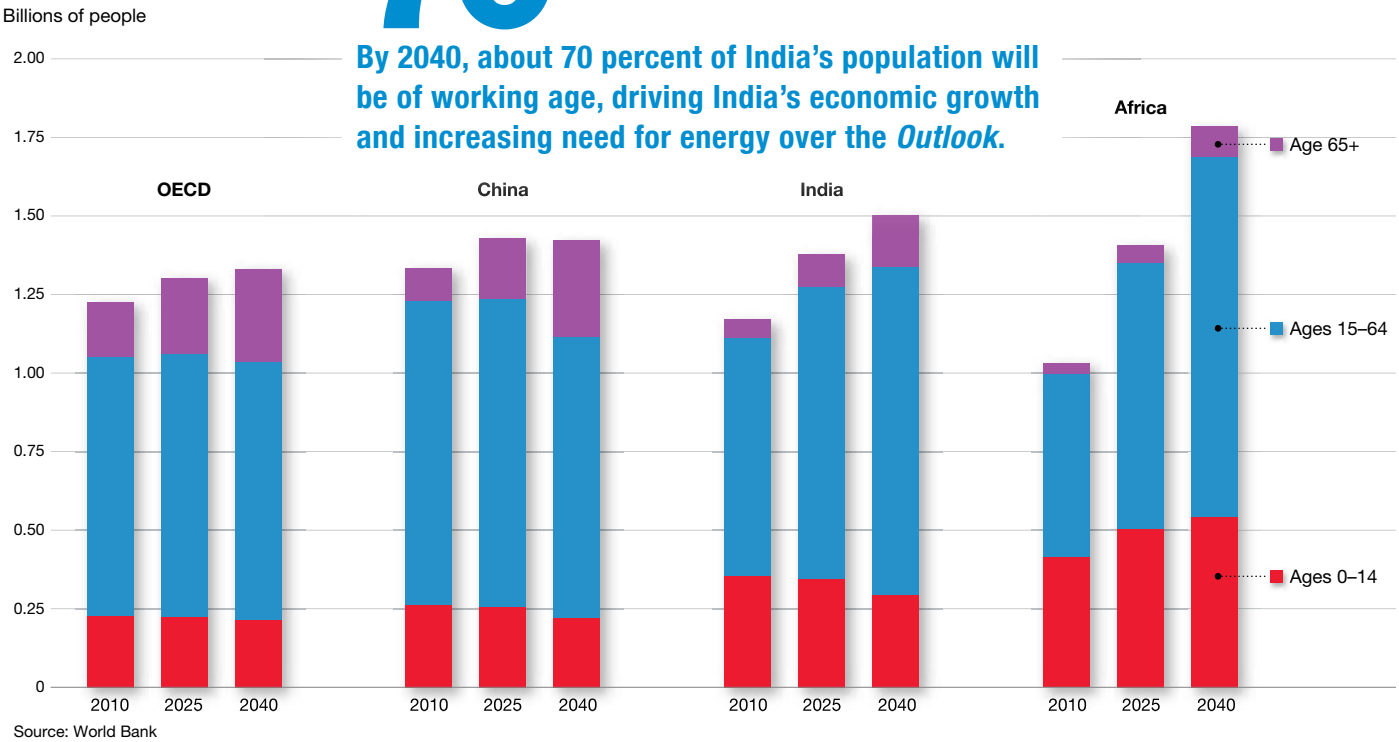
With Africa showing even greater population growth, we expect a higher percentage of working-age people. These demographic trends will help position India and Africa to become two of the strongest areas of GDP growth over the *Outlook* period, as long as these regions can equip their expanding working-age population with the right skills and create new sources of value and productive jobs that can grow their economies and expand prosperity.

This economic growth – and the improved living standards fostered by these demographic shifts – creates an opportunity to supply energy in a safe, reliable and affordable manner that enables both economic growth and social development.

70%

By 2040, about 70 percent of India's population will be of working age, driving India's economic growth and increasing need for energy over the *Outlook*.

Demographics by region



Source: World Bank

The global economy is expected to grow at an annual average rate of 2.8 percent from 2010 to 2040

Economic growth, and the improved living standards it enables, will require more energy.

Non OECD countries will contribute slightly more than half of total economic growth over the *Outlook* period. China alone will contribute more than 20 percent of global economic growth as its economic output rises, on average, more than 5 percent per year through 2040. India, whose economy is about one-third the size of China's economy today, will grow at a similar rate on average, and will be increasingly important as a leading growth engine in the decades ahead. With increases in their working-age populations, India and Africa will become two of the strongest areas of GDP growth over the next 30 years.

Meanwhile, Africa's GDP is expected to grow by an average of about 4 percent annually, through 2040.

Economic growth in OECD countries will be led by the United States, which contributes roughly 20 percent of the growth in the global economy. This growth is aided by the country's growing working-age population.

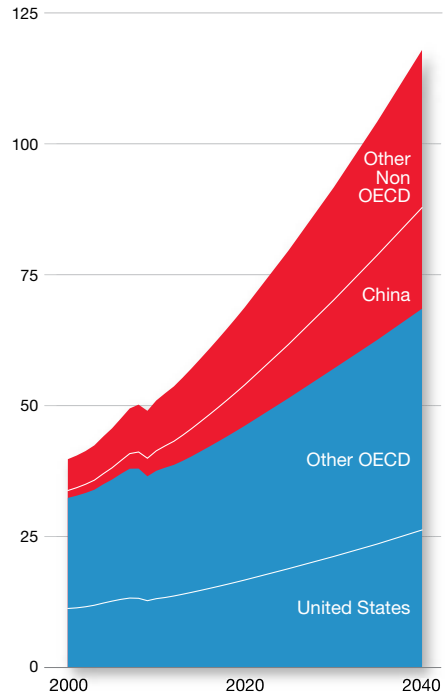
In 2040, global energy demand will be approximately 700 quadrillion BTUs, or about 35 percent greater than in 2010. Global energy demand does not rise as dramatically as economic growth as a result of declining energy intensity, or the amount of energy used to produce a unit of GDP output. While energy demand in the OECD will be essentially flat to 2040, economic output will increase by 80 percent.

This ability to significantly expand prosperity with relatively modest growth in demand reflects the combination of two key factors. First, the economic structure changes over time. For example, China will move from an energy-intensive manufacturing-based economy today to a more consumer-based economy, requiring less energy use per unit of GDP. Second, energy efficiency improves across all sectors. In all countries, modern technologies, fuels and energy management practices replace less efficient ones. Building and manufacturing processes use less energy, the cars we drive are more fuel-efficient and more natural gas is used for electricity generation.

All of this combines to slow energy demand growth in comparison to gains in economic growth and living standards.

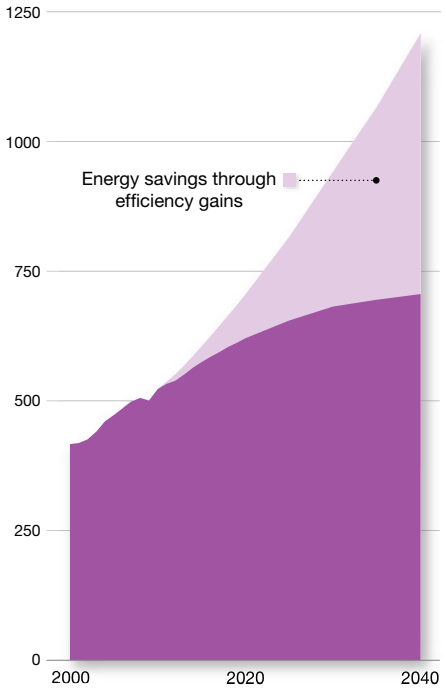
GDP

Trillions of 2005 dollars



Global energy demand

Quadrillion BTUs



500 quadrillion

Businesses and consumers will help generate energy savings of about 500 quadrillion BTUs across our economies in 2040. The greatest source of energy for the future is continuing to use it more efficiently.

Energy plays a vital role in helping economies grow and create new opportunities

Long-term economic growth and prosperity depends on some basic inputs: labor, capital and technology, combined with a civil society that promotes abundant opportunities and the rule of law. The “production function” is a generic term economists use to describe the activities that transform these inputs into goods and services that we consume every day.

Consider, for example, a factory. Producing something of value typically requires skilled people (labor), raw materials and machinery (capital), and technology, whether embodied in a piece of equipment that improves productivity or as an innovative new product. Of course, for such a factory to function within a broader economy, it also requires protection of property rights, enforcement of contracts and other elements of a productive society.

A country’s Gross Domestic Product (GDP) is the market value of the resulting output from such a “production function.” It covers all the goods and services produced within a country in a given time period. As one of the primary indicators for measuring the health of a country’s economy, GDP helps determine the vitality of consumer and government spending, a country’s ability to invest in the future, and the amount of goods and services it exports as well as imports.

Energy plays a key role in supporting this “production function.” It not only fuels capital investments – raw materials, machinery and other equipment – it is often the key behind technological advancements. Over the years, energy technologies have helped expand supplies, boost efficiency, increase safety and improve competitiveness.

Besides capital and technology, prosperous and competitive economies depend on an educated and skilled labor force as well as a free market system supported by sound public policies and the rule of law. These additional levers are critical to expanding economic opportunities and creating wealth through capital investments and effective use of advanced technologies.

For an economy to grow, it needs energy. To sustain and enhance economic progress around the world, we must continue to improve the value created through the use of energy sources, address related environmental challenges and safely expand the world’s commercially viable energy supplies through technological advancements. These efforts will continue to improve energy diversity and reduce the energy-intensity of our economies, helping expand economic prosperity and support energy security.

There is a marked difference in energy needs between Non OECD and OECD countries during the *Outlook* period

Energy efficiency is one of the largest and lowest-cost ways to extend our world's energy supplies and reduce greenhouse gas emissions. Energy-efficiency gains play a growing role in every country across the globe over the *Outlook* period. Still, in Non OECD countries, efficiency gains will be outpaced by the demand for energy to support better living standards and expanding prosperity for about 85 percent of the world's people.

Energy demand in developing countries rises by about 65 percent from 2010 to 2040. To put this into perspective, in 2005, Non OECD countries had about the same demand as OECD countries. By 2040, their demand will be more than double that of OECD countries.

And while energy will help fuel advancement in Non OECD countries, significant gaps in living standards will persist. On a per-capita basis, energy use will rise about 25 percent by 2040, though it will still be around 60 percent less than that in the OECD.

The effect of energy efficiency can be clearly seen in the OECD, reflecting the well-developed economies of these countries, with a high penetration of vehicles, modern appliances and electronics, facilities and industrial processes. And as consumers replace existing equipment with more advanced technologies, less energy will be required to achieve the same objective. Demand is likely to be relatively flat, even as economic output rises by about 80 percent.

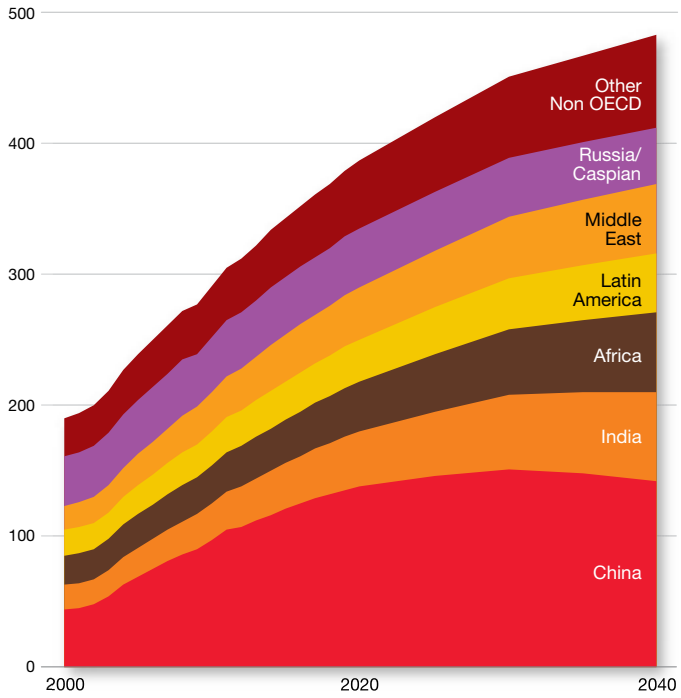
Overall, throughout the *Outlook* we expect OECD nations will remain significantly more efficient than Non OECD countries, averaging one-third the energy use per unit of economic output. This reflects a relatively advanced stage of overall economic productivity, generally aided by long-standing free market practices, greater emphasis on basic science, research and development, and substantial capital stock and infrastructure.

Ultimately, energy demand is determined by how people can use it to meet their needs

Over the *Outlook* period, ExxonMobil sees energy demand rising in four main sectors: electricity generation, industrial, transportation and residential/commercial. Each of these sectors has its own unique characteristics and requirements, which we will discuss in more detail throughout the book.

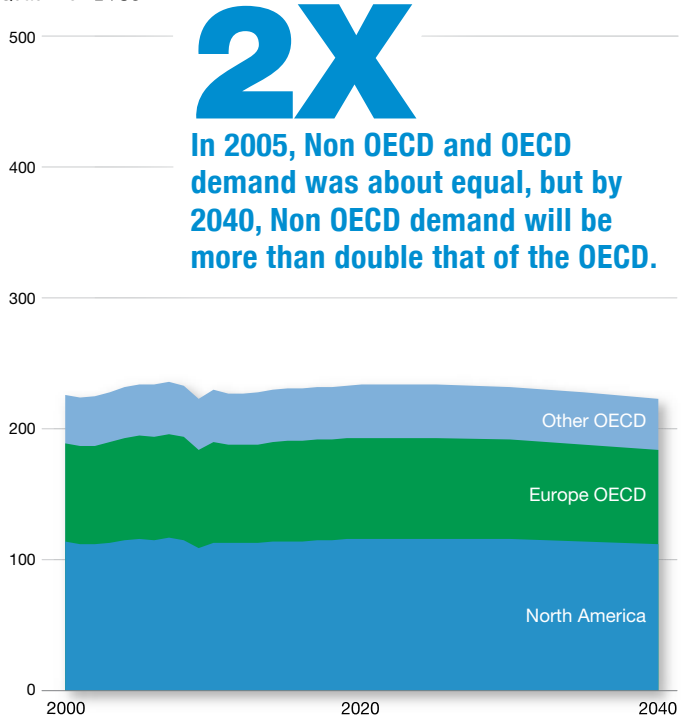
Non OECD energy demand

Quadrillion BTUs



OECD energy demand

Quadrillion BTUs



2X

In 2005, Non OECD and OECD demand was about equal, but by 2040, Non OECD demand will be more than double that of the OECD.

Today, and over the next 30 years, electricity generation represents the largest energy use across these four sectors. That's quite remarkable considering that a little over a century ago, electricity use was a novelty. Today, electricity is a basic necessity in the lives of most people. **Yet even now, around 1.3 billion people don't have access to electricity, according to the International Energy Agency (IEA).**

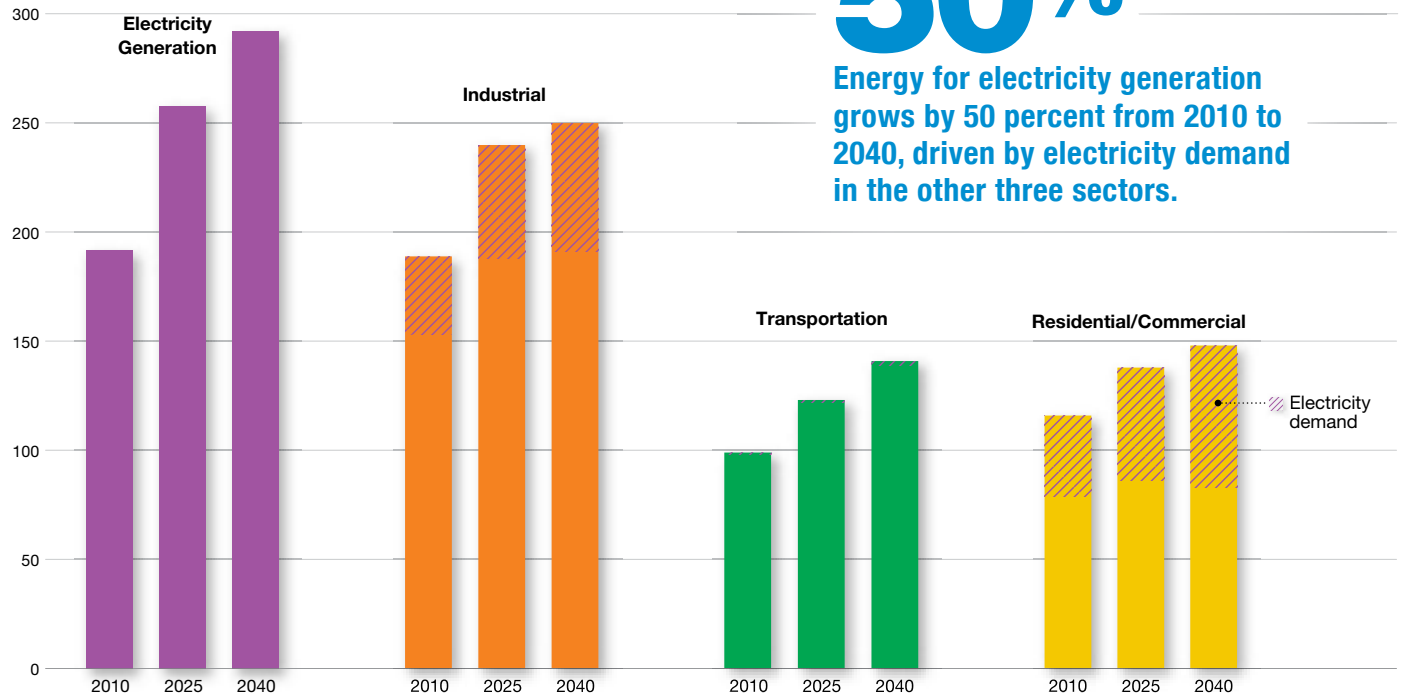
Total industrial energy use grows around 30 percent to 2040, representing a broad range of activities, from agriculture to production of raw materials, to chemicals and plastics and the manufacture of finished goods.

Transportation demand increases about 45 percent, reflecting the increased mobility of people and goods over land, across oceans or through the air, mainly as a result of growing commercial activity.

Demand for electric power in industrial, transportation and residential/commercial segments drives demand for electricity generation. About 40 percent of industrial demand growth is driven by electricity, and it accounts for about 90 percent of the growth in residential/commercial demand.

Energy demand by sector

Quadrillion BTUs



50%

Energy for electricity generation grows by 50 percent from 2010 to 2040, driven by electricity demand in the other three sectors.

Residential/commercial

As economies and populations grow, so will energy needs. By 2040, residential and commercial energy demand is expected to rise by about 30 percent. This increase is being driven by developing countries, where prosperity is expanding and more and more people are moving away from rural areas and into the cities. People are also shifting from biomass energy sources like wood and agricultural waste to modern fuels, improving their quality of life in the process. While overall demand is up, energy use per person in developing countries is actually declining, thanks to more energy-efficient buildings and appliances.

60%

As the world transitions to cleaner fuels, electricity and natural gas will account for more than 60 percent of the world's residential/commercial energy demand by 2040.

Residential and commercial energy demand rises even as efficiency improves

Residential and commercial energy demand grows about 30 percent during the *Outlook* period

Combined residential- and commercial-fuel demand increases to meet electricity needs as the world's population grows and more people move to cities and gain access to modern energy supplies. The United Nations estimates that the percentage of the world's population living in urban areas will increase from about 50 percent in 2010 to more than 60 percent by 2040.

Residential demand rises slower than the historical pace, reflecting growth in Non OECD countries and a gradual decline in demand in OECD countries. Over the *Outlook* period, residential demand rises around 20 percent.

Commercial demand for energy grows by 50 percent on a global basis through 2040. OECD countries see an increase in demand of close to 10 percent as improvements in commercial lighting, air conditioning and building insulation moderate growth. Commercial demand in Non OECD countries grows by more than 130 percent as electricity demand increases by more than 200 percent. China's commercial demand grows at more than 8 percent per year from 2010 to 2025 and then slows to 3 percent per year through the end of the *Outlook* as building standards and energy management practices improve.

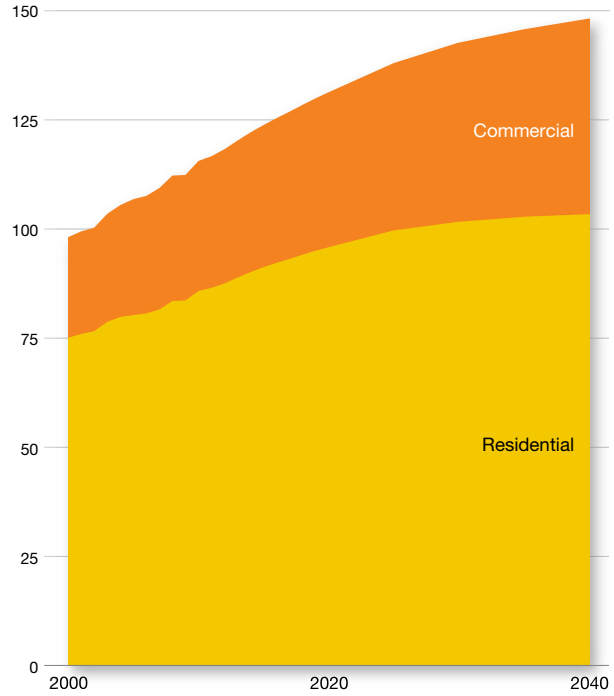
The fuels used to meet residential/commercial demand are changing. Electricity makes up the major growth area, increasing in share from around 30 percent in 2010 to about 40 percent by 2040.

The IEA estimates that 2.6 billion people lack access to modern cooking fuels even though electricity has grown strongly over the last two decades. As developing countries become more urban and people move to modern fuels such as gas, liquefied petroleum gas and electricity, the use of biomass shrinks. Gas demand grows 30 percent as biomass and coal decline.

This shift around the world to cleaner and more convenient forms of energy and resulting efficiency gains help moderate the

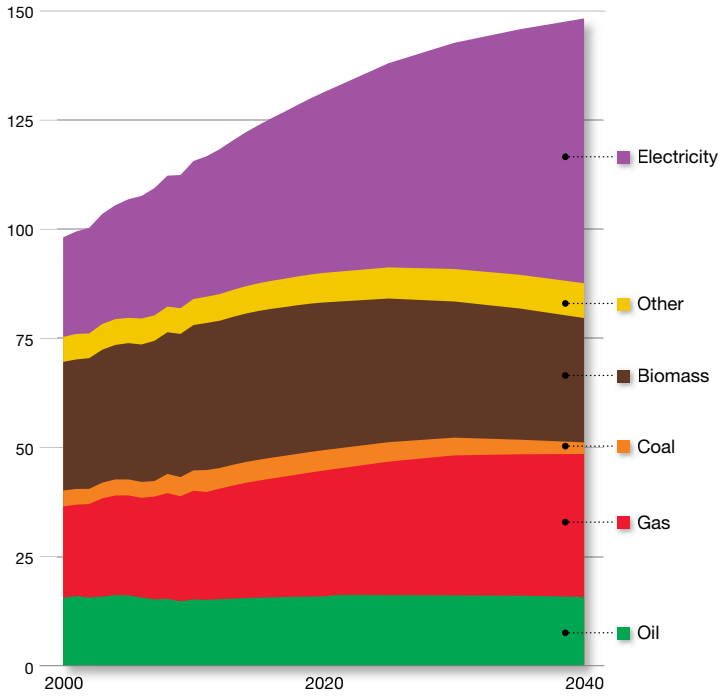
Residential/commercial fuel demand by sector

Quadrillion BTUs



Residential/commercial demand by fuel

Quadrillion BTUs



increase in commercial and residential demand over the *Outlook* period. Particularly in developing countries, these gains are helping improve the quality of life, while mitigating health problems.

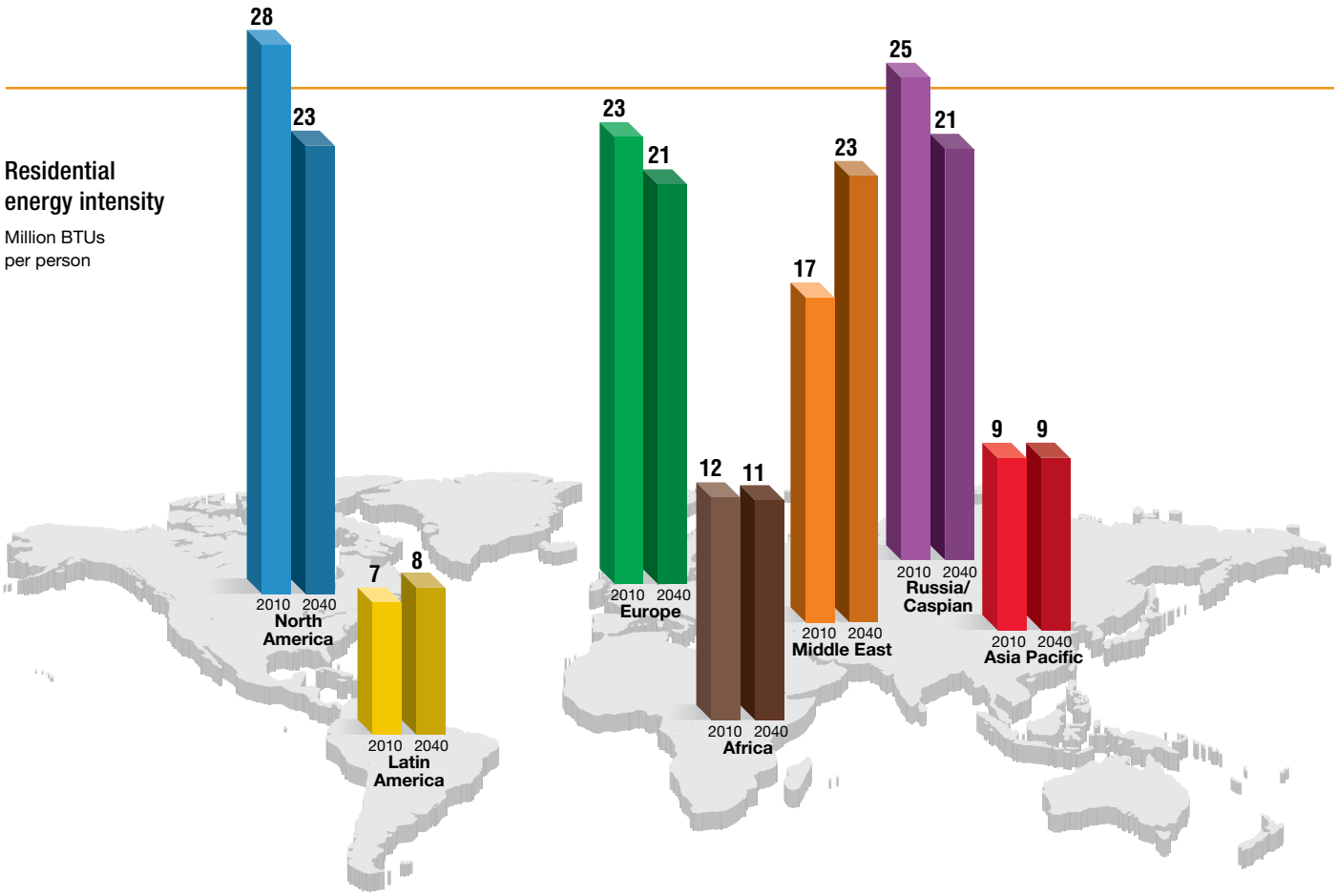
Residential consumption per person varies by region and reflects dramatic differences

A variety of factors impact our use of energy in our homes. The climates where we live, our incomes, and the efficiency of our homes and appliances all play a role in our residential energy consumption. According to the U.S. Energy Information Administration (EIA), homes built since 1990 are on average 27 percent larger than homes built in earlier decades. Between 2010 and 2040, residential demand in the OECD will decrease, while the Non OECD will go up by about 35 percent.

In OECD countries, residential energy intensity, or the amount of energy per person, is on a downward trend. Regions with relatively high energy use per capita, such as North America, tend to reflect higher levels of income that enable the move to more energy-efficient homes and appliances.

Over time, efficient use of energy helps moderate overall energy demand growth. For example, in Africa and India, residential demand grows to 2040, but household energy use per person will decline as people transition from traditional energy sources to more advanced technologies and fuels.

Areas with relatively higher income levels in the developing world will also capture efficiency gains. However, their energy use per capita is likely to remain flat or continue to grow, reflecting an increase in the use of modern energy technologies as incomes grow significantly. This is reflected in China's residential energy intensity, which grows from 11 to 13 million BTUs per person and is expected to surpass that of Japan by 2040. In higher-income developing regions, such as the Middle East, Latin America and parts of Asia Pacific, residential energy intensity will rise and more closely mirror OECD patterns of use.



Transportation

Our world is constantly on the move. Because of expanding economies and international trade, transportation-related energy demand will increase by more than 40 percent from 2010 to 2040. Most of this demand is driven by commercial sources such as trucks, planes, ships and trains. At the same time, personal vehicles are becoming significantly more energy-efficient. Although the number of cars on the road will about double, advances in automotive technology (such as hybrid cars) keep global personal transportation energy demands relatively steady.

65%

Heavy duty transportation demand grows 65 percent by 2040.

Commercial activity drives growth in transportation demand

Total transportation demand increases by more than 40 percent from 2010 to 2040, with growth coming almost entirely from commercial transportation

Energy demand for commercial transportation – heavy duty, aviation, marine and rail – grows dramatically over the *Outlook* period as expanding economies and international trade increases movement of goods and freight.

Heavy duty vehicle demand, the largest subsector, sees the greatest growth, up 65 percent, and accounts for 40 percent of all transportation demand by 2040.

Fuel for aviation and marine will increase about 75 percent and 90 percent, respectively, over the *Outlook* period, with their combined share growing from about 20 percent today to more than 25 percent by 2040.

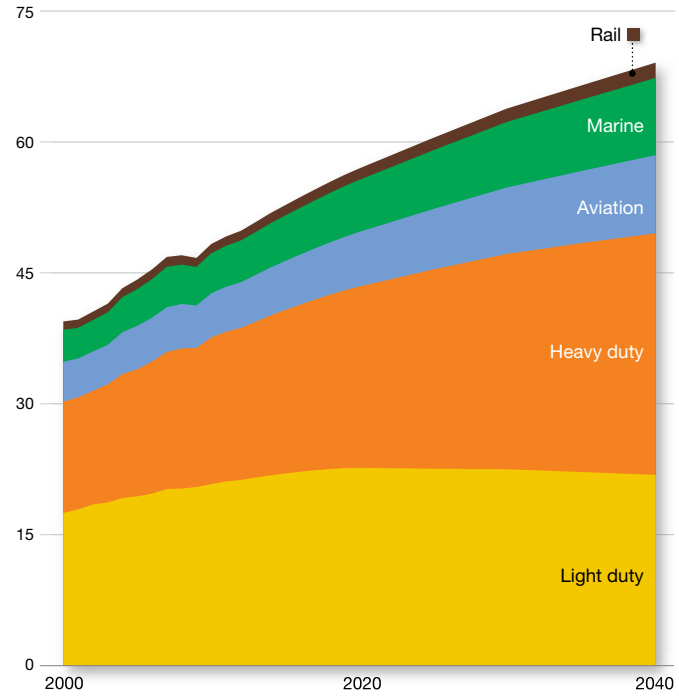
In contrast to the growth in commercial transportation, fuel demand for personal vehicles – cars, SUVs and small pickup trucks – actually plateaus fairly soon and begins a gradual decline as consumers turn to smaller, lighter vehicles and technologies improve fuel efficiency.

Transportation demand varies across different regions of the world. The strongest growth is in Asia Pacific, which remains the largest consumer of heavy duty vehicle energy and sees a significant increase in personal vehicle ownership, around 500 million vehicles from 2010 to 2040. By about 2015, transportation demand in Asia Pacific will exceed that of North America.

Together, Asia Pacific and North America will make up about 60 percent of global transportation demand in 2040. However, on a country basis, the United States will remain the largest transportation demand center, followed by China.

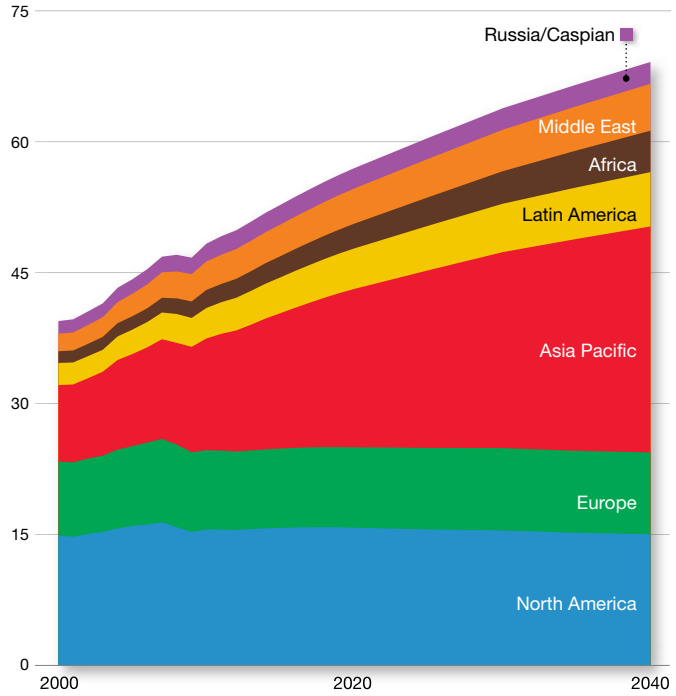
Transportation energy demand by sector

Millions of oil-equivalent barrels per day



Transportation energy demand by region

Millions of oil-equivalent barrels per day



Heavy duty transportation – freight trucks of all sizes, buses, emergency vehicles and work trucks – represents the majority of commercial demand

As economies expand and spur business activity, heavy duty vehicles will create the greatest growth in commercial transportation demand – up about 65 percent from 2010 to 2040.

Asia Pacific sees the most growth as the largest consumer of heavy duty energy through 2040. Heavy duty transportation demand is also on the rise in Europe, Latin America and the Middle East.

Going forward, ExxonMobil sees continued progress in fuel efficiency of heavy duty vehicles. In Non OECD countries, heavy duty vehicle intensity, or the amount of energy used per dollar of GDP, is expected to decline by 2 percent per year on average through 2040 as advances in technology and increased truck size create economies of scale.

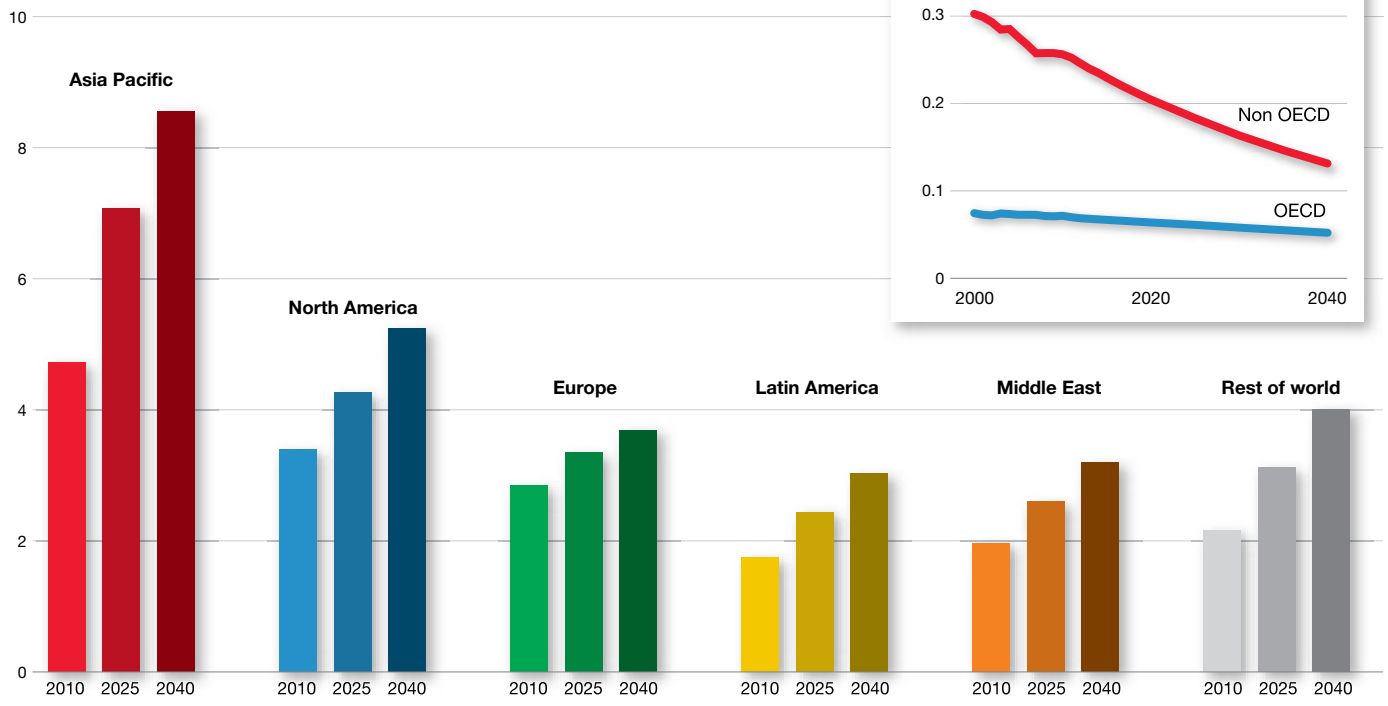
With a current fleet of large trucks, the OECD's potential for future intensity improvements depend more on technological and logistical advances. In spite of issues such as increased traffic congestion, ExxonMobil sees a decline in OECD heavy duty intensity of around 1 percent per year.

In Asia Pacific, total transportation demand doubles with almost 60 percent of the growth occurring in the light duty and heavy duty vehicle sectors. India's energy transportation demand more than triples, and personal vehicle demand accounts for more than 40 percent of this growth.

Africa, Latin America, and the Middle East will also see increases in transportation demand, but play a lesser role in worldwide transportation growth.

Heavy duty transportation demand by region

Millions of oil-equivalent barrels per day



Heavy duty transportation intensity

Oil-equivalent barrels per thousand dollars of GDP

Even with these improvements, demand for fuel for heavy duty vehicles will rise sharply through 2040, accounting for 40 percent of all transportation demand.

Cars become more energy-efficient and the personal vehicle fleet shifts from conventional gasoline and diesel to more hybrid models by 2040

The global personal vehicle fleet doubles over the *Outlook* period, from more than 800 million to more than 1.6 billion. As more energy-efficient vehicle options become available, conventional gasoline and diesel engine vehicles will make up a smaller share of the fleet over time, down to around 50 percent in 2040.

Around 2025, ExxonMobil expects hybrid vehicles will be less expensive and their share of sales will expand quickly, adding more efficiency to the fleet. Full hybrid vehicles will make up about 40 percent of the fleet in 2040, or more than 50 percent of new car sales in 2040. In the latter part of the *Outlook*, electric and plug-in hybrids (utilizing a gasoline engine and battery-powered motor) will begin to play a more significant role, making up around 10 percent of new car sales in 2040, or about 5 percent of the fleet.

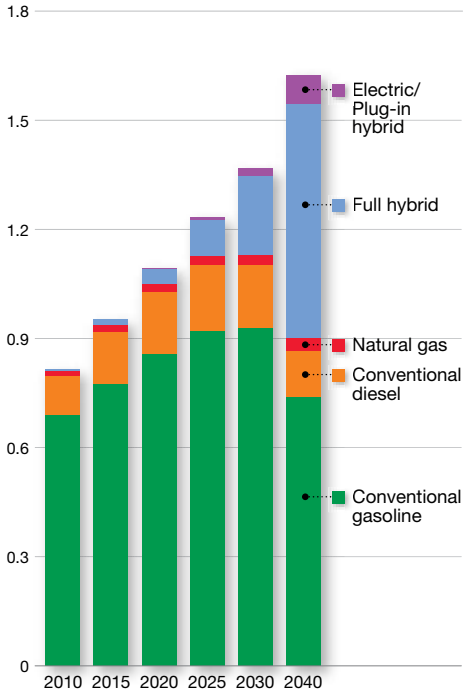
Oil will remain the predominant fuel source for transportation through 2040. Oil products benefit not only from the widespread availability of supplies, but also significant economic and practical advantages over alternatives. Technological advancements are continuing to improve the fuel economy of conventional vehicles every day. In order to make a significant impact in the marketplace, alternatives like plug-in hybrids or electric cars will need to make substantial progress to overcome hurdles, including a $10,000 to $15,000 higher upfront cost plus range and functional limitations for drivers. For example, the higher energy density of oil products is such that 100 pounds of gasoline can enable a car to travel 350 miles, compared to a 100-pound battery that will power a car for only about 15 miles and can take hours to recharge.

Government policies designed to improve the overall fuel economy of personal vehicles will shift the type of vehicles on the road. The overall mix will also continue to reflect the functional needs and comparative economics of vehicles available to consumers. New car technologies will continue to advance, and consumers will continue to make personal choices on the potential benefits of shorter driving distances.

Cars become much more fuel-efficient by 2040. New cars will average around 47 miles per gallon (mpg) by 2040, compared to about 27 mpg today. This shift in efficiency is driven by manufacturers incorporating improvements into new cars. Engine and transmission improvements, along with lighter body

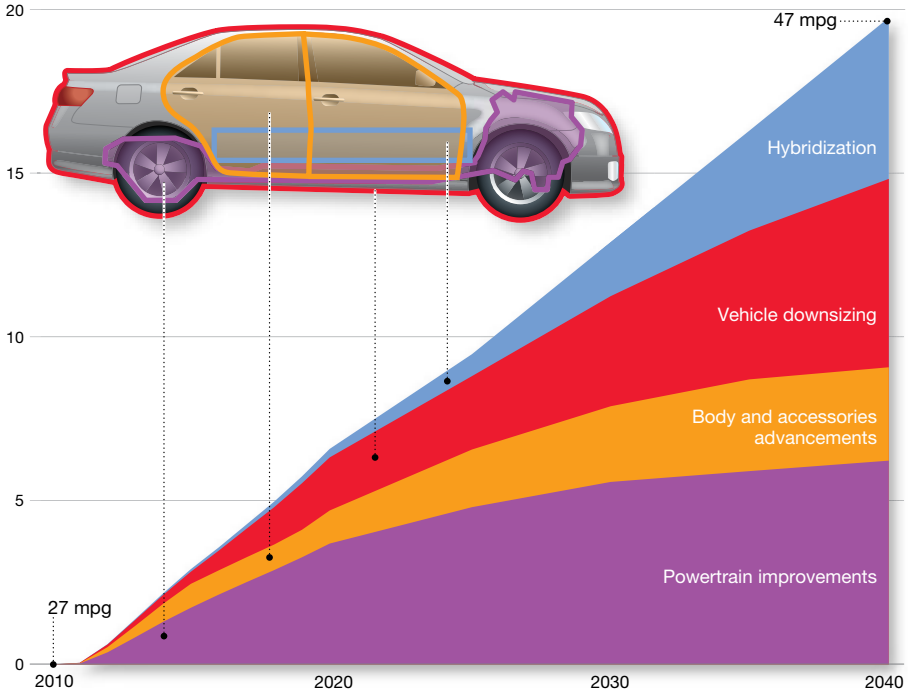
Vehicle fleet by type

Billions of vehicles



Incremental gains in efficiency of new light duty vehicles

Miles per gallon (MPG)



and accessory parts, are expected to improve efficiency of new cars by around 9 mpg. The overall efficiency improvement will also be enabled by manufacturers that introduce smaller vehicle models and engines to meet government fuel economy mandates as well as increased penetration of hybrids.

The push-pull between a growing vehicle fleet and improving vehicle efficiency results in effectively flattening energy demand for personal vehicles in our *Outlook*. But the trends vary significantly by region. Declines of about 30 percent in the OECD are offset by the doubling of energy demand for personal vehicles in the Non OECD.

While natural gas will be the fastest-growing major fuel to 2040, its growth in the transportation sector is limited

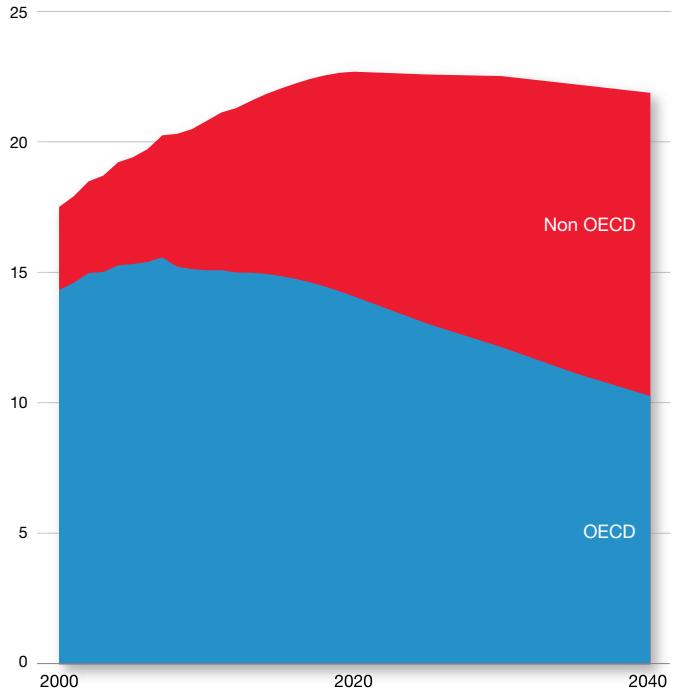
Although natural gas will play a greater role as a transportation fuel by 2040, it remains only a small share of the global transportation fuel mix, at 4 percent by 2040, up from today's 1 percent.

The two greatest transportation markets for natural gas are heavy duty and marine. These two sectors have unique qualities that may provide stronger economic incentives for use of natural gas compared to light duty vehicles. In particular, favorable opportunities may exist for the use of liquefied natural gas (LNG) for heavy duty trucks, particularly along high-traffic corridors and including both long-haul and specific services (e.g., buses, waste management and utility vehicles). This trend is particularly true in Asia Pacific and North America, where we see the largest energy demand in the heavy duty sector.

Our *Outlook* sees natural gas for heavy duty vehicles increasing by 8 billion cubic feet per day (BCFD) by 2040. This growth assumes that more than 20 percent of new heavy

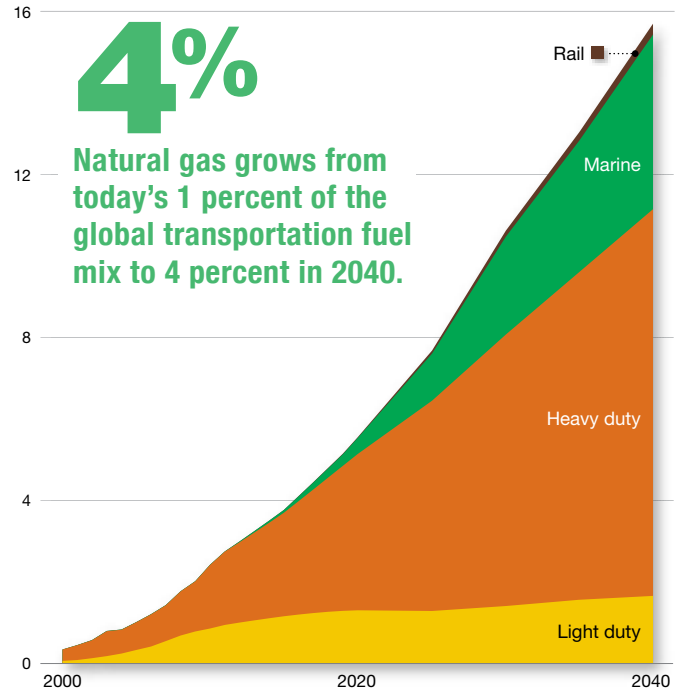
Light duty transportation demand by region

Millions of oil-equivalent barrels per day



Natural gas used for transportation by sector

Billions of cubic feet per day



duty vehicle sales will be either compressed natural gas (CNG) or LNG. However, even with this significant increase, gas represents about 6 percent of total heavy duty vehicle demand by 2040.

Today, natural gas is only a small contributor to meeting global demand for marine transportation fuels. ExxonMobil sees a shift toward natural gas in the marine sector, where it accounts for 8 percent of total demand by 2040. Natural gas, particularly LNG, provides an advantageous alternative to fuel oil as a way to meet new marine fuel standards over the *Outlook* period.

The greatest growth in natural gas as a transportation fuel is in Asia Pacific and North America. By 2040, Asia Pacific will account for 50 percent of the demand for natural gas in transportation.

Asia Pacific, North America and Europe make up almost 75 percent of the global demand for transportation fuel in 2040

The demand for transportation fuels varies significantly by region. In Asia Pacific, demand for motor gasoline rises with a growing light duty vehicle fleet. Economic growth and the resulting increased movement of goods and people drive demand for diesel fuel, which accounts for about 40 percent of the growth in total transportation demand. We also see strong growth in jet fuel demand in the Asia-Pacific region as income rises, driving stronger passenger and freight traffic.

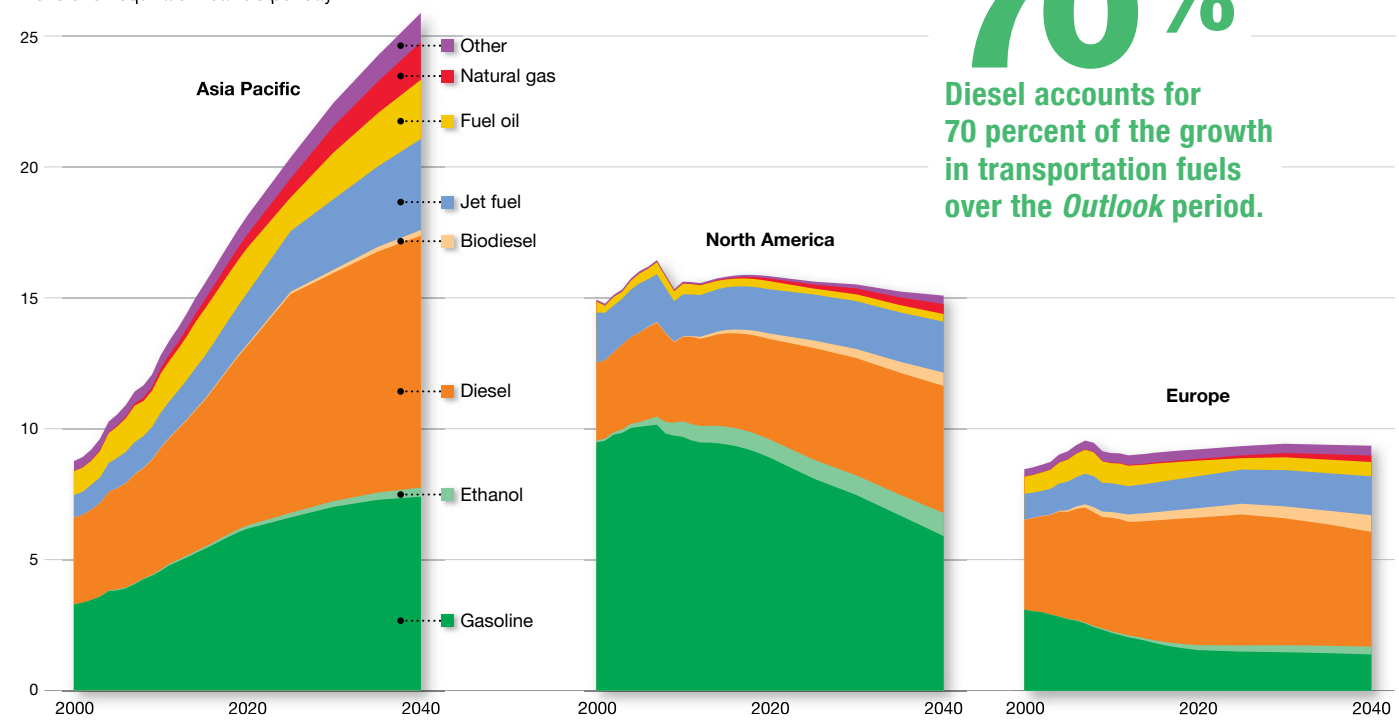
In contrast, North America demand for transportation fuels will decline modestly from 2010 to 2040, reflecting a drop in gasoline demand by one-third as light duty vehicles become more fuel-efficient, reflecting higher mpg standards and hybridization. Demand for diesel rises more than 65 percent, driven by commercial transportation needs.

Demand in Europe, while lower than in North America, is essentially flat over the *Outlook* period, reflecting a drop in gasoline demand of around 25 percent due to improved efficiency of light duty vehicles. As in North America, light duty vehicle demand decreases by one-third, while commercial transportation needs rise as much as 30 percent with economic growth.

The relative shift away from motor gasoline to diesel is driven by better light duty vehicle fuel economy and the growth in commercial transportation activity. About 80 percent of the growth in commercial transport demand will come from developing nations.

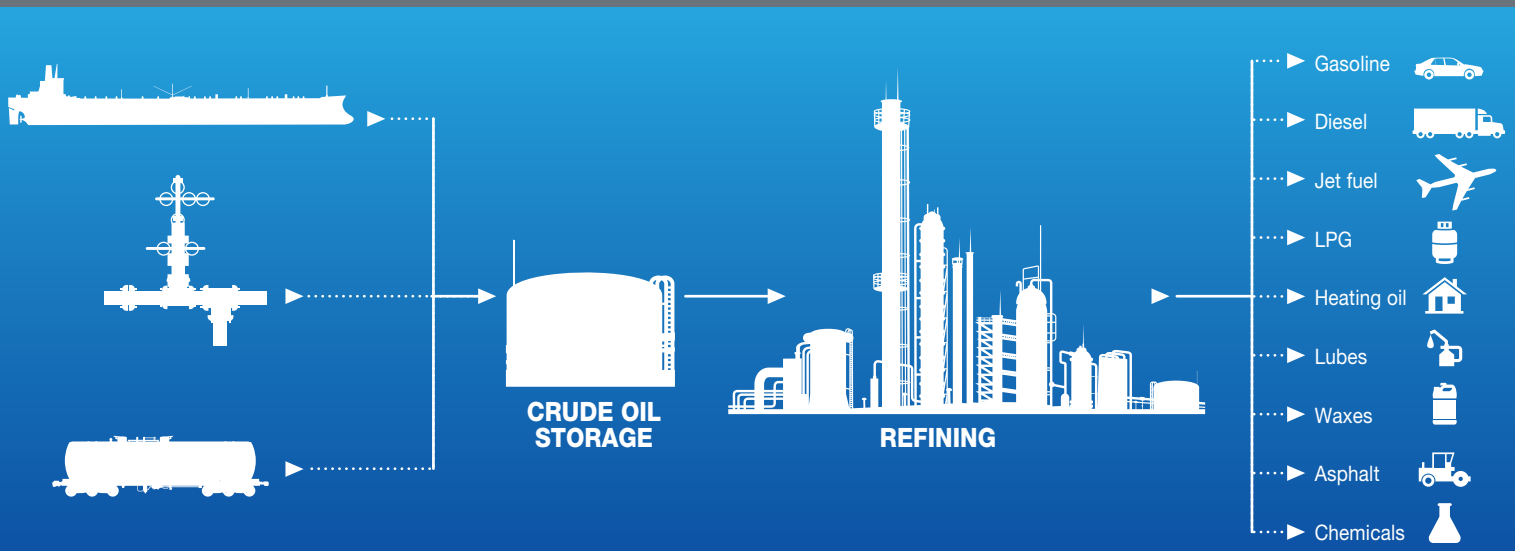
Transportation fuel mix

Millions of oil-equivalent barrels per day



70%

Diesel accounts for 70 percent of the growth in transportation fuels over the *Outlook* period.



Turning crude oil into usable products

Crude oil does a lot more than simply provide fuel for our cars and trucks, keep our homes and businesses comfortable and power our industries. It is also a key ingredient in making thousands of products that improve our lives, from aspirin and toothpaste to perfumes and inks; plus the packaging for many of these products.

In its raw state, crude oil is of little use. A refinery takes crude oil and "refines" or processes it into finished products. Depending on the type of crude oil, it is treated via different refining processes to turn it into fuels, lubricating oils, waxes, chemicals, chemical feedstocks (plastics) and many other products used every day in our society.

Refineries are billion-dollar investments designed to operate for decades. Typically, a refinery uses three major processes:

1. Separation, or fractionation, involves heating up the crude oil to separate it into naturally occurring components. In general, the more carbons in a molecule, the higher its boiling point. Smaller molecules will vaporize faster and heavy molecules will stay in liquid form.

Light products are further separated into propane and butane, often referred to as Liquefied Petroleum Gas (LPG), which is used as cooking and heating fuel. Heavier streams may also be further processed in conversion units to maximize diesel or gasoline production.

2. Conversion processes add value by rearranging crude oil molecules to produce important transportation fuels and petrochemical feedstocks. The most common conversion takes place in a fluid catalytic cracker (FCC), which uses a catalyst to break, or "crack," larger molecules into smaller molecules to maximize gasoline production. Other conversion processes may use either a coker or hydrocracker to upgrade the largest molecule chains.

3. The final stage of refining is purification, in which heat and a high-pressure catalyst are used to remove sulfur in a process called hydrotreating.

Our economies and way of life require reliable and affordable transportation fuels to meet consumer needs. Over time, new fuel specifications and seasonal or longer-term demand shifts, for example from gasoline to more diesel fuels, can occur. Although additional equipment can be integrated into an existing refinery to make more of the fuels that are in higher demand, it takes time and planning to add a new process unit. That's why understanding the energy demands of the future today is so important.

Industrial

Industry forms the foundation of the global marketplace. It creates jobs, supports healthy economies and supplies us with the goods and services we use in everyday life. Over the next 30 years, industrial energy demand will continue to grow. Factories and manufacturing plants must produce an ever-expanding amount of products to support growing populations and consumer demand. Producing the materials modern society needs – like steel, cement, plastics and chemicals – takes an enormous amount of energy.

50%

Energy demand, including feedstocks, for chemical production grows by 50 percent.

2010 2040

Chemicals and manufacturing sectors lead industrial energy demand growth

Industrial energy demand grows more than 30 percent over the *Outlook* period

Compared to the transportation and residential/commercial sectors, the industrial sector can seem less connected to the day-to-day lives of consumers. But industry uses energy to make a host of essential products including plastics, steel and textiles. This sector also includes energy used for agriculture, as well as the energy required to produce oil, natural gas and coal.

In fact, the industrial sector consumes close to 90 percent as much energy and electricity as the transportation and residential/commercial sectors combined.

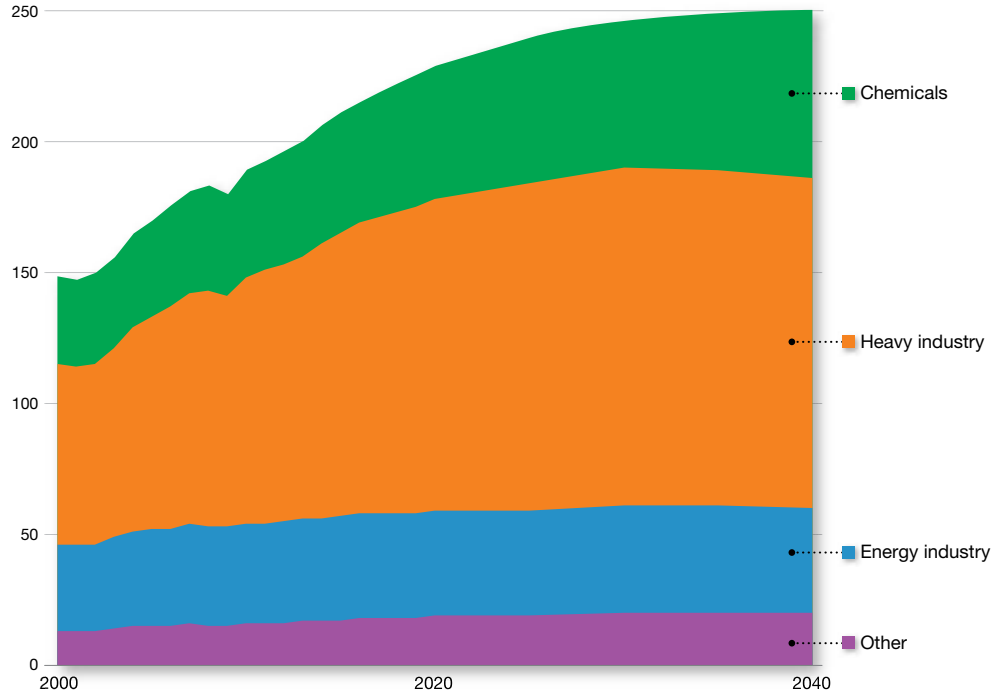
About 90 percent of the increase in industrial energy demand will come from two subsectors: heavy industry and chemicals. Heavy industry – which includes the manufacture of steel, iron and cement – will grow around 35 percent.

The chemicals subsector is the fastest-growing area, with demand growing more than 50 percent, largely due to increased demand for plastics and other advanced products. Today, chemicals play a major role in the majority of manufactured goods and are essential to advances in health care, communications and information technology.

Gains in energy efficiency help keep the increase in energy demand in all sectors from rising dramatically. For example, in another major industrial subsector – the global energy industry – demand for energy is expected to rise by only about 5 percent, largely as a result of ongoing improvements to efficiency and large reductions in natural gas flaring.

Industrial energy demand by sector

Quadrillion BTUs



20%

China's industrial demand will decline by close to 20 percent from 2025 to 2040 as its economy matures and energy efficiency improves.

Together, electricity and gas meet over half of industrial demand by 2040

As the industrial sector expands, electricity demand grows close to 80 percent and gas demand rises almost 55 percent.

Growth in gas demand, which is driven by abundant supplies and a transition away from coal, is boosted after 2030 as carbon dioxide (CO_2) costs spread beyond the OECD countries. Oil use will increase 30 percent, driven by strong growth in chemical feedstock.

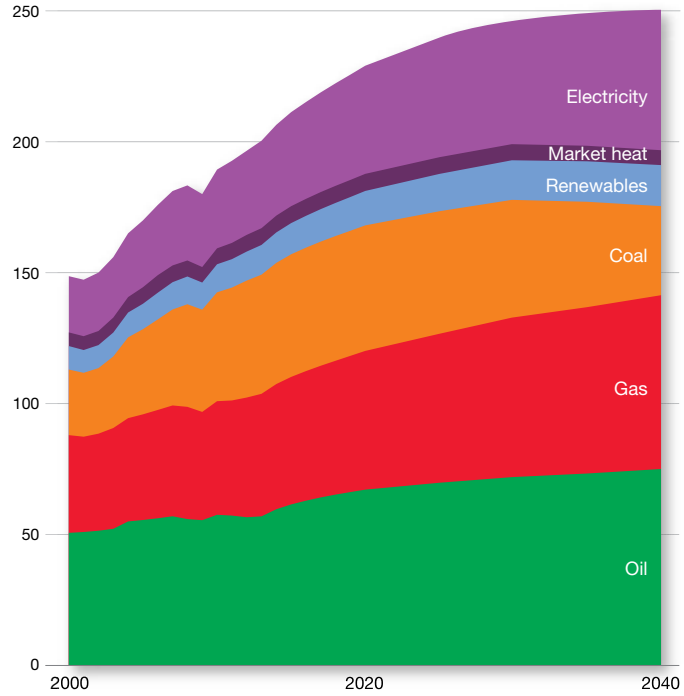
The key driver of slowing growth in industrial energy demand is the demand shift in China. China's current infrastructure expansion is expected to slow substantially in the second half of the *Outlook* as its population shrinks and the economy matures. This will lead to a decline in industry demand post-2030 to essentially offset growing demand in the rest of the world.

Over the next 30 years, demand shifts from China toward India and other expanding industrial areas, such as Southeast Asia, the Middle East and Africa. As economies in developing countries grow, so does their need for energy to fuel industries. Developing countries make up 70 percent of global industrial demand by 2040. In India, industrial demand for energy will nearly triple. Latin America, Africa and the Middle East see their industrial demand increase between 70 percent and 90 percent.

In the OECD, industrial energy demand is expected to remain largely unchanged through 2040. While industrial activity is not expected to decline, improvements in energy efficiency and a shift to less energy-intensive industries help offset any demand increases.

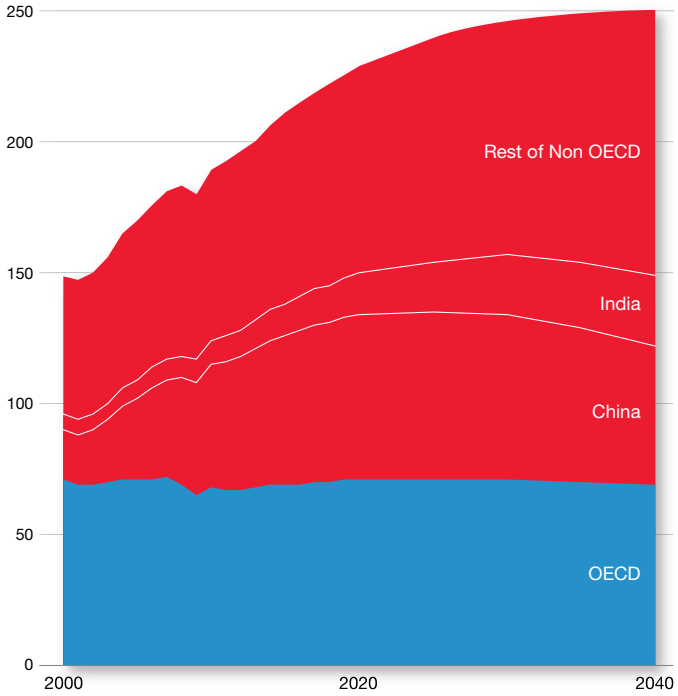
Industrial energy demand by fuel

Quadrillion BTUs



Industrial energy demand by region

Quadrillion BTUs



Electricity generation

Think of all the appliances and electronics you depend on every day for work, recreation and basic comfort. Computers, smartphones, air conditioning, microwaves, washing machines – these things all depend on electricity to work. And as the number of homes and businesses across the world grows, so does the need for power. Over the period of the *Outlook*, the fuel for electricity generation will account for about 55 percent of demand-related energy growth. The fuels we use to power our world are also changing, with natural gas emerging as the No.1 source of electricity generation by 2040.

85%

Global electricity demand will grow by 85 percent over the *Outlook* period.

2010 2040

Developing countries lead growth in electricity demand

Today, OECD and Non OECD countries consume approximately the same levels of electricity, but that relationship will change significantly as Non OECD electricity demand surges by 150 percent by 2040

As developing countries grow and expand their economies, their need for energy increases. Over the *Outlook* period, about 85 percent of growth in electricity demand will occur in the Non OECD economies.

Increased urbanization in countries such as China and India creates a significant source of this demand. In China, electricity demand more than doubles, and in India, it more than quadruples by 2040. Africa will also experience rapid growth in electricity use, with demand increasing 335 percent.

The OECD countries will see demand rise about 25 percent by 2040. Among these nations, the U.S. has the largest increase in demand, representing close to 50 percent of the growth in OECD electricity use.

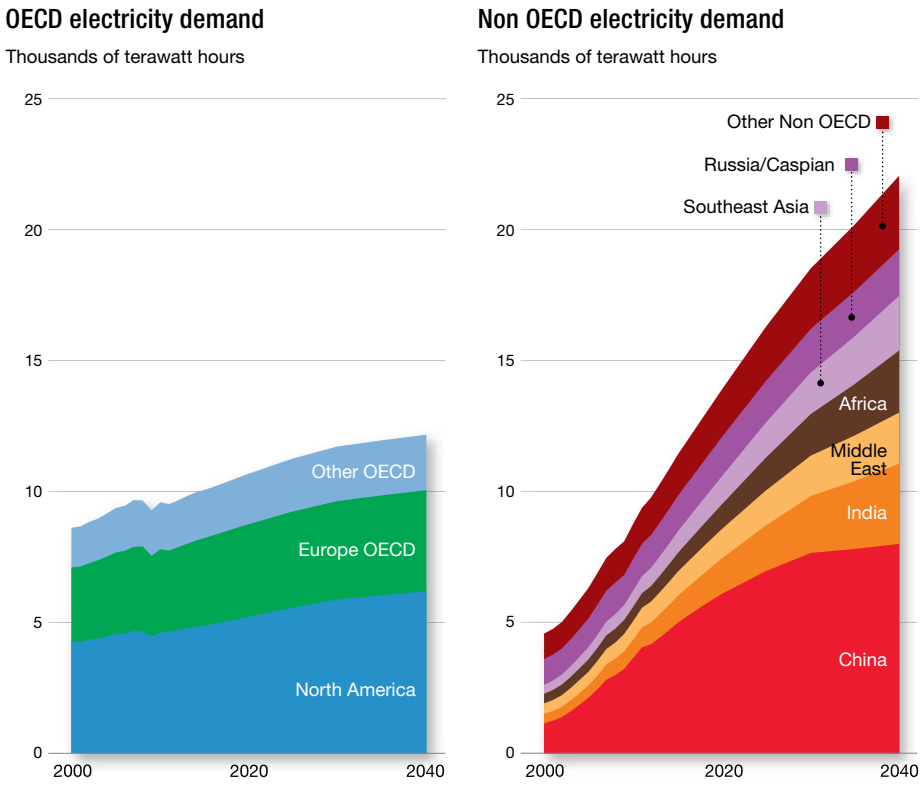
One of the emerging drivers of demand globally relates to digital warehouses. *The New York Times* reports that **on a worldwide basis, these data facilities use about 30 billion watts of electricity, roughly equivalent to the output of 30 nuclear power plants.** Data centers in the United States are estimated to account for one-quarter to one-third of that load.

Natural gas, nuclear and renewables grow to meet rising electricity demand, while coal and oil use declines

The fuels used to meet the world's growing demand for electricity are changing. Gas will see strong growth, increasing 85 percent and approaching one-third of fuel inputs for electricity generation by 2040. The use of nuclear power doubles over the *Outlook* period, with strong capacity growth

16,000 terawatts

By 2040, global electricity demand will grow by about 16,000 terawatt hours (about four times the current usage of the U.S.). This growth is driven primarily by an increase in the industrial sector of more than 75 percent, followed by residential/ commercial.



in China and other developing countries as they seek to diversify their electricity supply. Renewables – biomass, wind, solar, hydro and geothermal – become a larger part of the fuel mix, although their contribution remains relatively small at less than 10 percent.

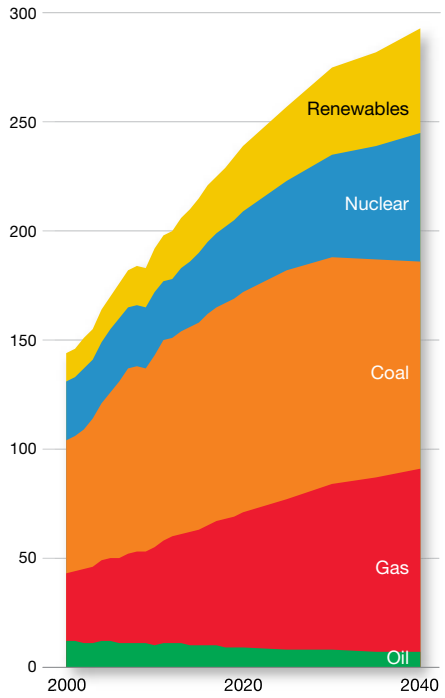
The fuel mix changes significantly by region. Non OECD countries experience growth across all fuel types (except oil) through 2025, with coal capturing the largest share, followed by gas. But that changes from 2025 on, as coal is driven down in the mix due to climate change policies and a shift toward more gas, nuclear and renewables. In total, Non OECD fuel consumption nearly doubles over the *Outlook*.

In OECD countries, ExxonMobil sees an ongoing transition from coal to gas in the first half of the *Outlook* period, with additional renewable- and nuclear-generating capacity becoming more significant after 2025. This will be driven in large part by the emergence of greenhouse gas policies that, together, will create a rising implied cost on carbon emissions through 2040 (see page 34).

Overall, OECD fuel demand grows until about 2030 and then begins to decline as a result of efficiency improvement gains, as a higher proportion of generating capacity utilizes more efficient technologies and fuels such as natural gas. As a result, the OECD is able to meet growing electricity demand with little growth in the overall amount of energy used to generate that electricity.

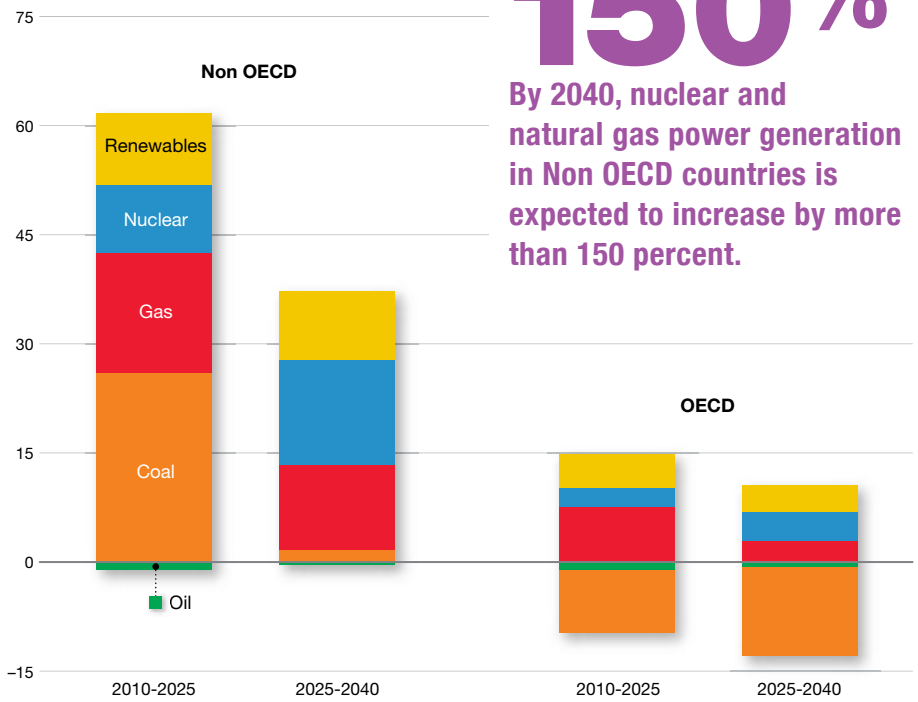
Fuel into electricity generation

Quadrillion BTUs



Growth in fuels for electricity generation

Quadrillion BTUs



150%

By 2040, nuclear and natural gas power generation in Non OECD countries is expected to increase by more than 150 percent.

Natural gas and nuclear become the most economic fuels for generating power

The economics of electricity are influenced by a number of factors, including technology, environmental impacts, public policies, capital investment costs and fuel prices. These factors considerably change the landscape in determining the most economic fuels for generating electricity.

Today, coal is a very competitive economic option for generating electricity. However, as costs arising from greenhouse gas policies are considered, natural gas becomes increasingly competitive, due to the fact that it emits up to 60 percent less CO_2 than coal when generating electricity. That is why by 2030, as implied CO_2 costs rise to about $60 per ton in the OECD, we expect global coal demand will begin a long-term decline for the first time in modern history.

Renewables are already playing a bigger role worldwide. As renewables – particularly wind and solar – gain share, there is increasing awareness of the potential downside that these intermittent resources may have on the cost and reliability of electricity supplies. This is particularly important in those areas where a significant share of generating capacity may not be available due to lack of wind or sunshine.

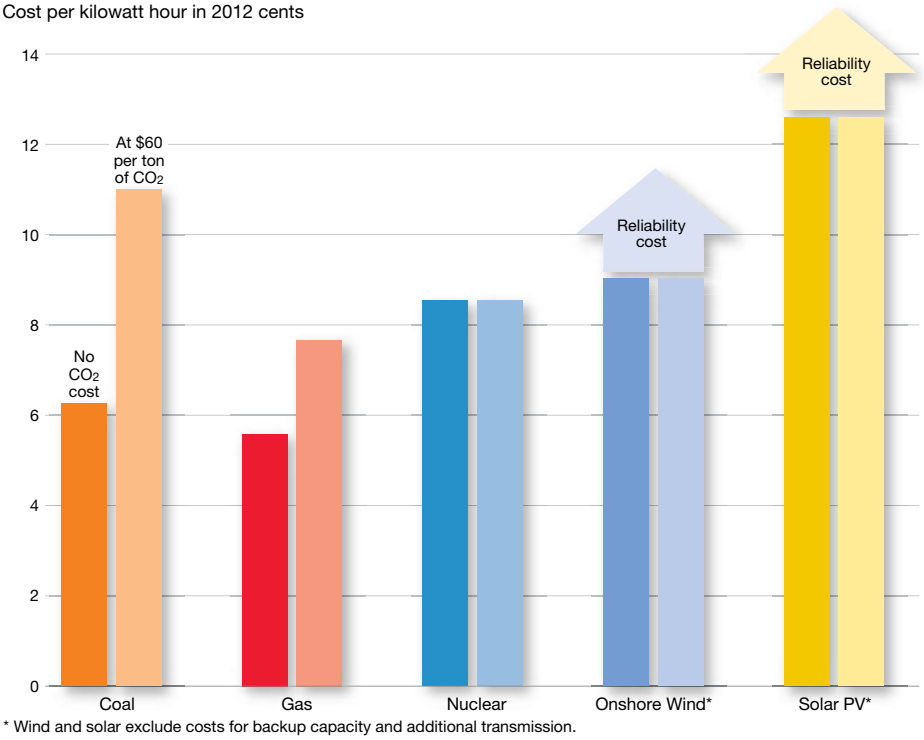
When the costs to overcome the challenges of intermittency and reliability are fully accounted for in the economics of wind and solar energy, it becomes clear that they will require subsidies, mandates or a relatively high cost of CO_2 to be competitive with other alternatives.

The United States represents a good example of how these variables can impact fuel demand for electricity. Coal faces a significant challenge from policies to reduce greenhouse gas emissions; wind and solar face challenges related to economics and reliability considerations (see page 31); and nuclear faces unique considerations regarding public perceptions of safety. At the same time, new gas-fired generating units use very efficient technologies and are easy to build at a reasonable cost, flexible to operate and supported by abundant gas supplies. As a result, gas is increasingly viewed as the most economical fuel choice for electricity generation for the United States.

In the future, carbon capture and storage (CCS) technologies may offer another approach to help reduce CO_2 emissions. However, the use of CCS will likely be limited until improved technologies are developed, and countries adopt appropriate legal and regulatory frameworks to manage its use and potential impacts over time.

Average U.S. cost of electricity generation in 2030

Cost per kilowatt hour in 2012 cents



* Wind and solar exclude costs for backup capacity and additional transmission.

60%

Natural gas, which emits up to 60 percent less CO_2 than coal when used for electricity generation, will gain the most. By 2040, natural gas will account for 30 percent of global electricity generation, compared to just over 20 percent today.

Electricity 201: The challenges of harnessing wind and solar energy

Wind and solar energy comprise an important and growing part of the global energy mix and have an important role to play in meeting energy needs. However, for decades, people have been working to overcome the challenges associated with harnessing the wind and sun to generate energy. The key obstacle is the intermittent nature of these natural resources: The sun doesn't shine 24 hours a day and the wind doesn't blow continuously.

To generate electricity from the sun, photovoltaic solar panels capture light energy, or photons. Various weather conditions can substantially impact the effectiveness of solar, for example when the air is humid or is of poor quality or when the skies are cloudy, making solar electricity generation intermittent.

Wind power generation depends on how fast wind is blowing. If wind speed is too low or too high, the turbine cannot generate electricity. This makes wind electricity generation variable and intermittent.

The availability of wind and sun at certain times of the day also factors into their use as reliable sources of energy. Solar power is best during mid-day. However, in many regions of the world, peak electricity demand occurs in the afternoon when air conditioning load is highest. In other regions, peak power demand occurs during winter evenings, when the sun has already set.

Because solar and wind cannot be relied on to always generate power when electricity is needed, other more flexible types of generation, such as hydro, coal or natural gas, must remain on standby to ensure reliability of the power system. However, hydropower is limited in supply and coal power generation emits the highest amount of CO_2 and is slow to start up. That makes natural gas the generation fuel of choice to complement wind and solar.

Gas emits up to 60 percent less CO_2 than coal when used for electricity generation. Gas plants are quick to start up and adjust to demand, are quicker and less costly to build, and have a smaller environmental footprint. Because gas generation produces minimal sulfur or particulates emissions, it can be located in populated areas. And unlike coal, onsite fuel storage is not required.

The intermittency and variability of wind and solar generation limit their practical ability to meet electricity demand. The need to have additional generation to ensure a reliable electricity supply increases their cost relative to alternatives like gas and nuclear. That's why, even though by 2040 wind-powered energy grows by seven times, it will only account for about 7 percent of global electricity supply. Likewise, solar power generation is expected to increase by more than 20 times, but will only account for about 2 percent of global electricity supply in 2040.

Emissions

Over the past decade, countries around the world have been working to address the risks associated with rising greenhouse gas emissions. Global emission growth patterns are already changing – reflecting the more widespread use of energy-efficient technologies and less carbon-intensive energy sources. After decades of growth, energy-related CO_2 emissions are expected to plateau around 2030, despite a steady rise in overall energy demand. From 2010 to 2040, the *Outlook* shows the growth rate of global CO_2 emissions will be about half that of energy demand.

20%

By 2040, CO_2 emissions in OECD countries will be 20 percent lower than in 2010.

Efficiency gains and public policies help reduce carbon emissions

Climate change policies will play a key role in limiting the growth of greenhouse gas in the future

Public policies are a key factor in assessing the energy future, particularly in the area of greenhouse gas (GHG) emissions.

Policies related to GHG emissions, and carbon emissions in particular, remain uncertain. But, for purposes of the outlook to 2040, ExxonMobil assumes a cost of carbon as a proxy for a wide variety of potential policies that might be adopted by governments over time to help stem GHG emissions such as carbon emissions standards, renewable portfolio standards and others.

For example, in most OECD nations, ExxonMobil expects the implied cost of CO_2 emissions to reach about $80 per ton in 2040. OECD nations will continue to lead the way in adopting these policies, with developing nations gradually following, led by China.

As seen in the electricity generation sector, these policies are likely to have a direct and significant impact on the fuel choices made by individual countries, including a shift away from coal as CO_2 costs rise.

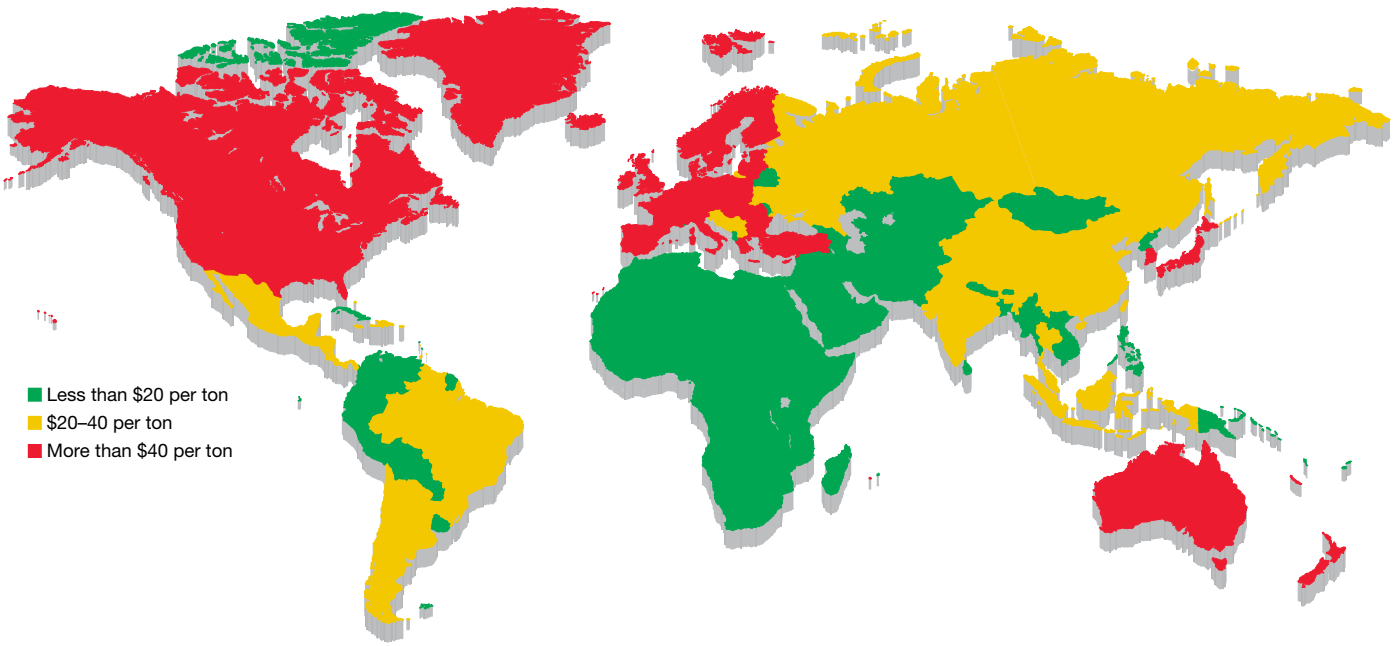
The introduction of rising CO_2 costs will have a variety of impacts on the economy and energy use in every sector and region within any given country. Therefore, the exact nature and the pace of GHG policy initiatives will likely be affected by their impact on the economy, economic competitiveness, energy security and the ability of individuals to pay the related costs.

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

A notable finding again in this year's *Outlook* is that CO_2 emissions are likely to peak in 2030 due to efficiency gains and a gradual transition to less carbon-intensive energy supplies.

CO_2 "proxy" cost

Assumed cost of CO_2 emissions associated with public policies in 2040 in 2012 dollars



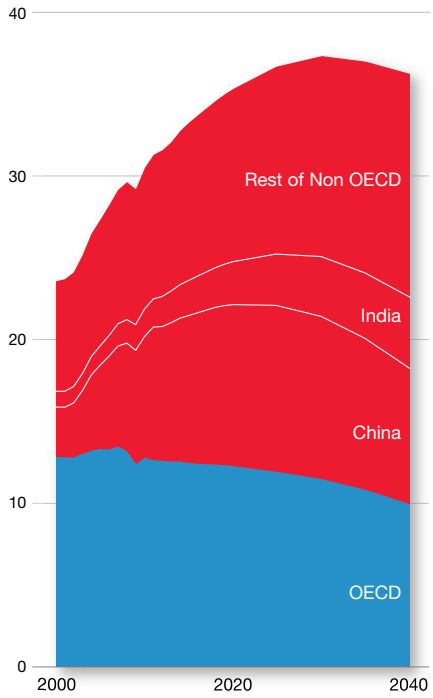
Globally, from 2010 to 2040, the rate of increase of CO_2 emissions will be about half that of energy demand growth. Two factors impact this: the wise and efficient use of energy and a shift to less carbon-intensive fuels. Of these factors, the most important over the *Outlook* relates to improving efficiency of energy use as people continue to improve their living standards.

In fact, emissions patterns through 2040 will vary greatly between OECD and Non OECD countries, reflecting the different stages of economic development and varying degrees and types of energy used at a national level. Overall, Non OECD emissions will rise close to 50 percent, as energy demand rises by about 65 percent. Over the same period, OECD emissions are likely to decline about 20 percent.

Non OECD emissions surpassed OECD emissions in 2004, and by 2040 Non OECD nations will account for about 70 percent of the global total. However, on a per-capita basis, OECD emissions will remain substantially higher. At the same time, OECD emissions will remain much lower on the basis of emissions per unit of economic output, reflecting a significantly higher degree of energy-efficient practices and technologies across their economies.

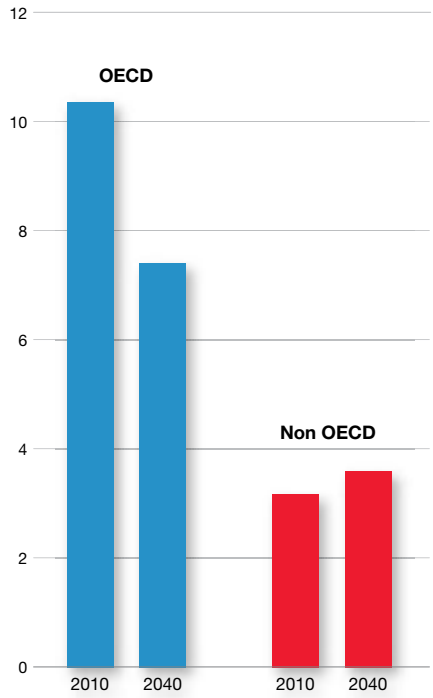
Energy-related CO_2 emissions by region

Billion tons



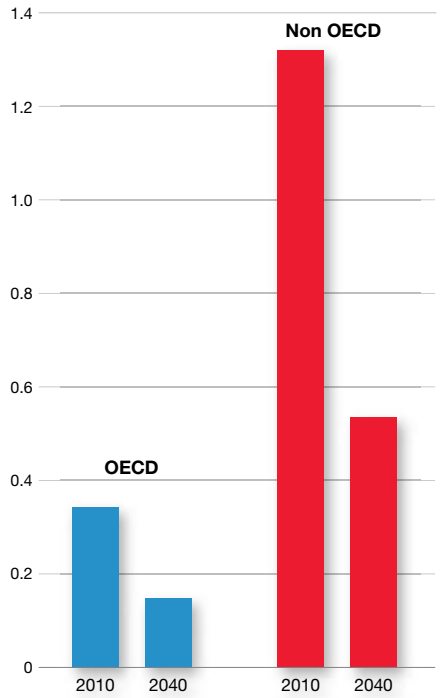
Energy-related CO_2 emissions per capita

Tons per person



Energy-related CO_2 emissions per GDP

Tons per thousand dollars of GDP, in 2005 dollars



Supply

Energy sources will continue to evolve and diversify as global energy demand surges. In one of the most significant developments shown over the *Outlook*, advancements in drilling technology will cause natural gas to overtake coal as the No. 2 fuel source by 2040. Oil is projected to remain the No. 1 fuel; however, alternative sources such as nuclear, wind, solar and biofuel will take on an increasingly large role in meeting the world's energy needs in the future.

60%

Oil and gas will supply about 60 percent of global energy demand in 2040, up from 55 percent in 2010.

Unconventional fuel supplies play a greater role in meeting energy demand

The global liquid fuel mix will require diverse types of supply

Over the *Outlook* period, the growth in so-called "unconventional" supplies due to technology advancements is critical. ExxonMobil projects total liquids demand to rise to 113 million barrels per day of oil equivalent (MBDOE) in 2040, a 30 percent increase from 2010. About 70 percent of this increase is tied to the transportation sector.

Conventional crude production from both OPEC and Non OPEC sources will see a slight decline over time. However, this decline is more than offset by rising production of crude oil from deepwater, oil sands and tight oil resources.

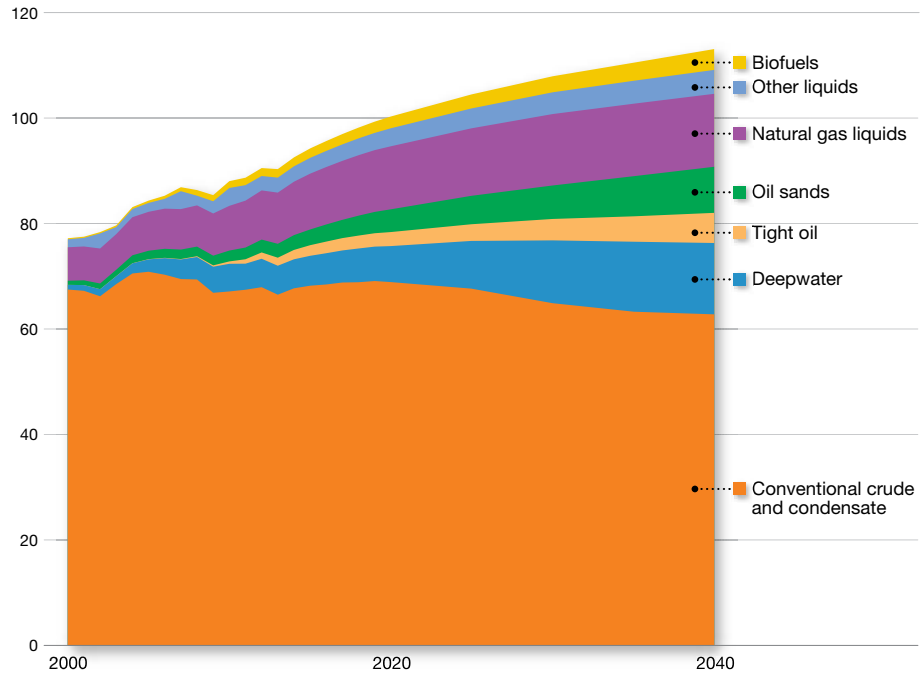
The successes of deepwater and oil sands developments are examples of how new technologies are key to delivering additional sources of liquid supplies to meet rising demand. Ten years ago, these supplies were barely on the radar screen.

The same is true for tight oil, which is growing as a result of recent advances in technology that have enabled the energy industry to unlock the oil found in "tight" rock formations. The advances are very similar to the ones that have enabled the growth in "unconventional" production of natural gas, which is also producing a rise in natural gas liquids (NGLs).

While the composition of the world's liquid fuels is changing, one fact does not: the world continues to hold significant oil resources. Even by 2040, ExxonMobil estimates that less than half of the world's recoverable crude and condensate will have been produced. Even with production, the resource base continues to grow due to the ability of the industry to find and develop new types of resources through improved science and technical innovations.

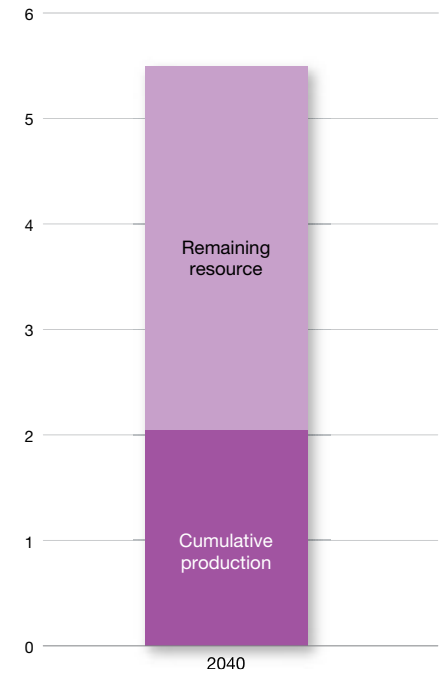
Liquids supply by type

Millions of oil-equivalent barrels per day



Crude and condensate resource

Trillion barrels of oil



Source: IEA

Technology-enabled oil and other liquid supplies are vital to meet rising demand

By 2040, only about 55 percent of the world's liquid supply will come from conventional crude oil production. The rest will be provided by deepwater, tight oil and NGLs, as well as oil sands and biofuels, as technology enables increased development of these resources (see page 43).

North America sees a dramatic rise, with production of technology-enabled supplies representing 75 percent of the region's total by 2040. The majority of this growth comes from tight oil, like the Bakken formation in North Dakota, deepwater developments in the Gulf of Mexico and Canadian oil sands. These supplies enable North American total liquids production to grow about 40 percent.

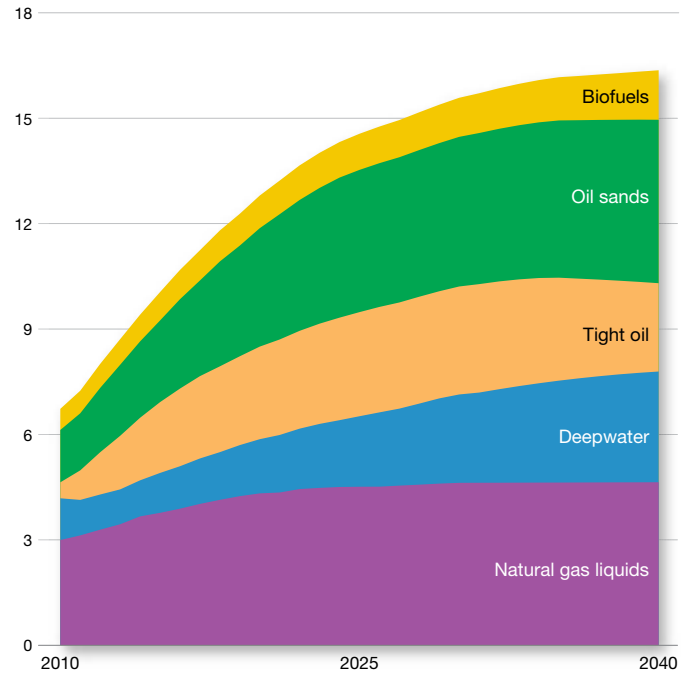
Total Latin American liquids production almost doubles due to developments in Brazil deepwater and Venezuelan oil sands, while in the Middle East, continued growth in conventional liquids along with NGLs and tight oil developments coming later in the *Outlook* period lead to 45 percent supply growth.

Large deepwater developments, primarily in Angola and Nigeria, drive growth in supplies in Africa.

As we look to the future, energy sources considered "unconventional" today are rapidly becoming conventional, thanks to the technologies available to produce them, giving them an increasingly significant role in the global energy mix.

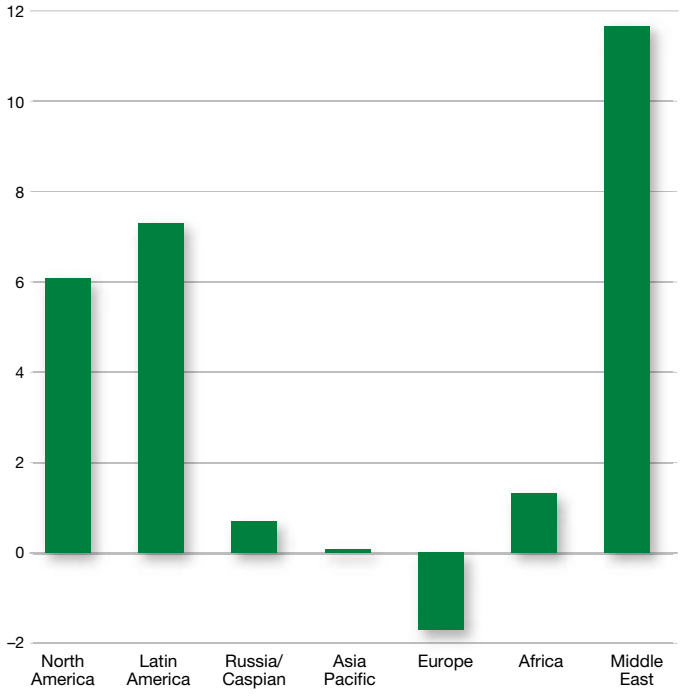
Major new liquids in North America

Millions of oil-equivalent barrels per day



Liquid supply growth by region, 2010-2040

Millions of oil-equivalent barrels per day



Natural gas is the fastest-growing major fuel

Global gas supply increases about 65 percent by 2040, with 20 percent of production occurring in North America

Natural gas plays an increasingly significant role in the energy fuel mix over the next 30 years as technological advancements help develop this abundant, clean energy resource. By 2025, natural gas will have overtaken coal as the second most consumed fuel, after oil.

In North America, unconventional gas production is expected to grow substantially to satisfy around 80 percent of gas demand by 2040. The growth in unconventional supplies is a result of recent improvements in technologies used to tap these resources (see page 43). This will provide opportunities for North America to become a potential natural gas exporter by about 2020.

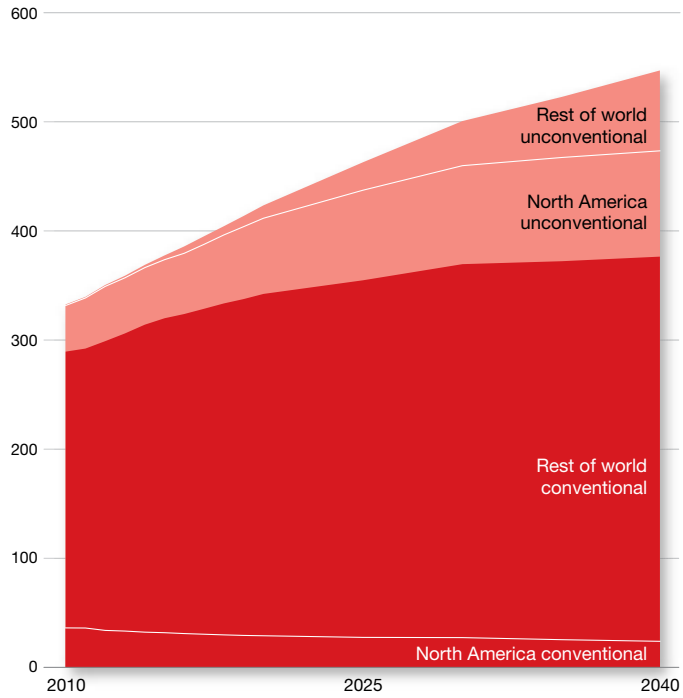
It is important to put North America's unconventional gas production in perspective. Globally, about 60 percent of the growth in natural gas comes from unconventional resources, which approach one-third of the global gas supply by 2040. New technologies are enabling economic exploration and development of what once was a hard-to-produce resource (see page 43). Shale gas comprises the largest component of unconventional resources, but it also includes coal bed methane and tight gas.

For the next two decades, over half the growth in unconventional gas supply will be in North America, moving the U.S. energy mix toward a lower-carbon resource. This competitive energy supply provides a strong foundation for increasing economic output in the United States, opening up new and valuable opportunities in many regions and sectors of the U.S. economy, including the energy sector and other industrial sectors such as chemicals, steel and auto manufacturing.

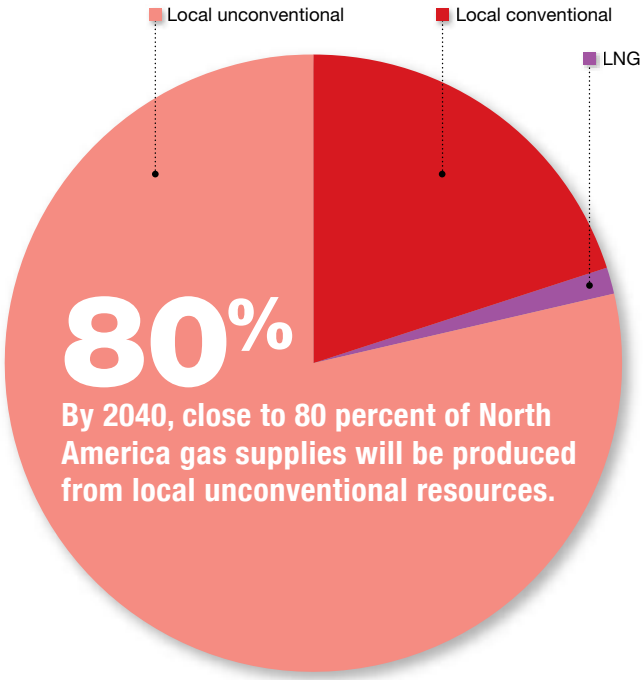
The shift toward natural gas will carry tremendous benefits for consumers and the environment. Natural gas is affordable, reliable, efficient and available. It is also the least carbon-intensive of the major energy sources, emitting up to 60 percent less CO_2 emissions than coal when used for electricity generation.

Global natural gas supply

Billions of cubic feet per day



North America natural gas demand by supply type in 2040

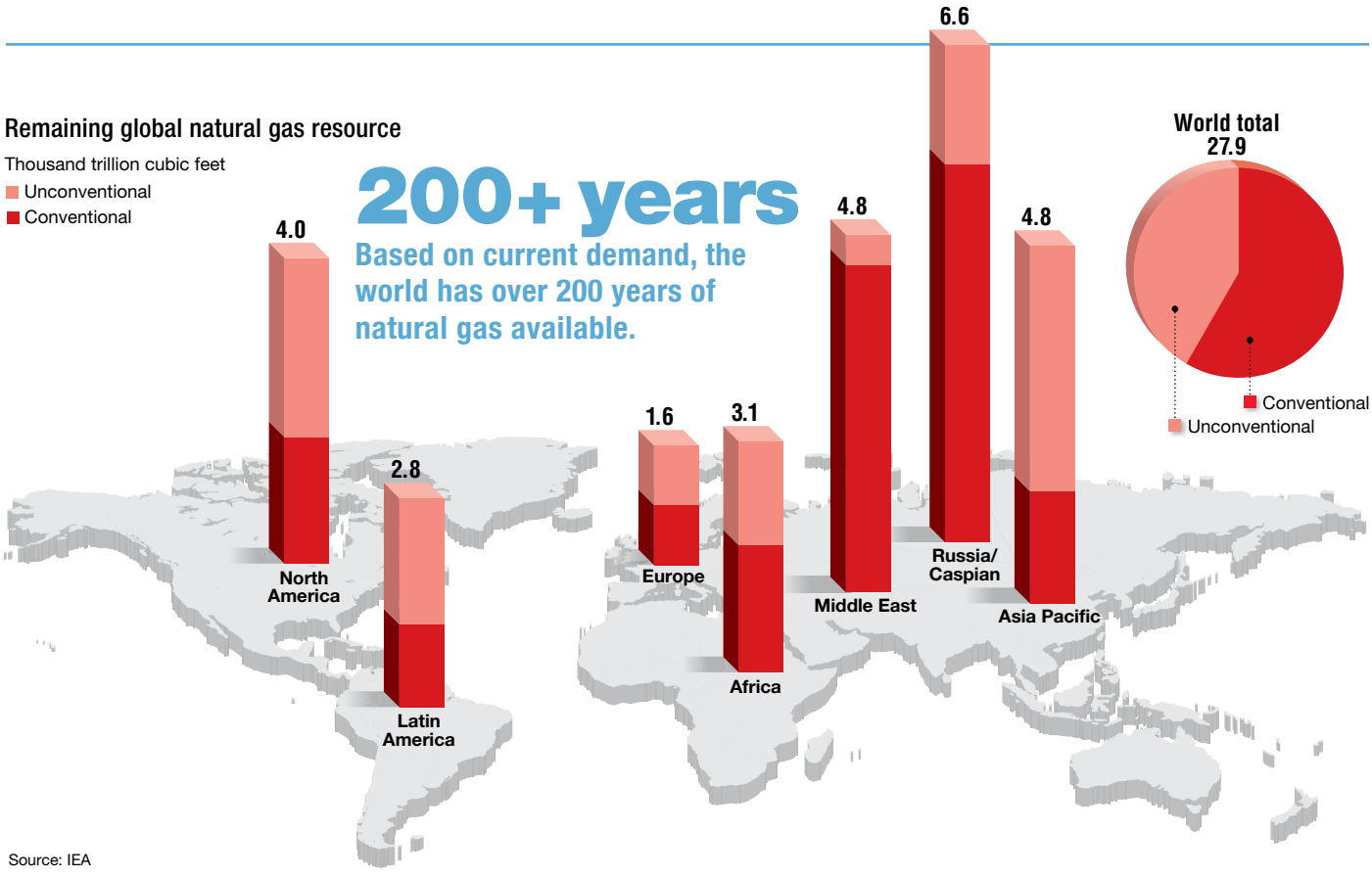


Natural gas is an abundant, widespread resource that will be the fastest-growing major fuel to 2040

The International Energy Agency estimates there is about 28,000 trillion cubic feet (TCF) of remaining natural gas resources across the globe. Experts believe this is enough natural gas to meet current demand levels for more than 200 years.

Globally, unconventional gas makes up about 40 percent of the estimated remaining resource. In North America, unconventional gas has a higher share – accounting for about two-thirds.

Unconventional gas production is increasing rapidly in North America. As for unconventional production in other parts of the world, it will take more time to understand the specific geology and technology required to economically produce the resource and to develop the infrastructure to move the gas to markets.



Source: IEA

Global energy mix continues to evolve

Oil, gas, nuclear and renewables grow, while coal experiences a decline by 2040

With global energy demand increasing around 35 percent from 2010 to 2040, a diverse, reliable and affordable fuel mix will be needed to provide the energy that enables economic growth and societal advancements. As our world changes – with improved living standards, more fuel-efficient vehicles and modern appliances and buildings, as well as increased limitations on greenhouse gas emissions – some important changes occur in the makeup of our energy supply.

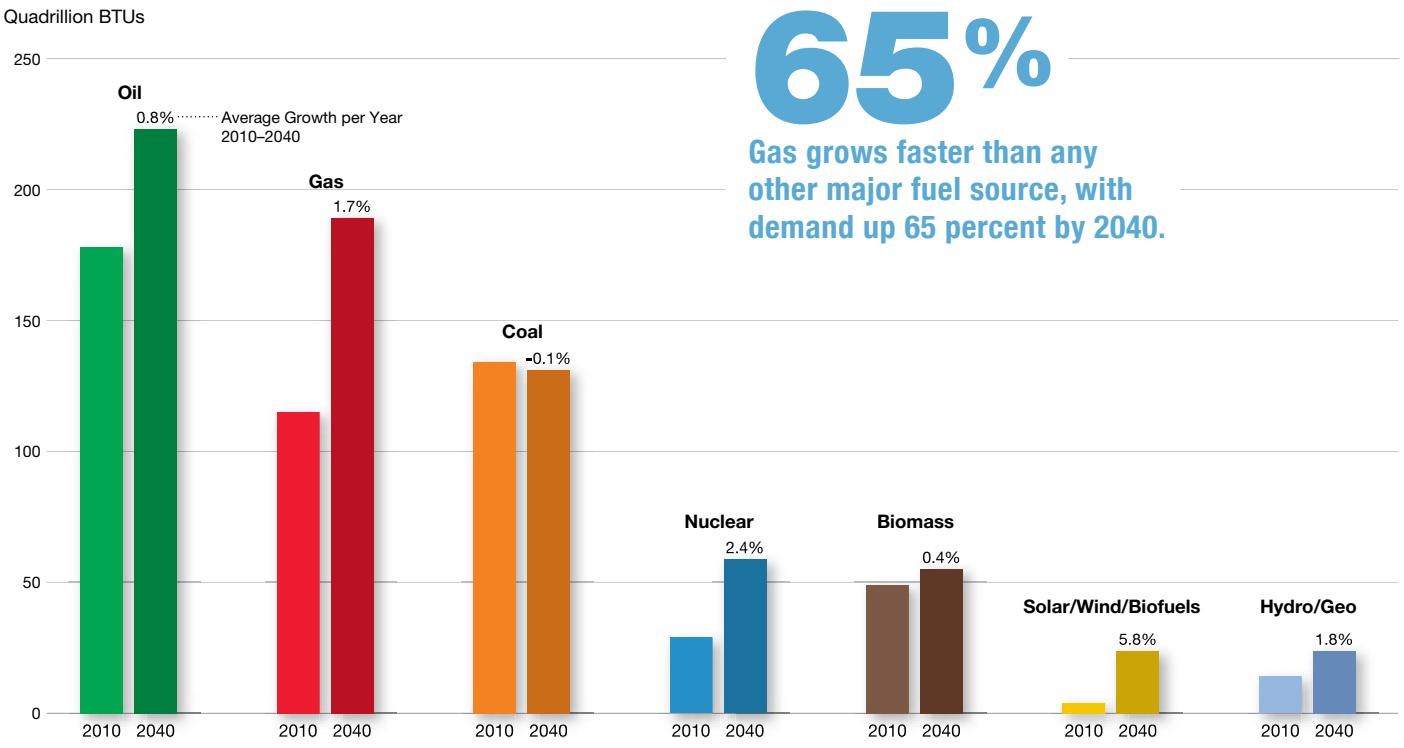
Oil will remain the largest single source of energy to 2040, growing around 25 percent. But the most significant shift in the energy mix occurs as natural gas displaces coal as the second-largest fuel by 2025. Gas will grow faster than any other major fuel source, with demand up 65 percent by 2040. An economical and clean fuel source, gas grows in importance as it helps meet rising power generation demand in the future.

Because they are abundant in supply and more economical to develop than other fuel sources, oil, natural gas and coal will continue to play a major role in long-term energy supply. Together, these three fuels will provide approximately 80 percent of total global energy by 2040. The industry has established stringent practices to ensure that producing wells protect groundwater while at the same time minimizing overall environmental impact.

Even so, as the world moves to less carbon-intensive fuel sources, coal will peak and begin a gradual decline in 2025 and is predicted to end up at about the same level it was in 2010 by the end of the *Outlook* period. Nuclear will grow significantly, mainly due to rising electricity demand and a desire to reduce CO_2 emissions. From 2010 to 2040, the use of nuclear energy is predicted to double.

Another notable shift in the energy mix is the significant growth in wind, solar and biofuels. These three fuels grow rapidly, with demand in 2040 more than five times the 2010 level. Still, by 2040, they will only make up 3 to 4 percent of total world energy, as greater advances in technology are needed to increase the commercial viability and associated economics of developing these resources.

Energy mix continues to evolve



65%

Gas grows faster than any other major fuel source, with demand up 65 percent by 2040.

Technologies in use for decades are now being integrated to safely tap once hard-to-produce supplies

Unconventional resources found in shale and other tight rock formations were once considered uneconomic to produce. Today, technology is helping unlock these resources in North America, with growing opportunities around the world.

In recent years, a combination of two technologies in use for decades – horizontal drilling and hydraulic fracturing – has enabled the energy industry to economically access and produce natural gas and oil found in shale and tight rock.

Horizontal drilling allows a well to be drilled horizontally underground for thousands of feet, providing greater access to reservoirs to enhance and maximize productivity and economic resource recovery. This drilling practice also reduces the environmental footprint by enabling the drilling of multiple wells from a single location.

In hydraulic fracturing, a solution – primarily water and sand, mixed with a small amount of chemicals – is injected into the rock thousands of feet underground to open very thin cracks, allowing trapped natural gas and oil to migrate to the well. This technology has been used safely in more than one million wells worldwide for the past six decades.

Together these two technologies have unlocked vast new supplies of natural gas and oil, which otherwise would not have been commercially viable.

The results are changing the landscape of energy supply in North America, particularly in the United States. For example, six years ago, production from North Dakota's Bakken region registered at a modest 6,000 barrels per day. Thanks to these combined technologies, in July 2012, production exceeded 600,000 barrels of oil per day – a 100-fold increase. Due to the use of technology in places like the Bakken, according to the U.S. Energy Information Administration, for the first time since the mid-1980s, crude production in the United States is increasing.

Other technologies are enabling the development of oil sands and heavy oil in North America and Latin America, as well as deepwater reservoirs worldwide. These advancements in technology are enabling energy companies to extend reliable and affordable supplies to meet growing energy demand.

SPECIAL SECTION

Global trade

From ancient caravans to the e-commerce of today, people have long engaged in trade to meet their needs. Trading, on its most basic level, is an act of exchanging something you have in relative abundance, for something others have that you need or would rather have. These are voluntary, mutually beneficial exchanges, otherwise they would not take place. Whether you are the seller or the buyer, the more opportunities there are to trade, the more wealth and value will be created for everyone. When options for trade are limited, so is the ability to make a good trade.

All trade – local, regional and international – reflects the relative limitations or advantages of both the buyer and the seller. Simply put, people, businesses and countries will focus their resources on developing the goods and services that they can produce most efficiently compared to others. To meet the rest of their needs, they'll buy or trade for the goods and services they don't produce themselves in a free marketplace. Free trade is a rational and voluntary choice by two parties, enabling them to meet their own specific needs and maximize the benefits across the global economy.

Energy imports and exports have been an important part of international trade for more than a century. Creating opportunities to expand the free trade of oil, natural gas, coal and chemicals remains vital to national economies around the world. Energy-related trades are fundamentally the same as the thousands of other products traded globally on a daily basis, like grain, cars, computer products and steel. Expanding trade opportunities for any product – including energy – helps economies grow and increases the prosperity of people around the world.

Energy trade helps fuel economic growth

Trade benefits people by making the supply of goods and services more efficient and economical

One of the hallmarks of modern international trade is significant integration and optimization of supply chains across the world. A great example is Apple's iPhone.™ Designed in California, its major components, such as flash memory, touch screen and application processor, are produced in Japan, Korea, Germany and other countries in addition to the U.S. Finally, all these are assembled in China into the final product – iPhone – which is then shipped all over the world. This sort of integration that routinely makes reliable and affordable products available for consumers around the world is only possible when we have robust international trade.

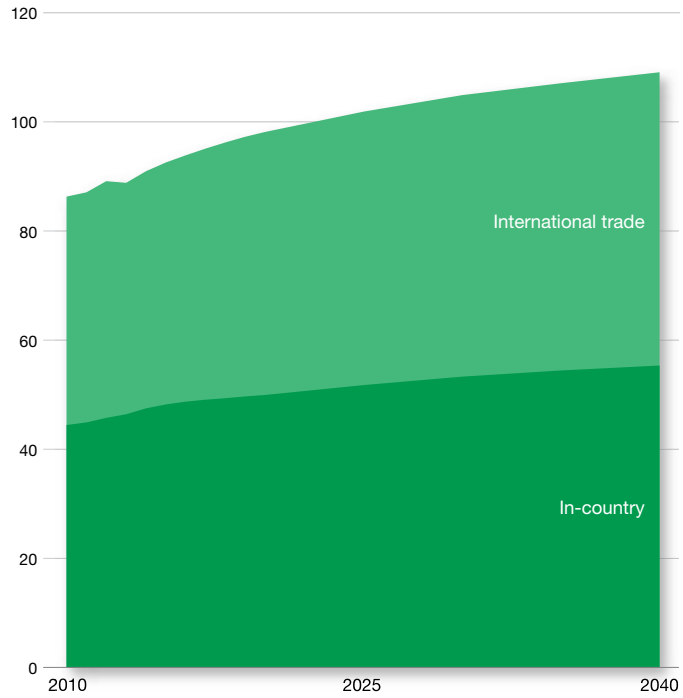
Although less visible, the energy industry is no stranger to this kind of integration. Substantial quantities of oil, natural gas and coal are freely and routinely traded on the international market every day, enabling abundant opportunities for buyers (importers) as well as sellers (exporters) to create value that helps fuel economic growth and improve living standards worldwide. Also, as energy trade benefits people and nations on both sides, these exchanges have a positive impact on international relations.

The ongoing evolution of energy trade illustrates comparative advantages of various parties in the energy supply chain. They occupy different stages of the value-adding processes, ranging from exploration and development of oil and natural gas resources, to refining of crude oil into liquid fuels or chemical feedstocks, and to the distribution of products such as gasoline and natural gas to end users for a wide variety of applications. In the end, not only the fuels, but also many of the finished products from downstream operations of the industry, as well as from other subsequent high-value-added industries, are traded worldwide to meet consumer needs.

Clearly, the free trade that enables an efficient link between energy suppliers and consumers – internationally and locally – is vital to ensuring reliable and affordable supplies for

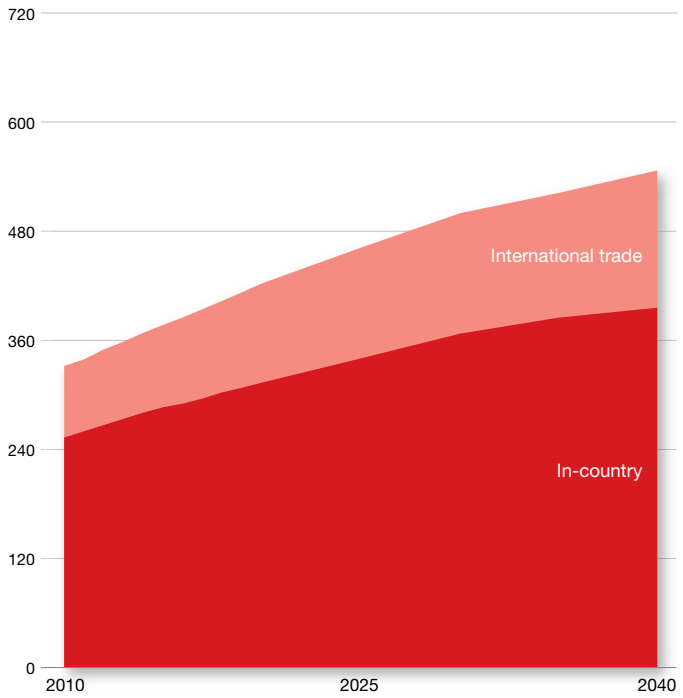
Oil supply to meet global demand

Millions of oil-equivalent barrels per day



Gas supply to meet global demand

Billions of cubic feet per day



households and businesses. In fact, meeting global oil demand today requires about one-half of the world's supplies to be traded internationally, while about one-fourth of global natural gas supplies are traded internationally. On a regional or national basis, trade can be of greater or lesser importance over time, depending on supply and demand patterns.

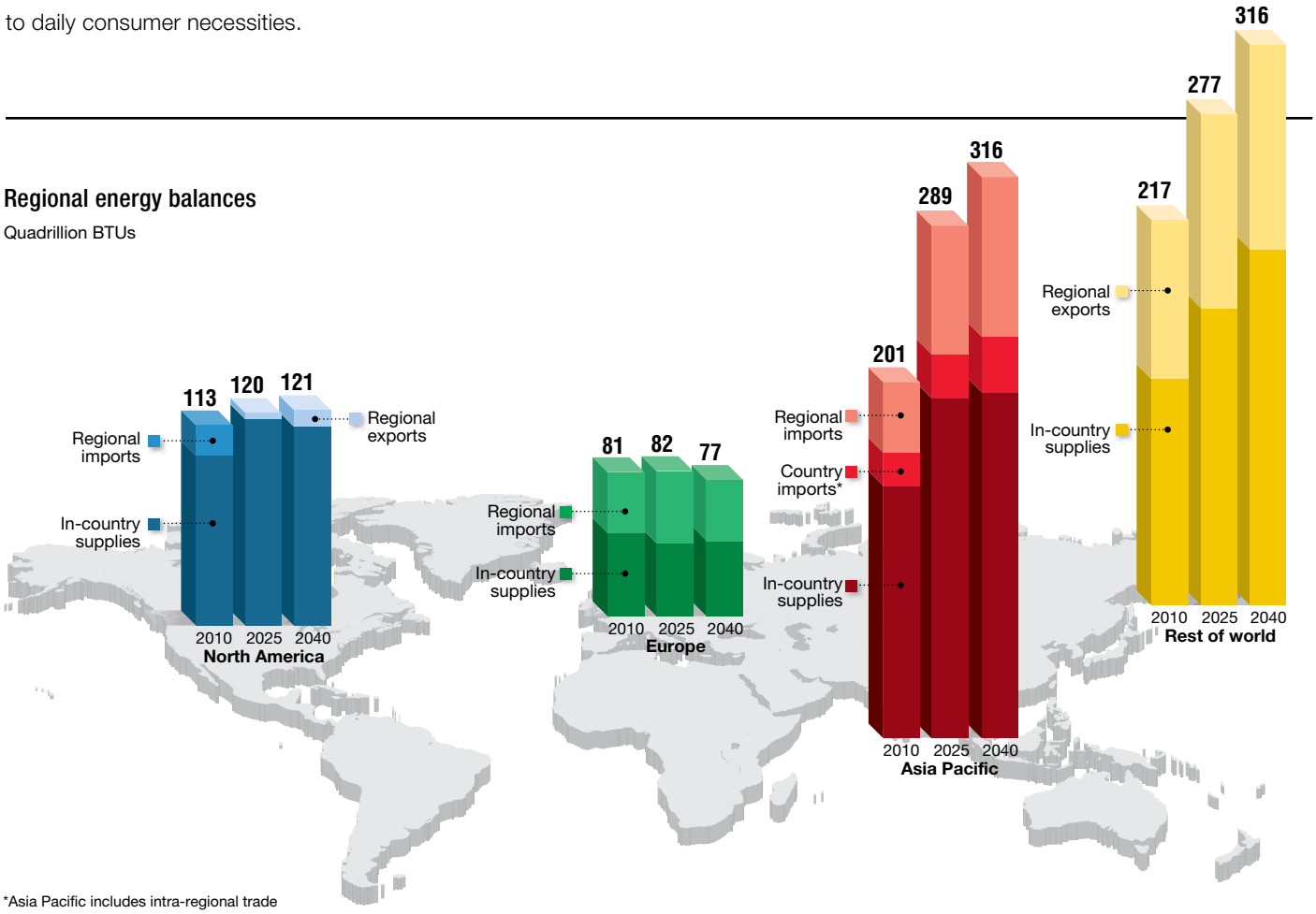
Regional energy balances to shift

Today, North America stands out as a prominent example of the dynamic nature of energy supply and demand over time. The region is capitalizing on advanced technologies to unlock huge oil and gas resources that were previously uneconomic to produce.

The comparative advantage offered by these local supplies is positioning North America to create significant economic value and consumer benefits. These economic benefits will spring not only from direct, value-added contributions of the energy industry, but also through indirect contributions from other industrial and commercial segments of the economy that benefit from reliable, affordable energy supplies. This includes the impact on economic petrochemical supplies, which serve as essential inputs widely used in high-value-added manufacturing processes for final products ranging from transportation vehicles to daily consumer necessities.

Overall, as its oil demand falls and oil and natural gas production rises, North America is also likely to transition to a net energy exporter by 2025. In contrast, Europe and Asia Pacific are likely to continue to call on international markets to meet a substantial portion of their energy requirements. The most significant change will occur in Asia Pacific, where demand is forecast to rise significantly faster than domestic supplies over the *Outlook* period. Here, the economic growth in the region, and the energy required to fuel it, will open more opportunities for energy trade.

The value of free trade is a fundamental principle of modern economics. Free trade helps optimize the allocation of scarce resources, maximize economic performance and improve standards of living worldwide. From North America to Asia Pacific, free trade leads to more choices, higher wealth and better jobs. Ultimately, it is an abundance of these trade opportunities that help advance prosperity and living standards for people around the world.



*Asia Pacific includes intra-regional trade

Energy supplies continue to change

Our world's energy supplies have changed throughout history. The most dramatic changes occurred in the past 50 to 60 years, as advances in our productivity and a dramatic evolution of technology enabled higher living standards and created better lifestyles for people.

Today, the world consumes about 25 times the amount of energy used 200 years ago. A diverse supply mix helps ensure more people around the world have access to energy that is reliable, affordable, convenient and clean.

The rapid rise of oil use from 1900 to 1950 fueled the growth of modern transportation and dramatic gains in intra- and inter-regional trade.

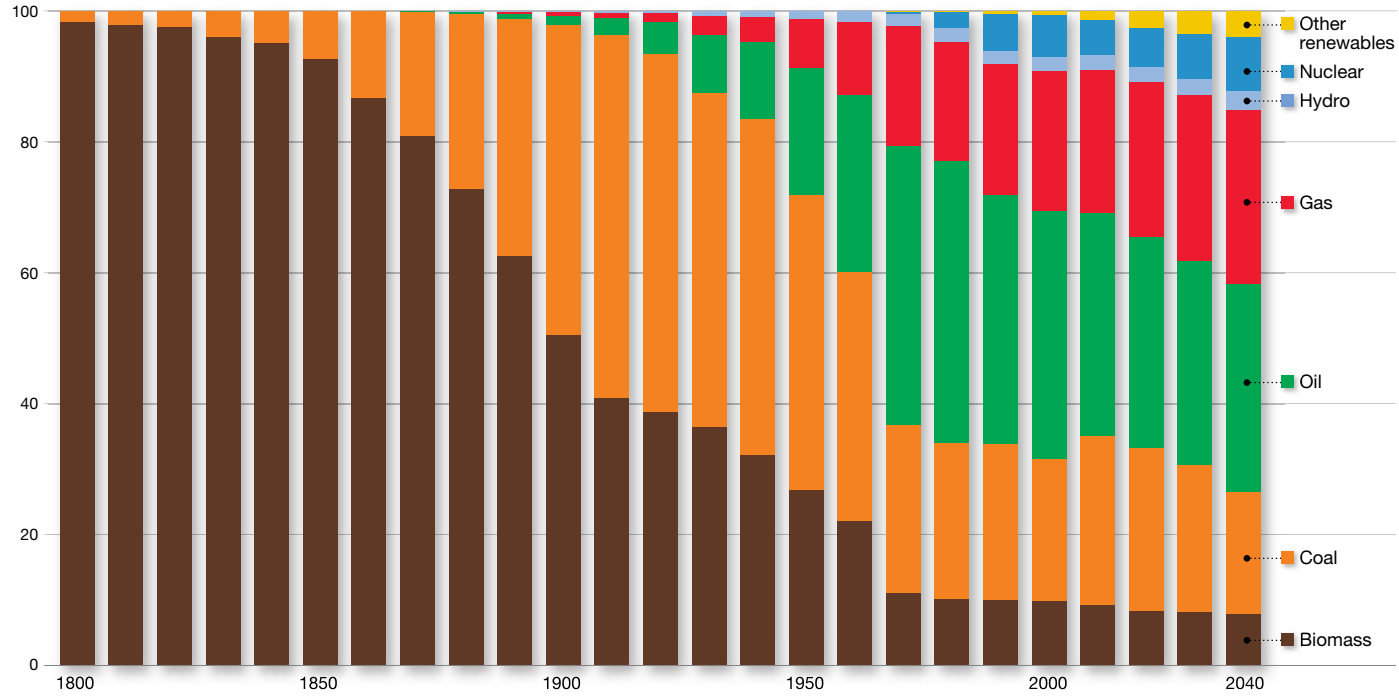
And today, natural gas is poised to surge as technology unlocks huge resources of this useful energy. At the same time, modern renewables are gaining prominence in many countries, in many cases as a result of significant public policies including public funding of new production capacity.

With advances in technology over the past decade, from computers to smartphones, it's easy to think that the fuel powering these advances might change just as quickly. But that's not the case. Developing new energy sources and scaling them up to make an impact takes time and resources. It took 100 years from the first oil well discovery until oil became the No. 1 source of energy in the world.

The IEA estimates that an unprecedented level of investment – an estimated $1.6 trillion per year on average – will be necessary to meet energy demand through 2035. That's why ExxonMobil looks ahead to develop an informed view of what the energy future will look like to 2040. A team of experts within ExxonMobil developed this energy forecast. This job is challenging, and subject to uncertainties and unexpected developments.

The evolution of energy, technology and the human progress it enables will continue. Ultimately, what types of fuel and how energy will be used will depend on actions taken by consumers, suppliers and policymakers. Being informed enables all of us to make better decisions about our energy future.

Global fuel mix by decade



Source: Smil, Energy Transitions (1800-1960)

World energy demand

WORLD Regions	Energy Demand (Quadrillion BTUs) 1990	 2000	 2010	 2025	 2040	Average Annual Change 2010-2025	 2025-2040	 2010-2040	% Change 2010-2025	 2025-2040	 2010-2040	Share of Total 2010	 2025	 2040
World	**360**	**416**	**522**	**654**	**705**	**1.5%**	**0.5%**	**1.0%**	**25%**	**8%**	**35%**	**100%**	**100%**	**100%**
OECD	190	225	230	234	223	0.1%	-0.3%	-0.1%	2%	-5%	-3%	44%	36%	32%
Non OECD	170	190	292	420	482	2.5%	0.9%	1.7%	44%	15%	65%	56%	64%	68%
Africa	17	22	29	44	61	2.7%	2.2%	2.4%	49%	38%	106%	6%	7%	9%
Asia Pacific	90	125	201	289	316	2.5%	0.6%	1.5%	44%	10%	58%	38%	44%	45%
China	33	44	97	146	142	2.8%	-0.2%	1.3%	51%	-3%	47%	19%	22%	20%
India	13	19	28	49	68	3.7%	2.2%	3.0%	74%	39%	141%	5%	8%	10%
Europe	74	78	81	82	77	0.0%	-0.4%	-0.2%	0%	-6%	-6%	16%	12%	11%
European Union	68	72	73	72	66	-0.1%	-0.5%	-0.3%	-2%	-8%	-10%	14%	11%	9%
Latin America	15	20	26	36	45	2.1%	1.5%	1.8%	37%	26%	73%	5%	5%	6%
Middle East	11	18	30	43	53	2.4%	1.4%	1.9%	44%	22%	76%	6%	7%	7%
North America	95	114	113	116	112	0.2%	-0.3%	0.0%	3%	-4%	-1%	22%	18%	16%
United States	81	96	94	94	89	0.0%	-0.4%	-0.2%	0%	-5%	-6%	18%	14%	13%
Russia/Caspian	58	38	42	45	43	0.4%	-0.4%	0.0%	7%	-5%	1%	8%	7%	6%
Energy by Type - World														
Primary	**360**	**416**	**522**	**654**	**705**	**1.5%**	**0.5%**	**1.0%**	**25%**	**8%**	**35%**	**100%**	**100%**	**100%**
Oil	137	158	178	208	223	1.1%	0.5%	0.8%	17%	7%	26%	34%	32%	32%
Gas	72	89	115	160	189	2.2%	1.1%	1.7%	39%	18%	65%	22%	24%	27%
Coal	86	90	134	156	131	1.0%	-1.2%	-0.1%	17%	-16%	-2%	26%	24%	19%
Nuclear	21	27	29	41	59	2.4%	2.5%	2.4%	42%	45%	106%	5%	6%	8%
Biomass/Waste	36	41	49	55	55	0.8%	0.0%	0.4%	13%	0%	14%	9%	8%	8%
Hydro	7	9	12	16	19	2.3%	1.1%	1.7%	40%	18%	66%	2%	2%	3%
Other Renewables	1	3	7	18	29	6.4%	3.3%	4.8%	152%	63%	311%	1%	3%	4%
End-Use Sectors - World														
Residential/Commercial														
Total	**87**	**98**	**116**	**138**	**148**	**1.2%**	**0.5%**	**0.8%**	**19%**	**7%**	**28%**	**100%**	**100%**	**100%**
Oil	13	16	15	16	16	0.4%	-0.2%	0.1%	7%	-3%	4%	13%	12%	11%
Gas	16	21	25	31	33	1.4%	0.5%	0.9%	23%	7%	31%	22%	22%	22%
Biomass/Waste	26	29	33	33	28	-0.1%	-1.0%	-0.5%	-1%	-13%	-14%	29%	24%	19%
Electricity	16	23	32	47	61	2.6%	1.7%	2.2%	48%	30%	92%	27%	34%	41%
Other	15	9	11	12	11	0.6%	-0.6%	0.0%	9%	-8%	0%	9%	8%	7%
Transportation														
Total	**65**	**81**	**99**	**124**	**141**	**1.5%**	**0.9%**	**1.2%**	**25%**	**14%**	**43%**	**100%**	**100%**	**100%**
Oil	64	79	94	114	125	1.3%	0.6%	1.0%	21%	10%	33%	95%	92%	89%
Other	1	1	4	10	16	5.2%	3.5%	4.3%	114%	68%	258%	5%	8%	11%
Industrial														
Total	**138**	**149**	**189**	**240**	**250**	**1.6%**	**0.3%**	**0.9%**	**27%**	**4%**	**32%**	**100%**	**100%**	**100%**
Oil	45	51	58	70	75	1.3%	0.5%	0.9%	21%	8%	30%	30%	29%	30%
Gas	31	37	43	57	66	1.8%	1.0%	1.4%	31%	17%	53%	23%	24%	27%
Coal	29	25	42	47	34	0.8%	-2.1%	-0.7%	13%	-27%	-18%	22%	20%	14%
Electricity	18	21	30	46	54	2.8%	1.1%	1.9%	52%	17%	78%	16%	19%	21%
Other	15	14	17	21	21	1.4%	0.2%	0.8%	23%	4%	27%	9%	9%	9%
Electricity Generation - World														
Primary	**118**	**144**	**192**	**258**	**292**	**2.0%**	**0.8%**	**1.4%**	**34%**	**13%**	**52%**	**100%**	**100%**	**100%**
Oil	15	12	10	8	7	-1.5%	-1.0%	-1.2%	-21%	-13%	-31%	5%	3%	2%
Gas	24	31	45	69	84	2.9%	1.3%	2.1%	53%	21%	85%	24%	27%	29%
Coal	48	61	88	105	95	1.2%	-0.7%	0.2%	20%	-10%	8%	46%	41%	32%
Nuclear	21	27	29	41	59	2.4%	2.5%	2.4%	42%	45%	106%	15%	16%	20%
Hydro	7	9	12	16	19	2.3%	1.1%	1.7%	40%	18%	66%	6%	6%	7%
Wind	0	0	1	5	10	10.5%	4.4%	7.4%	346%	90%	746%	1%	2%	3%
Other Renewables	3	4	7	13	19	4.1%	2.5%	3.3%	84%	45%	166%	4%	5%	6%
	Electricity Demand (Terawatt Hours)													
World	**10149**	**13175**	**18332**	**27490**	**34198**	**2.7%**	**1.5%**	**2.1%**	**50%**	**24%**	**87%**	**100%**	**100%**	**100%**
OECD	6657	8603	9578	11237	12154	1.1%	0.5%	0.8%	17%	8%	27%	52%	41%	36%
Non OECD	3492	4572	8754	16254	22044	4.2%	2.1%	3.1%	86%	36%	152%	48%	59%	64%
	Energy-Related CO_2 Emissions (Billion Tons)													
World	**21.3**	**23.6**	**30.5**	**36.7**	**36.3**	**1.2%**	**-0.1%**	**0.6%**	**20%**	**-1%**	**19%**	**100%**	**100%**	**100%**
OECD	11.3	12.8	12.8	11.9	9.9	-0.5%	-1.2%	-0.8%	-7%	-17%	-22%	42%	32%	27%
Non OECD	10.0	10.7	17.7	24.8	26.3	2.3%	0.4%	1.3%	40%	6%	49%	58%	68%	73%
	GDP (2005$, Trillions)													
World	**30**	**40**	**51**	**80**	**118**	**3.0%**	**2.7%**	**2.8%**	**56%**	**48%**	**131%**	**100%**	**100%**	**100%**
OECD	25	32	38	51	68	2.1%	1.9%	2.0%	37%	33%	82%	74%	65%	58%
Non OECD	5	7	13	28	49	5.1%	3.8%	4.4%	110%	75%	268%	26%	35%	42%
Africa	1	1	1	2	4	4.1%	3.8%	3.9%	82%	74%	217%	2%	3%	3%
Asia Pacific	6	9	14	26	43	4.3%	3.4%	3.9%	89%	66%	214%	27%	33%	37%
China	1	1	4	10	19	6.8%	4.3%	5.6%	169%	88%	406%	7%	13%	16%
India	0	1	1	3	6	6.3%	4.9%	5.6%	149%	106%	413%	2%	4%	5%
Europe	11	14	16	21	27	1.8%	1.7%	1.8%	31%	29%	69%	31%	26%	23%
European Union	10	13	14	18	23	1.7%	1.6%	1.6%	29%	27%	63%	28%	23%	20%
Latin America	1	2	2	4	6	3.6%	2.9%	3.3%	70%	54%	162%	5%	5%	5%
Middle East	1	1	1	2	4	4.0%	3.1%	3.6%	81%	58%	186%	3%	3%	3%
North America	9	13	15	22	31	2.5%	2.3%	2.4%	45%	40%	104%	30%	28%	26%
United States	8	11	13	19	26	2.4%	2.2%	2.3%	44%	39%	100%	26%	24%	22%
Russia/Caspian	1	1	1	2	3	3.6%	2.8%	3.2%	70%	52%	159%	2%	3%	3%
	Energy Intensity (Thousand BTU per $ GDP)													
World	**11.9**	**10.5**	**10.2**	**8.2**	**6.0**	**-1.5%**	**-2.1%**	**-1.8%**	**-20%**	**-27%**	**-42%**			
OECD	7.6	7.0	6.1	4.6	3.3	-2.0%	-2.2%	-2.1%	-26%	-28%	-47%			
Non OECD	31.1	25.8	21.7	14.9	9.8	-2.5%	-2.8%	-2.6%	-31%	-35%	-55%			

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

Regional energy demand

Regions	Energy Demand (Quadrillion BTUs unless otherwise indicated) 1990	2000	2010	2025	2040	Average Annual Change 2010-2025	2025-2040	2010-2040	% Change 2010-2025	2025-2040	2010-2040	Share of Total 2010	2025	2040
AFRICA														
Primary	17	22	29	44	61	2.7%	2.2%	2.4%	49%	38%	106%	100%	100%	100%
Oil	4	5	7	12	18	3.3%	2.6%	3.0%	64%	48%	142%	25%	28%	29%
Gas	2	4	5	8	11	3.4%	2.3%	2.9%	66%	41%	134%	16%	18%	18%
Coal	3	3	4	7	11	3.9%	3.0%	3.5%	78%	57%	178%	13%	16%	18%
Nuclear	0	0	0	0	1	5.7%	9.2%	7.4%	130%	275%	762%	0%	1%	2%
Biomass/Waste	8	10	13	16	18	1.3%	0.9%	1.1%	22%	14%	39%	44%	36%	30%
Hydro	0	0	0	1	1	5.5%	3.1%	4.3%	122%	58%	250%	1%	2%	2%
Other Renewables	0	0	0	0	1	12.5%	5.9%	9.1%	482%	137%	1280%	0%	1%	1%
End-Use Demand (including electricity)														
Total End-Use	15	20	26	36	48	2.3%	2.0%	2.1%	41%	34%	88%	100%	100%	100%
Residential/Commercial	7	9	13	18	22	2.2%	1.6%	1.9%	39%	26%	76%	49%	49%	46%
Transportation	2	3	4	7	10	3.1%	2.5%	2.8%	58%	45%	129%	16%	18%	20%
Industrial	6	8	9	12	16	2.1%	2.2%	2.1%	36%	38%	87%	34%	33%	34%
Memo: Electricity Demand	1	1	2	4	8	5.7%	4.4%	5.0%	129%	90%	335%	7%	12%	17%
Electricity Generation Fuel	3	4	6	12	20	5.2%	3.6%	4.4%	115%	70%	265%	19%	27%	33%
CO_2 Emissions, Billion Tons	0.7	0.9	1.1	1.9	2.8	3.5%	2.6%	3.1%	68%	48%	148%			
ASIA PACIFIC														
Primary	90	125	201	289	316	2.5%	0.6%	1.5%	44%	10%	58%	100%	100%	100%
Oil	28	43	56	77	88	2.2%	0.9%	1.5%	39%	14%	58%	28%	27%	28%
Gas	6	12	22	42	57	4.5%	2.1%	3.3%	94%	36%	164%	11%	14%	18%
Coal	32	42	89	118	102	1.9%	-0.9%	0.5%	33%	-13%	15%	44%	41%	32%
Nuclear	3	5	6	14	27	5.9%	4.3%	5.1%	136%	89%	345%	3%	5%	9%
Biomass/Waste	19	21	23	25	23	0.7%	-0.5%	0.1%	11%	-7%	3%	11%	9%	7%
Hydro	1	2	4	6	8	3.5%	1.5%	2.5%	69%	25%	110%	2%	2%	2%
Other Renewables	0	1	2	6	11	7.2%	3.8%	5.5%	184%	74%	394%	1%	2%	3%
End-Use Demand (including electricity)														
Total End-Use	76	98	151	213	228	2.3%	0.5%	1.4%	41%	7%	52%	100%	100%	100%
Residential/Commercial	29	33	42	54	58	1.7%	0.5%	1.1%	30%	7%	39%	28%	26%	26%
Transportation	11	18	26	42	53	3.1%	1.6%	2.4%	59%	27%	102%	17%	20%	23%
Industrial	36	47	82	117	117	2.3%	0.0%	1.2%	41%	0%	42%	55%	55%	51%
Memo: Electricity Demand	7	12	24	43	54	3.9%	1.6%	2.7%	77%	27%	125%	16%	20%	24%
Electricity Generation Fuel	23	41	77	122	146	3.2%	1.2%	2.2%	60%	19%	90%	38%	42%	46%
CO_2 Emissions, Billion Tons	5.3	7.4	13.2	18.2	18.1	2.2%	-0.1%	1.1%	38%	-1%	37%			
EUROPE														
Primary	74	78	81	82	77	0.0%	-0.4%	-0.2%	0%	-6%	-6%	100%	100%	100%
Oil	30	32	30	28	26	-0.5%	-0.6%	-0.6%	-8%	-9%	-16%	38%	34%	33%
Gas	12	17	20	22	22	0.6%	0.1%	0.3%	9%	1%	11%	24%	26%	29%
Coal	19	14	12	10	6	-1.2%	-3.6%	-2.4%	-16%	-42%	-52%	15%	13%	8%
Nuclear	8	10	10	10	10	0.1%	0.1%	0.1%	2%	2%	3%	12%	12%	13%
Biomass/Waste	2	3	5	5	5	0.2%	-0.9%	-0.3%	3%	-13%	-10%	6%	6%	6%
Hydro	2	2	2	2	2	0.2%	0.2%	0.2%	2%	3%	5%	3%	3%	3%
Other Renewables	0	0	2	4	6	6.2%	2.6%	4.4%	146%	48%	262%	2%	5%	8%
End-Use Demand (including electricity)														
Total End-Use	57	61	63	64	62	0.1%	-0.2%	-0.1%	1%	-3%	-2%	100%	100%	100%
Residential/Commercial	17	18	21	21	20	0.0%	-0.3%	-0.1%	0%	-4%	-4%	33%	32%	32%
Transportation	14	17	19	19	19	0.2%	0.0%	0.1%	3%	0%	3%	30%	30%	31%
Industrial	26	25	24	24	23	0.1%	-0.3%	-0.1%	1%	-5%	-4%	38%	38%	37%
Memo: Electricity Demand	9	10	11	13	14	1.0%	0.4%	0.7%	16%	6%	23%	18%	21%	23%
Electricity Generation Fuel	27	29	32	33	31	0.3%	-0.5%	-0.1%	4%	-8%	-4%	39%	41%	40%
CO_2 Emissions, Billion Tons	4.5	4.3	4.3	4.1	3.4	-0.4%	-1.3%	-0.8%	-5%	-17%	-22%			
LATIN AMERICA														
Primary	15	20	26	36	45	2.1%	1.5%	1.8%	37%	26%	73%	100%	100%	100%
Oil	8	10	12	16	18	1.7%	1.1%	1.4%	28%	17%	50%	47%	44%	41%
Gas	3	4	5	8	13	3.0%	2.8%	2.9%	55%	50%	133%	21%	24%	29%
Coal	1	1	1	1	1	2.0%	0.2%	1.1%	35%	4%	40%	3%	3%	3%
Nuclear	0	0	0	0	1	4.0%	3.5%	3.8%	81%	69%	204%	1%	1%	1%
Biomass/Waste	3	3	4	5	5	1.0%	0.5%	0.7%	16%	7%	24%	16%	13%	11%
Hydro	1	2	2	3	4	2.4%	1.2%	1.8%	42%	20%	71%	9%	9%	9%
Other Renewables	0	0	1	2	3	6.0%	2.8%	4.4%	139%	52%	262%	3%	5%	6%
End-Use Demand (including electricity)														
Total End-Use	14	18	23	31	39	2.1%	1.5%	1.8%	36%	26%	71%	100%	100%	100%
Residential/Commercial	3	4	4	6	6	1.8%	1.0%	1.4%	31%	17%	53%	18%	18%	16%
Transportation	4	5	7	10	13	2.6%	1.3%	1.9%	46%	22%	78%	31%	33%	32%
Industrial	7	9	12	15	20	1.8%	1.8%	1.8%	31%	32%	73%	51%	49%	51%
Memo: Electricity Demand	1	2	3	5	7	3.1%	2.3%	2.7%	59%	41%	125%	13%	15%	17%
Electricity Generation Fuel	3	4	6	9	12	2.9%	2.0%	2.4%	53%	35%	107%	23%	25%	27%
CO_2 Emissions, Billion Tons	0.7	0.9	1.2	1.6	2.0	2.0%	1.4%	1.7%	35%	24%	67%			

Regions	Energy Demand (Quadrillion BTUs unless otherwise indicated) 1990	2000	2010	2025	2040	Average Annual Change 2010-2025	2025-2040	2010-2040	% Change 2010-2025	2025-2040	2010-2040	Share of Total 2010	2025	2040
MIDDLE EAST														
Primary	11	18	30	43	53	2.4%	1.4%	1.9%	44%	22%	76%	100%	100%	100%
Oil	7	11	16	21	24	1.7%	0.9%	1.3%	30%	15%	49%	54%	49%	45%
Gas	4	7	13	21	26	3.1%	1.5%	2.3%	58%	25%	97%	45%	49%	50%
Coal	0	0	0	0	0	-2.5%	-2.0%	-2.2%	-31%	-26%	-49%	1%	1%	0%
Nuclear	0	0	0	0	2	-	7.9%	-	-	214%	-	0%	1%	3%
Biomass/Waste	0	0	0	0	0	6.4%	6.4%	6.4%	152%	154%	540%	0%	0%	0%
Hydro	0	0	0	0	0	5.0%	3.3%	4.2%	108%	63%	239%	0%	0%	0%
Other Renewables	0	0	0	0	0	8.4%	5.2%	6.8%	237%	113%	618%	0%	0%	1%
End-Use Demand (including electricity)														
Total End-Use	9	15	23	34	41	2.5%	1.4%	1.9%	44%	23%	77%	100%	100%	100%
Residential/Commercial	1	3	4	7	9	3.2%	1.9%	2.5%	60%	33%	112%	19%	21%	23%
Transportation	3	4	7	9	11	2.0%	1.3%	1.7%	35%	22%	65%	29%	27%	27%
Industrial	5	8	12	18	21	2.5%	1.2%	1.8%	44%	19%	72%	52%	52%	51%
Memo: Electricity Demand	1	1	2	5	7	4.3%	2.6%	3.4%	89%	46%	176%	10%	14%	16%
Electricity Generation Fuel	3	5	9	14	18	2.9%	1.7%	2.3%	54%	29%	99%	31%	33%	34%
CO_2 Emissions, Billion Tons	0.7	1.1	1.8	2.4	2.7	1.9%	1.0%	1.5%	33%	16%	54%			
NORTH AMERICA														
Primary	95	114	113	116	112	0.2%	-0.3%	0.0%	3%	-4%	-1%	100%	100%	100%
Oil	42	49	47	45	40	-0.3%	-0.7%	-0.5%	-4%	-10%	-14%	42%	39%	36%
Gas	21	26	27	34	36	1.6%	0.4%	1.0%	26%	6%	34%	24%	29%	32%
Coal	20	23	21	14	7	-2.6%	-4.7%	-3.6%	-32%	-51%	-67%	19%	12%	6%
Nuclear	7	9	10	12	14	1.2%	1.3%	1.3%	20%	21%	45%	9%	10%	13%
Biomass/Waste	3	4	3	4	3	0.5%	-0.3%	0.1%	7%	-4%	3%	3%	3%	3%
Hydro	2	2	2	3	3	1.3%	0.3%	0.8%	21%	4%	27%	2%	2%	3%
Other Renewables	1	1	2	5	8	5.3%	3.1%	4.2%	118%	59%	247%	2%	4%	7%
End-Use Demand (including electricity)														
Total End-Use	73	86	86	90	88	0.3%	-0.2%	0.1%	5%	-2%	2%	100%	100%	100%
Residential/Commercial	18	22	23	24	24	0.3%	0.0%	0.2%	5%	0%	5%	26%	26%	27%
Transportation	25	31	32	32	31	0.0%	-0.2%	-0.1%	0%	-3%	-3%	37%	36%	35%
Industrial	30	34	31	34	33	0.6%	-0.2%	0.2%	9%	-3%	5%	36%	38%	38%
Memo: Electricity Demand	11	15	16	19	21	1.3%	0.7%	1.0%	21%	11%	34%	18%	21%	24%
Electricity Generation Fuel	33	42	43	46	46	0.4%	0.0%	0.2%	6%	0%	6%	38%	39%	41%
CO_2 Emissions, Billion Tons	5.6	6.6	6.4	6.0	5.1	-0.4%	-1.2%	-0.8%	-6%	-16%	-21%			
RUSSIA/CASPIAN														
Primary	58	38	42	45	43	0.4%	-0.4%	0.0%	7%	-5%	1%	100%	100%	100%
Oil	18	8	9	10	9	0.5%	-0.2%	0.1%	7%	-3%	5%	21%	21%	22%
Gas	23	20	23	25	24	0.6%	-0.3%	0.1%	9%	-5%	4%	54%	55%	55%
Coal	13	7	7	6	4	-1.2%	-2.6%	-1.9%	-16%	-32%	-43%	16%	13%	9%
Nuclear	2	2	3	4	4	1.9%	1.2%	1.5%	33%	19%	57%	6%	8%	10%
Biomass/Waste	1	0	0	0	1	1.4%	1.1%	1.2%	22%	19%	45%	1%	1%	1%
Hydro	1	1	1	1	1	0.7%	0.4%	0.5%	11%	6%	17%	2%	2%	2%
Other Renewables	0	0	0	0	0	10.2%	5.9%	8.1%	332%	137%	922%	0%	0%	1%
End-Use Demand (including electricity)														
Total End-Use	46	29	33	34	33	0.3%	-0.2%	0.1%	5%	-3%	2%	100%	100%	100%
Residential/Commercial	12	9	9	9	8	-0.1%	-0.7%	-0.4%	-1%	-9%	-10%	28%	26%	25%
Transportation	6	3	4	5	5	1.1%	0.3%	0.7%	18%	4%	22%	13%	14%	15%
Industrial	28	17	19	20	20	0.3%	-0.1%	0.1%	5%	-1%	4%	59%	59%	60%
Memo: Electricity Demand	5	3	4	5	6	1.8%	0.8%	1.3%	31%	12%	47%	13%	16%	18%
Electricity Generation Fuel	27	19	20	21	20	0.5%	-0.5%	0.0%	8%	-8%	0%	47%	47%	46%
CO_2 Emissions, Billion Tons	3.9	2.3	2.5	2.5	2.2	0.0%	-0.8%	-0.4%	0%	-12%	-12%			

Glossary

ExxonMobil's *Outlook for Energy* contains **global projections through 2040.** In the *Outlook*, we refer to standard units for the measurement of energy:

Billions of cubic feet per day (BCFD). This is used to measure volumes of natural gas. One billion cubic feet per day of natural gas can heat approximately 5 million homes in the U.S. for one year. 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. It takes approximately 400,000 BTUs per day to run the average North American household. (Quad refers to quadrillion BTUs.)

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). Three hundred terawatt hours is equivalent to about 1 quadrillion BTUs (Quad).

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 vehicles on the world's roads today.

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