ExxonMobil

Taking on the world's toughest energy challenges.™

2012 The Outlook for Energy: A View to 2040

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This presentation 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

Welcome to *The Outlook for Energy*, ExxonMobil's long-term view of the world's energy future. With this edition, we have expanded the *Outlook* to the year 2040 for the first time.

What do we see over the next 30 years? The answer to that question varies by region, reflecting diverse economic and demographic trends as well as the evolution of technology and government policies.

Everywhere, though, we see energy being used more efficiently and energy supplies continuing to diversify as new technologies and sources emerge. Other key findings of this year's *Outlook* include:

> *"In the decades ahead, the world will need to expand energy supplies in a way that is safe, secure, affordable and environmentally responsible. The scale of the challenge is enormous and requires an integrated set of solutions and the pursuit of all economic options."*
>
> Rex W. Tillerson, ExxonMobil Chairman and CEO

- **Global energy demand will be about 30 percent higher in 2040 compared to 2010,** as economic output more than doubles and prosperity expands across a world whose population will grow to nearly 9 billion people. **Energy demand growth will slow** as economies mature, efficiency gains accelerate and population growth moderates.

- **In the countries belonging to the Organization for Economic Cooperation and Development** (OECD) – including countries in North America and Europe – **we see energy use remaining essentially flat,** even as these countries achieve economic growth and even higher living standards. In contrast, **Non OECD energy demand will grow by close to 60 percent.** China's surge in energy demand will extend over the next two decades then gradually flatten as its economy and population mature. Elsewhere, billions of people will be working to advance their living standards – requiring more energy.

- The need for energy to make electricity will remain the single biggest driver of demand. By 2040, **electricity generation will account for more than 40 percent of global energy consumption.**

- **Demand for coal will peak and begin a gradual decline,** in part because of emerging policies that will seek to curb emissions by imposing a cost on higher-carbon fuels. Use of renewable energies and nuclear power will grow significantly.

- **Oil, gas and coal continue to be the most widely used fuels,** and have the scale needed to meet global demand, making up about 80 percent of total energy consumption in 2040.

- **Natural gas will grow fast enough to overtake coal** for the number-two position behind oil. Demand for natural gas will rise by more than 60 percent through 2040. For **both oil *and* natural gas, an increasing share of global supply will come from unconventional sources** such as those produced from shale formations.

- **Gains in efficiency through energy-saving practices and technologies** – such as hybrid vehicles and new, high-efficiency natural gas power plants – **will temper demand growth *and* curb emissions.**

- **Global energy-related carbon dioxide (CO_2) emissions will grow slowly, then level off around 2030.** In the United States and Europe, where a shift from coal to less carbon-intensive fuels such as natural gas already is under way, emissions will decline through 2040.

ExxonMobil uses *The Outlook for Energy* to guide our global investment decisions. Because we know that the world's energy future will be shaped by decisions made not just by companies like ours, but also by policymakers and consumers, we share this document publicly to encourage a broader understanding of energy issues that affect us all.

Energy in everyday lives

From cars to cell phones, pharmaceuticals to plastics and air conditioning to water heating, energy is part of people's lives more than ever before.

But energy's benefits extend far beyond what people use individually at home, at work and on the road. A range of essential activities – including agriculture, computing, manufacturing, construction, and health and social services – depends on access to modern energy.

In addition, many familiar elements of modern life would not exist without the plastics, chemicals and fertilizers made from oil and natural gas.

Global fundamentals

Consider how modern energy enriches your life. Now consider the 7 billion other people on earth who also use energy each day to make their own lives richer, more productive, safer and healthier. Then you will recognize what is perhaps the biggest driver of energy demand: the human desire to sustain and improve the well-being of ourselves, our families and our communities. Through 2040, population and economic growth will drive demand higher, but the world will use energy more efficiently and shift toward lower-carbon fuels.

25%

The world's population will rise by more than 25 percent from 2010 to 2040, reaching nearly 9 billion people. Population and economic growth are key factors behind increasing demand for energy.

Demographics and economic expansion drive energy demand

Non OECD will see a steep rise in population, but demographics also shape energy demand

Population growth is one reason why ExxonMobil sees global energy demand rising by about 30 percent from 2010 to 2040. By 2040, there will be nearly 9 billion people on the planet, up from about 7 billion today.

But population growth is slowing. In some places – many OECD countries, plus China – populations will change little by 2040. This global deceleration, coupled with gains in energy efficiency, will further the significant slowdown in energy demand growth that has been under way for decades. For example, ExxonMobil sees global energy demand rising by 20 percent from 2010 to 2025, but by only 10 percent from 2025 to 2040.

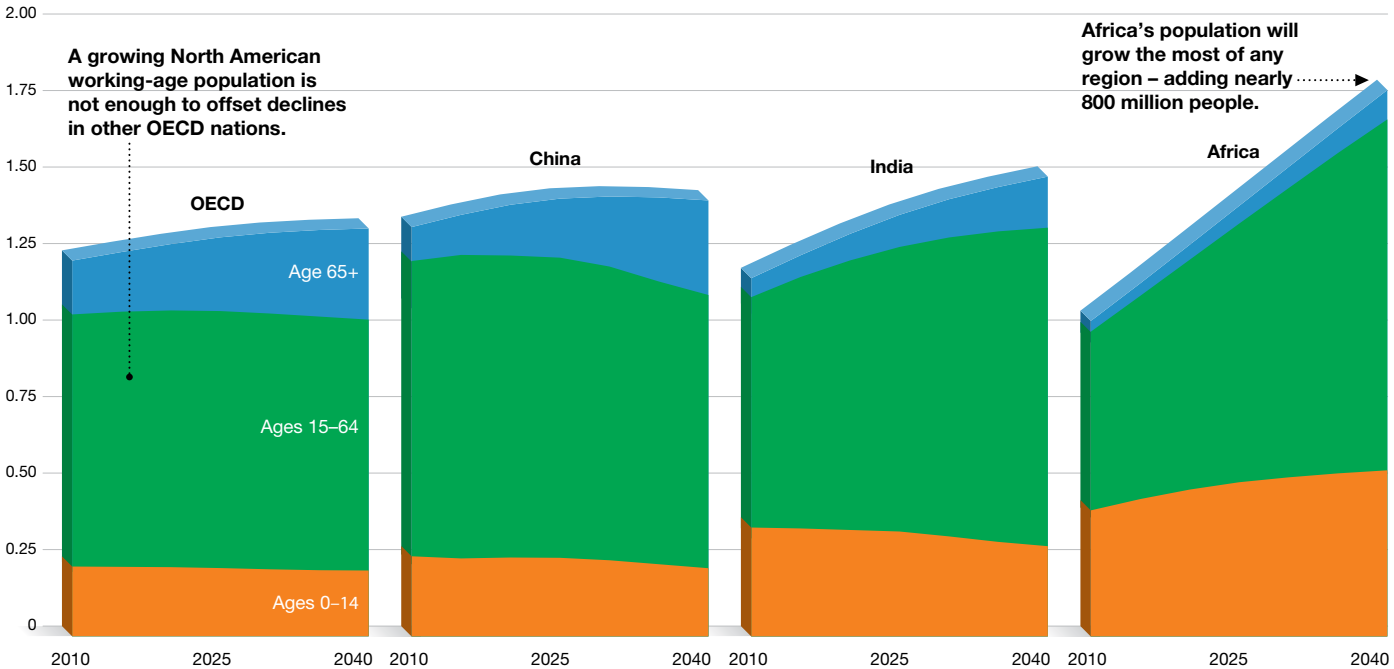
While population is a key to projecting energy demand, demographics matter, too. **Of particular importance is a country's working-age population** – people 15 to 64 years old – because that group is the engine for economic growth and energy demand.

In OECD countries, low birth rates and other factors are producing a rising percentage of older citizens. China, whose population will peak around 2030, will see a steep drop in its working-age group. This shift, tied to policies on family size, helps explain why **China's gross domestic product (GDP) growth – and its energy demand – is expected to moderate in coming decades.**

India, meanwhile, will see steep growth in its population and its working-age group, as will Africa. These demographic trends will help **India and Africa become two of the strongest areas of GDP growth through 2040.**

Demographics by region

Billions of people



Source: World Bank

"Nobody can do without energy. The relationship between economic growth and the demand of energy is crucial, and the availability of energy sources to economies is crucial."

Maria van der Hoeven
Executive Director, International Energy Agency

OECD energy demand flattens through 2040, but Non OECD demand rises by 60 percent as energy efficiency improves in all regions

The world's economies will continue to grow, but at varying rates. **ExxonMobil sees OECD economies expanding by about 2 percent a year** on average through 2040, as the United States, European nations and others gradually recover and return to sustained growth. **Non OECD economies will grow much faster, at almost 4.5 percent a year.**

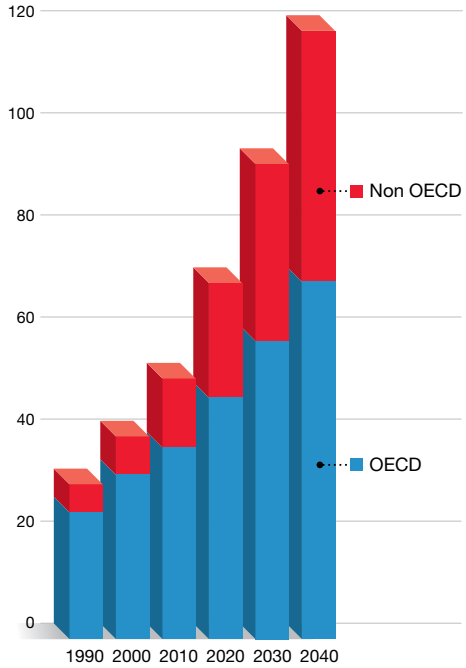
This economic growth – and the improved living standards it enables – will require more energy. ExxonMobil expects **global energy demand to be about 30 percent higher in 2040 than in 2010.** While that is a significant increase, and meeting it will require trillions of dollars in investment and advances in energy technology, growth in energy use would be **more than four times that amount were it not for expected gains in energy efficiency across the world's economies.** Some of these efficiency gains will come from ongoing improvements in technologies and energy management practices; some will be spurred by policies that impose a cost on CO_2 emissions *(see page 30)*.

The power of efficiency can be seen most clearly in the more mature economies of the **OECD where energy demand will remain essentially flat** through 2040 even as GDP nearly doubles.

Efficiency will have a big impact in Non OECD countries, too. But these gains will not be enough to offset the rise in energy demand associated with having five-sixths of the world's population accelerating its progress toward better living standards and greater prosperity. ExxonMobil sees **Non OECD energy demand rising by nearly 60 percent.** However, even by 2040, per-capita energy use in these countries will be about 60 percent less than in the OECD.

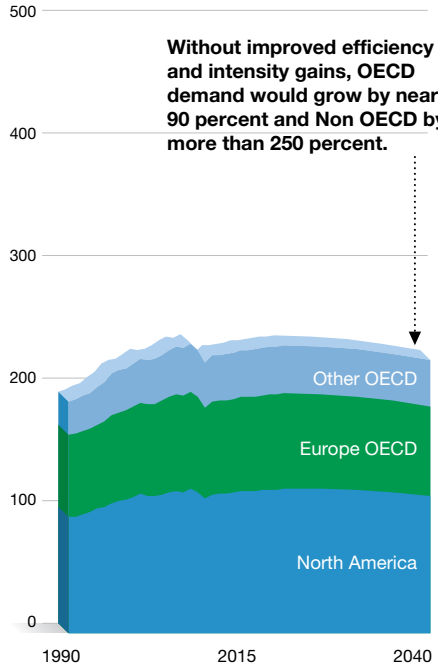
Global GDP by region

Trillions of 2005 dollars



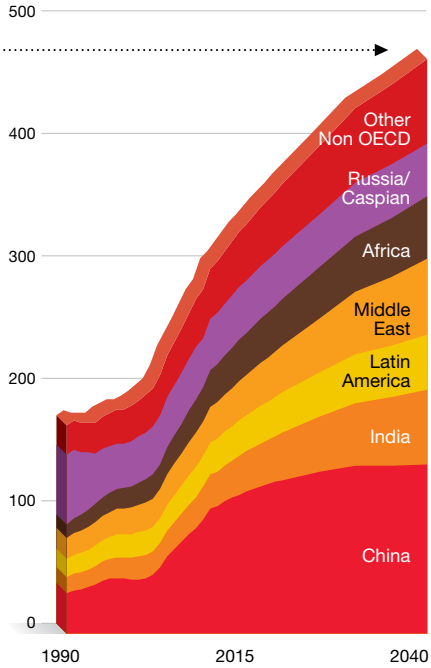
OECD energy demand

Quadrillion BTUs



Non OECD energy demand

Quadrillion BTUs



The world's energy continues to evolve

Natural gas will become the world's number-two fuel as demand shifts to lower-carbon sources

Even with advances in efficiency, rising populations and expanding economies will produce a net increase in global energy demand. Demand for all forms of energy is projected to rise at an average annual rate of 0.9 percent a year from 2010 to 2040.

Oil will remain the world's top energy source, led by 70-percent growth in liquid petroleum demand in Non OECD nations. **The fastest-growing major energy source will be natural gas, with global demand rising by about 60 percent from 2010 to 2040.** By 2025, natural gas will have risen to become the second most widely used source of energy worldwide.

Demand for coal, on the other hand, will peak around 2025 and then decline, as improved efficiency couples with a shift to less carbon-intensive energies, particularly in the electricity generation sector *(see page 28)*. This shift will be led by the OECD, but even China, which today accounts for close to 50 percent of global coal demand, will see its coal usage fall by more than 10 percent through 2040. This would mark the first long-term decline in global coal usage since the start of the Industrial Revolution. **Nonetheless, oil, gas and coal combined account for about four-fifths of the fuel mix throughout the *Outlook* period.**

Global demand for the least carbon-intensive fuels – natural gas, nuclear and renewables – will rise at a faster-than-average rate. Nuclear power will grow on average at about 2.2 percent a year – a substantial increase, but lower than projections prior to the 2011 tsunami damage to the Fukushima plant in Japan.

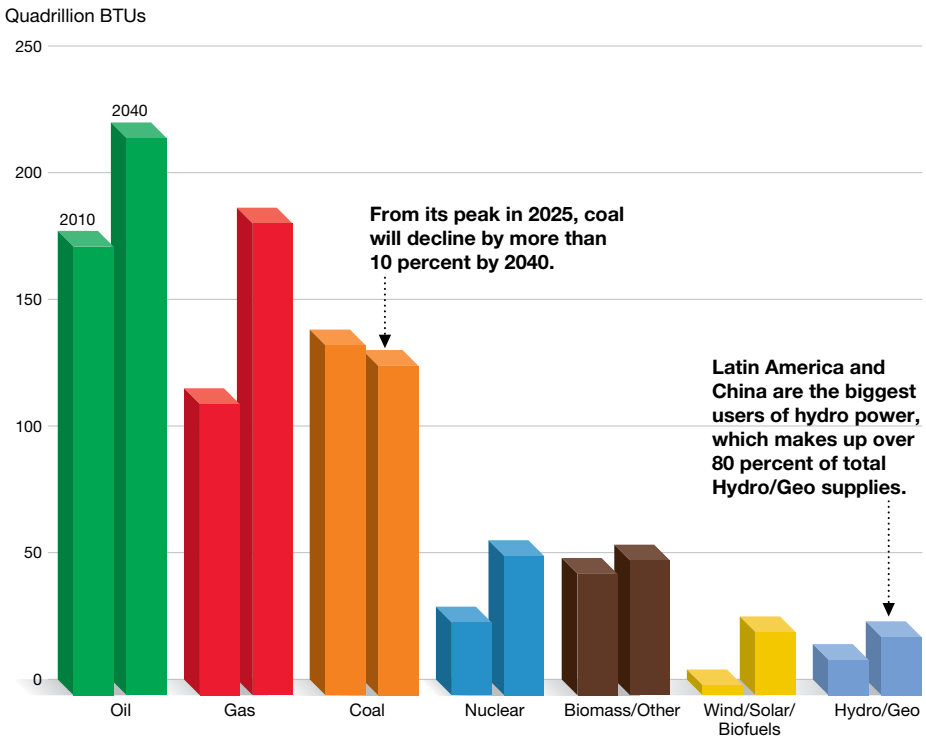
Wind, solar and biofuels also will see strong growth. By 2040, they will account for about 4 percent of global demand. **Growth in wind power is especially rapid.** Wind is the fastest-growing energy source in the *Outlook* period, rising at about 8 percent a year – or more than 900 percent – over the period.

60%

OIL AND NATURAL GAS SHARE OF GLOBAL DEMAND

By 2040, oil and natural gas will be the world's top two energy sources, accounting for about 60 percent of global demand, compared to about 55 percent today. Gas is the fastest-growing major fuel source over this period, growing at 1.6 percent per year from 2010 to 2040. Investments and new technologies, applied over many years and across multiple regions, will enable energy supplies to grow and diversify *(see page 36)*.

Global energy demand by fuel type



The Outlook for Energy: How it guides our investments

All of ExxonMobil's major investments have their roots in *The Outlook for Energy*. For example, over the past 15 years, **we have spent more than $10 billion to expand our refining and petrochemical production in Singapore** because we expect economic growth across the Asia Pacific region will continue to spur demand for transportation fuels and the chemicals used for plastics and other manufacturing.

Our decision over a decade ago **to invest with Qatar Petroleum to develop their natural gas reserves** was grounded in our view that global demand for gas would rise significantly, as was our $41 billion **purchase of XTO Energy** in 2010. And projected strength in commercial transportation demand, coupled with tightening emissions standards, drove our 2008 decision to invest more than $1 billion to **expand clean diesel production capacity** in the United States and Europe.

ExxonMobil invested more than $125 billion in energy projects over the past five years. As big as those investments are, the International Energy Agency estimates that to meet energy demand, global energy infrastructure investment will need to average approximately $1.5 trillion per year (in year-2010 dollars) through 2035, with half of that amount related to oil and natural gas.

What else does *The Outlook for Energy* tell us about how best to meet the future needs of the world's energy consumers? Our long-term forecasts show that the world's energy supplies will continue to grow more diverse, and our investments reflect those forecasts. In addition to our continued investments in conventional oil and gas production, **ExxonMobil also is making significant investments in oil sands, deepwater and Arctic production, and the oil and natural gas supplies found in shale and other rock formations.**

Demand for reliable, affordable energy exists every day in every community. Successfully meeting this demand requires foresight and effective long-term planning, followed by huge investments and years of work to build the infrastructure required to produce and deliver energy and chemicals. It also takes an ongoing ability to understand and manage an evolving set of technical, financial, geopolitical and environmental risks in a dynamic world. *The Outlook for Energy* is an essential tool to help us provide the energy needed for continuing human progress.

Residential/ commercial

Homes and businesses represent a significant portion of global energy demand, especially when electricity usage is considered. Through 2040, economic expansion, rising prosperity and a continued rise in the number of households globally will cause demand to grow by 25 percent in the residential/ commercial sector. Energy use in this sector continues shifting toward electricity and natural gas.

40%

By 2040, electricity will provide 40 percent of the world's residential/commercial energy demand.

Prosperity and population growth drive residential/commercial energy demand

Residential energy demand increases as Africa and China lead a 50-percent rise in the number of households worldwide

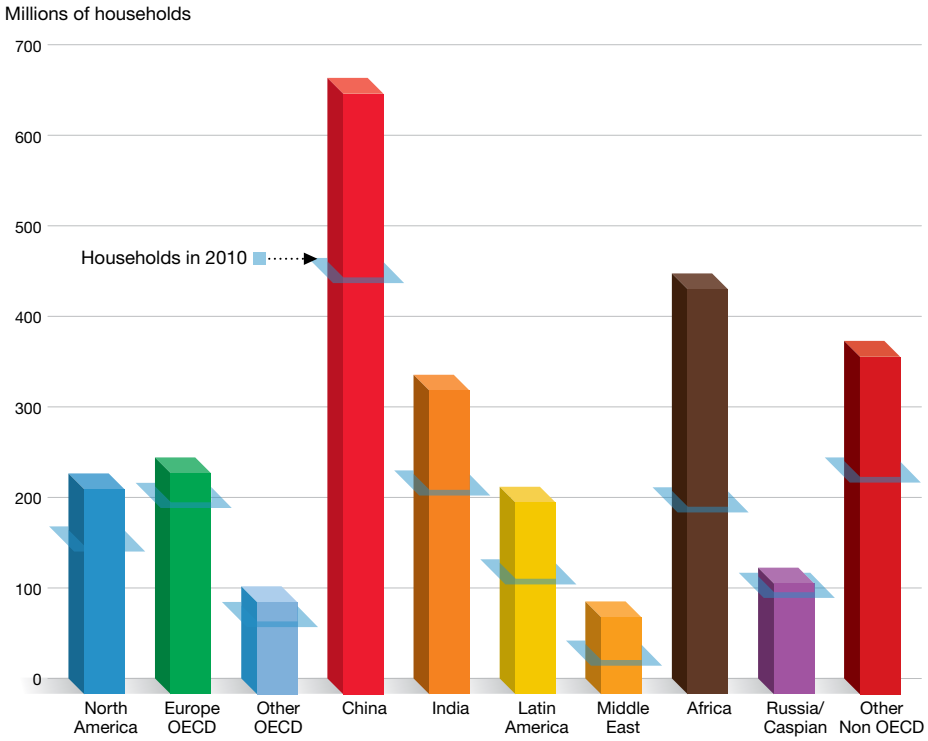
By 2040, there will be 2.8 billion households in the world, an increase of nearly 50 percent from 2010. These households will need energy for lighting, heating, cooking, hot water and refrigeration, as well as electricity to run everything from computers to air conditioners.

Every region will see a net increase in households through 2040, **but growth will be particularly strong in Africa, China, India and Latin America.** The reasons vary. In Africa, it is an expected sharp rise in population. In China, it is rising affluence, which enables fewer multifamily or shared households. In India and Latin America, it is a mix of both. By 2040, these four regions will account for about 60 percent of all households in the world.

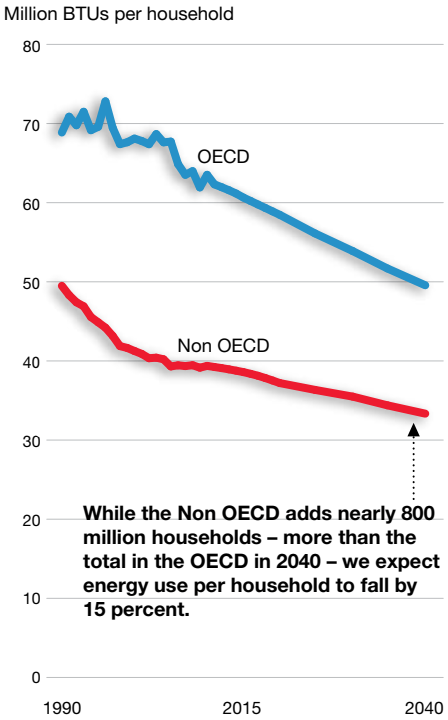
Through 2040, global growth in households will more than offset projected improvements in residential energy efficiency, resulting in rising demand in this sector. Yet in terms of the relationship between people, their homes and their energy use, it is important to remember that **significant differences exist between regions.**

For example, although India and Africa will have the largest *populations* by 2040, each will have *fewer homes* than China. Also, while the number of households in Africa, China and India will rise sharply, accounting for 60 percent of total household growth, average *energy use per household* in Non OECD nations will remain relatively low; even by 2040 it will be only about two-thirds of the level of the average household in the OECD.

Households by region in 2040



Residential energy use per household



Energy use in commercial buildings in the United States varies widely. It averages over 100,000 BTUs per square foot of floor space each year. Households typically use less than half that amount.

U.S. Department of Energy
Buildings Energy Data Book 2010

Economic activity spurs a rise in energy demand for businesses, with growth led by Non OECD

Residential/commercial demand for energy, including electricity, is expected to rise by about 25 percent from 2010 to 2040. **Virtually all of this increase will come from Non OECD countries, and almost all of it will be met by two forms of energy: electricity and natural gas** *(see page 14)*.

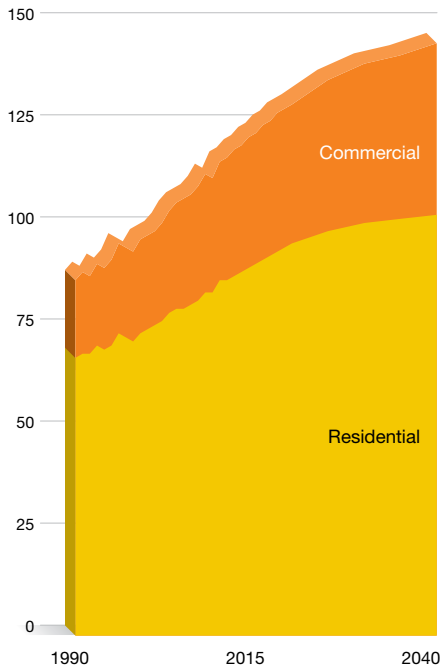
Broken down by subsector, *residential* energy demand is expected to rise through 2030, then flatten as global growth in households and population begins to slow around that time. On the other hand, *commercial* demand for energy will continue to grow on a global basis though 2040, as economic advancement in Non OECD countries will require more energy, particularly electricity, for stores, hospitals, schools and businesses.

China, which today is one of the largest users of energy for residential/commercial purposes, will see demand flatten in this sector after 2025 as its population nears a peak *(see page 6)* and energy efficiency continues to improve. **But residential/commercial demand will continue to rise sharply in Africa, India and other developing regions, including the Middle East and Southeast Asia.**

In OECD countries, demand in the residential/commercial sector will be little changed through 2040, as modest population and economic growth is offset by gains in energy efficiency.

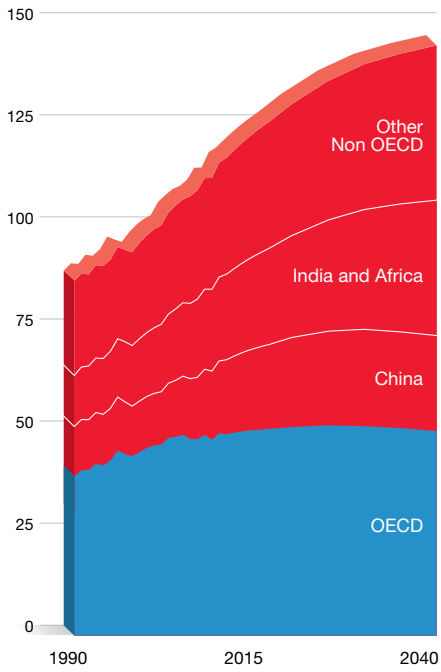
Residential/commercial demand by sector

Quadrillion BTUs



Residential/commercial demand by region

Quadrillion BTUs



25%

INDIA AND AFRICA'S SHARE OF RESIDENTIAL/COMMERCIAL DEMAND BY 2040

India and Africa will be two of the fastest-growing sources of residential/commercial energy demand. Together, the two regions will account for about 25 percent of demand in this sector by 2040, up from less than 20 percent in 2010. This growth is the result of a large increase in the number of households, as well as growth in retail stores and other commercial activities. By 2040, Africa's residential/commercial energy demand will be nearly equal to China's.

Residential/commercial demand shifts to electricity

Use of traditional biomass fuels will continue to fall sharply in Non OECD countries

Perhaps the most dramatic element of the residential/commercial sector is not *how much* energy will be used in homes and businesses over the next 30 years, but *what types*. Globally, ExxonMobil expects **residential/commercial demand to continue shifting *toward* electricity and *away* from primary fuels used directly by consumers.** This trend has been under way for several decades, but will continue to strengthen over the *Outlook* period.

By 2040, electricity will account for about 40 percent of the energy used in the residential/commercial sector, compared to less than 30 percent today. This shift helps explains why electricity generation will be the fastest-growing source of energy demand through 2040 *(see page 26)*.

The shift to electricity in the residential/commercial sector is happening in all parts of the world, but for varying reasons. In OECD countries, electricity is mostly displacing oil, as economics and other factors drive consumers away from fuels such as liquefied petroleum gas (LPG), kerosene or distillate for their heating and cooking needs.

In Non OECD countries, electricity is increasingly supplementing or replacing traditional biomass fuels. This trend is positive in several ways. Traditional biomass fuels such as wood and dung are harmful to air quality and dangerous to use. Increased access to modern energy helps reduce poverty and improve health, education, safety and social progress. **Even today, more than 1.3 billion people – one-fifth of the world's population – lack access to electricity.**

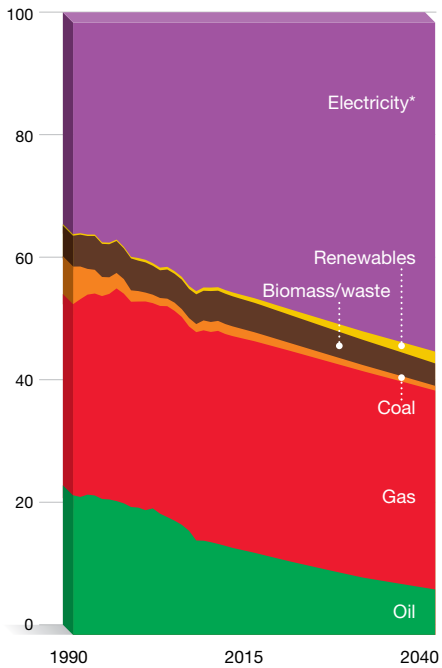
30%

GAS SHARE OF OECD DEMAND IN 2040

Natural gas is the second most commonly used fuel for residential/commercial purposes in developed countries, and by 2040 it will account for 30 percent of their demand in the sector. Gas is very versatile; it can be used for space heating, water heating, commercial cooling, cooking, drying, and combined heat and power in commercial buildings.

OECD residential/commercial fuel demand by market share

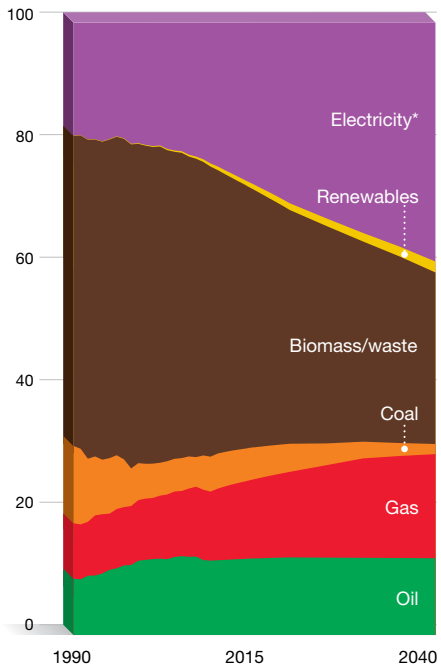
Percent



*Includes market heat

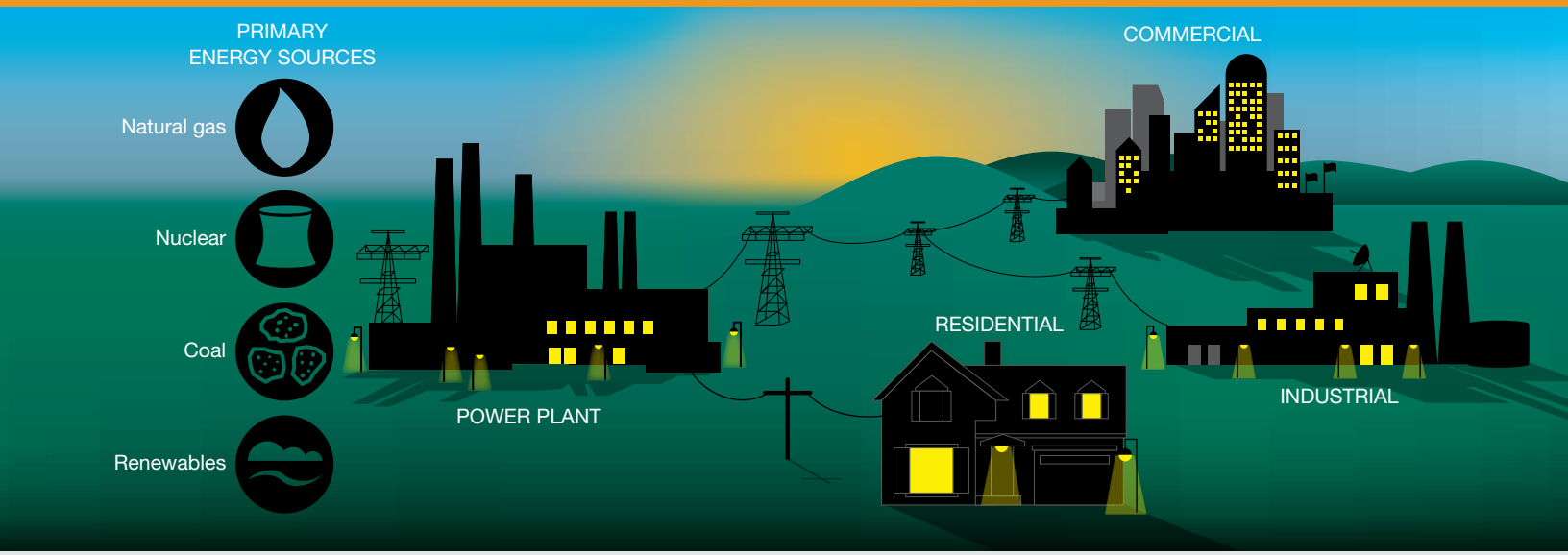
Non OECD residential/commercial fuel demand by market share

Percent



Electricity primer:

How primary energy is used to produce electricity for consumers



Since electricity is invisible, yet ready at the flip of a switch, it can be easy to overlook its origins. But understanding energy trends requires awareness that the electricity we use today – in our homes, offices and industries – comes from power plants, where operators use primary energy (natural gas, coal, etc.) to generate electric power.

Many generators use heat from burning coal, natural gas or biomass, or the heat that arises from nuclear reactions or geothermal resources. This heat is used to create steam, which is then used to spin a turbine. Alternately, turbines can be spun directly by water or wind energy. In either case, the mechanical energy from the turbines is transformed, using magnets, into electricity. In the case of solar photovoltaics, light is transformed directly into electricity.

No matter the source, **it takes a significant amount of energy to make electricity.** Globally, more than 35 percent of the primary energy consumed on a daily basis is being used to make electricity.

Also important to know is that **a significant amount of energy is *lost* in the electricity generation process.** For example, a new turbine powered by coal or nuclear (which produce about 55 percent of global electricity) is, at most, about 40-percent efficient. That means that for every 100 units of primary energy that go into these plants, only 40 units or less are converted to useable electrical energy. New natural gas plants are more efficient, with a 60-percent efficiency rate.

In addition to the losses during electricity production, a significant amount of electricity also is lost as it is sent to consumers across transmission lines. These “line losses” total about 10 percent in OECD nations and 15 percent or more in the Non OECD. **Improving efficiency in power generation and transmission represents one of the biggest opportunities for curbing growth in energy demand and CO_2 emissions in coming decades.**

One of the challenges of electricity is that, unlike other forms of energy, **it cannot be cost-effectively stored in large quantities for later use.** As a result, intermittent sources such as wind and solar – which generate electricity only when the wind blows or the sun shines – must be integrated with other on-demand or “dispatchable” sources such as natural gas, coal and nuclear. Despite these challenges, demand for electricity continues to grow because it is a uniquely versatile energy source, standing ready to be used for a variety of purposes in homes, businesses and industries around the world.

Transportation

One of the most profound shifts in energy usage through 2040 will come from the transportation sector. The proliferation of hybrid and other advanced vehicles – along with improvements to conventional-vehicle efficiency – will result in flattening demand for *personal transportation*, even as the number of personal vehicles in the world doubles. In contrast, demand for fuel for *commercial transportation* – trucks, airplanes, trains and ships – will continue to rise sharply.

90%

In 2040, 90 percent of global transportation will run on liquid petroleum-based fuels, compared to 95 percent today.

Commercial transportation demand rises as the global economy continues to expand

As personal vehicles grow more fuel-efficient, growth in global transportation demand will be led by trucks, ships and planes

Over the next 30 years, ExxonMobil expects **hybrid vehicles to move from the margins to the mainstream.** As a result, energy trends in the transportation sector will diverge in an unprecedented way, with demand for personal transportation fuels changing very little even as commercial transportation energy needs continue to rise sharply.

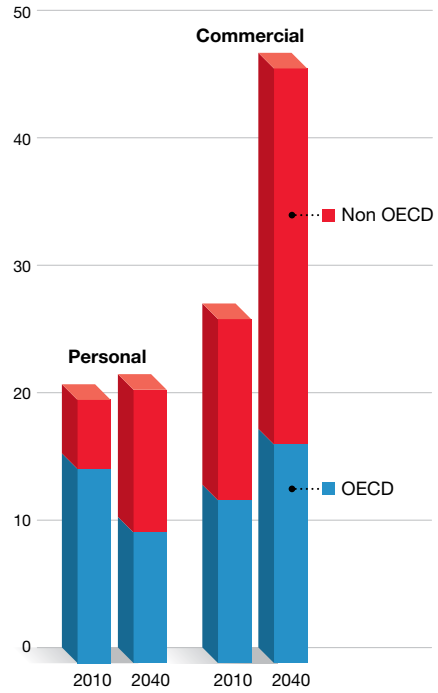
Personal, or light duty, vehicles are the cars, SUVs and light pickup trucks that people drive in their everyday lives. From now through 2040, **the number of personal vehicles in the world – what we call "the global fleet" – will nearly double, to 1.6 billion vehicles.** Not surprisingly, the vast majority of this growth will come from the Non OECD, where prosperity is growing rapidly and vehicle ownership levels today are relatively low.

And yet global demand for fuel for personal vehicles will soon peak and then begin to decline. The reason is an expected steep increase in average vehicle fuel economy. Largely because of tightening government standards, ExxonMobil expects that by 2040, hybrids and other advanced vehicles will account for nearly 50 percent of all light duty vehicles on the road, compared to only about 1 percent today *(see page 20)*.

On the other hand, demand for *commercial* transportation – mostly trucks, but also airplanes, ships and trains – is expected to rise in all regions of the world, even with significant gains in efficiency. Overall, global energy demand for transportation will rise by nearly 45 percent from 2010 to 2040.

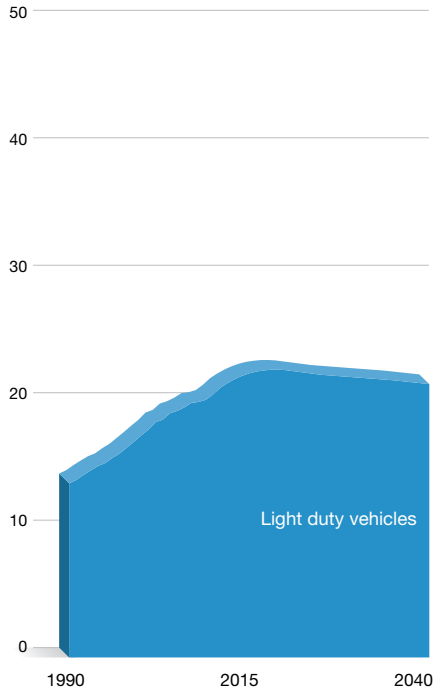
Global road transportation demand

Millions of oil-equivalent barrels per day



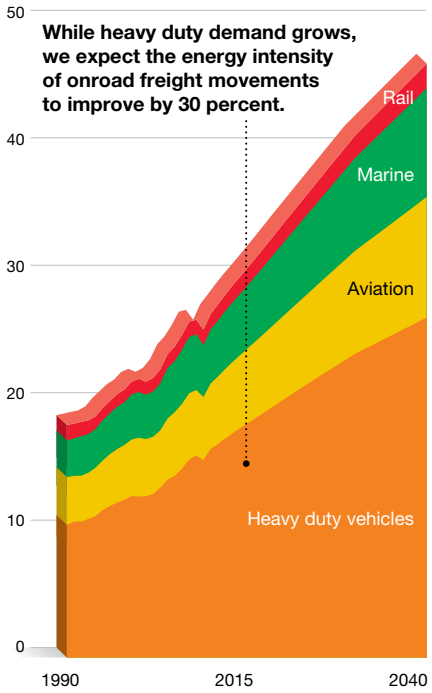
Personal transportation demand

Millions of oil-equivalent barrels per day



Commercial transportation demand

Millions of oil-equivalent barrels per day



Global commercial freight movements have doubled since 1980, to more than 40 trillion ton-miles per year.* Most of this freight is moved by ships.

*World Bank World Development Indicators 2010, Maritime International Secretariat Services Limited (Marisec)

Global economic activity, led by the Non OECD, outpaces gains in commercial-vehicle efficiency

Global economic growth will drive a steep increase in demand for energy for commercial transportation, as business activity and rising incomes enable increased movement of goods – both within and between nations. From 2010 to 2040, **demand for energy for commercial transportation will rise by more than 70 percent.** Most of this growth will come from heavy duty vehicles, which include freight trucks of all sizes, as well as buses, emergency vehicles and work trucks.

ExxonMobil expects that heavy duty vehicles will grow significantly more fuel-efficient over the next 30 years. However, these improvements will be partially offset by operating factors such as increased road congestion and evolving delivery trends. As a result, **by 2030, the world will use more fuel for trucks and other heavy duty vehicles than for all personal vehicles combined. By 2040, heavy duty fuel demand will be up about 60 percent versus 2010.**

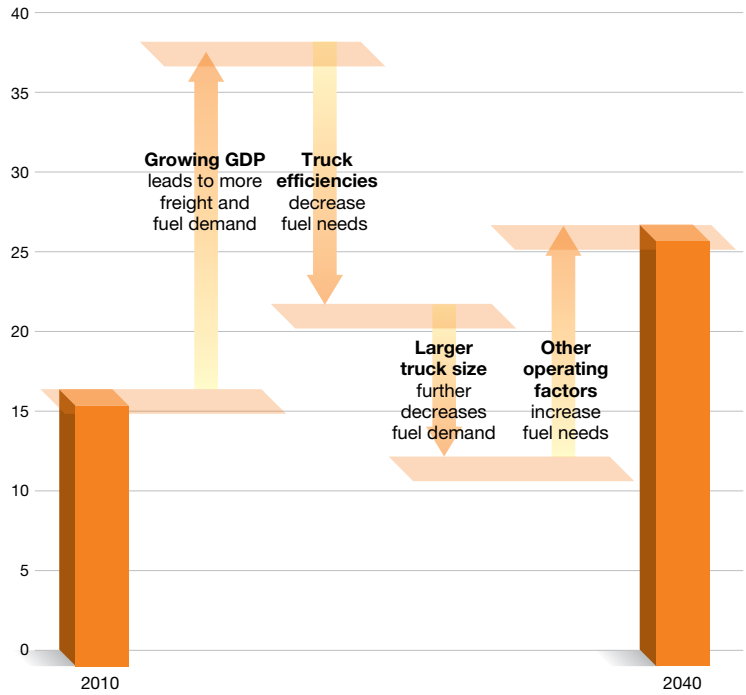
This shift will be reflected in the market for transportation fuels. Demand for diesel – the most popular fuel for heavy duty vehicles – will rise by 85 percent through 2040, while gasoline demand will fall by about 10 percent.

Growth in commercial transportation is not limited to vehicles on the road. Together, demand for aviation and marine fuels will almost double over the next 30 years.

While demand for energy for commercial transportation will rise in all parts of the world through 2040, growth will be steepest in Non OECD countries, whose economies are expanding at a faster rate than the more mature economies of the OECD. About 80 percent of the growth in commercial transport demand will come from developing nations.

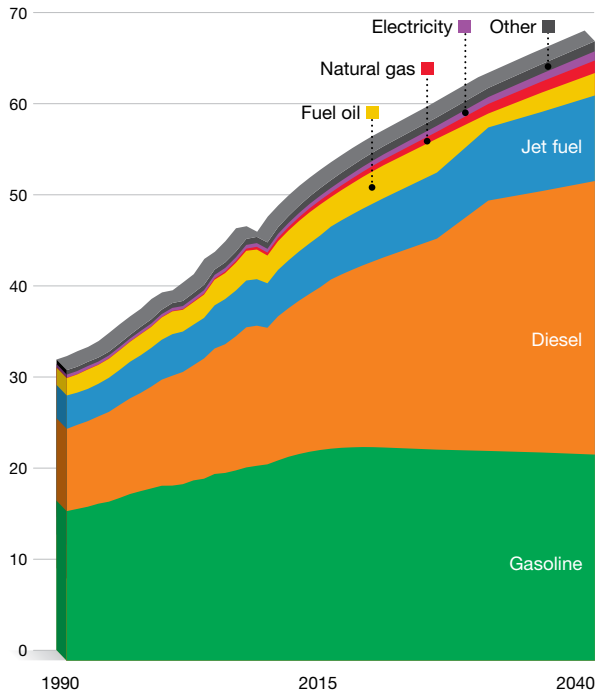
Heavy duty demand changes

Millions of oil-equivalent barrels per day



Transportation fuel demand

Millions of oil-equivalent barrels per day



Personal vehicles will become far more fuel-efficient by 2040

Growing use of hybrid vehicles will help countries meet fuel-economy goals

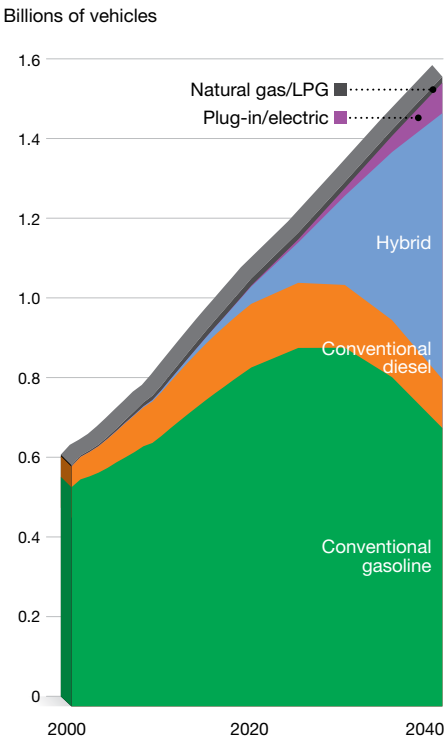
The cars on the world's roads in 2040 will be a very different mix than what we have today. To a large extent, these changes will be driven by government policies that will mandate the fuel economy of personal vehicles.

Conventional gasoline- and diesel-powered vehicles will become much more efficient over the coming decades. However, these gains will not be enough on their own to meet government targets. As a result, **conventional vehicles, which today are about 98 percent of the global fleet, will drop to about 50 percent of the fleet and only 35 percent of new-car sales by 2040.**

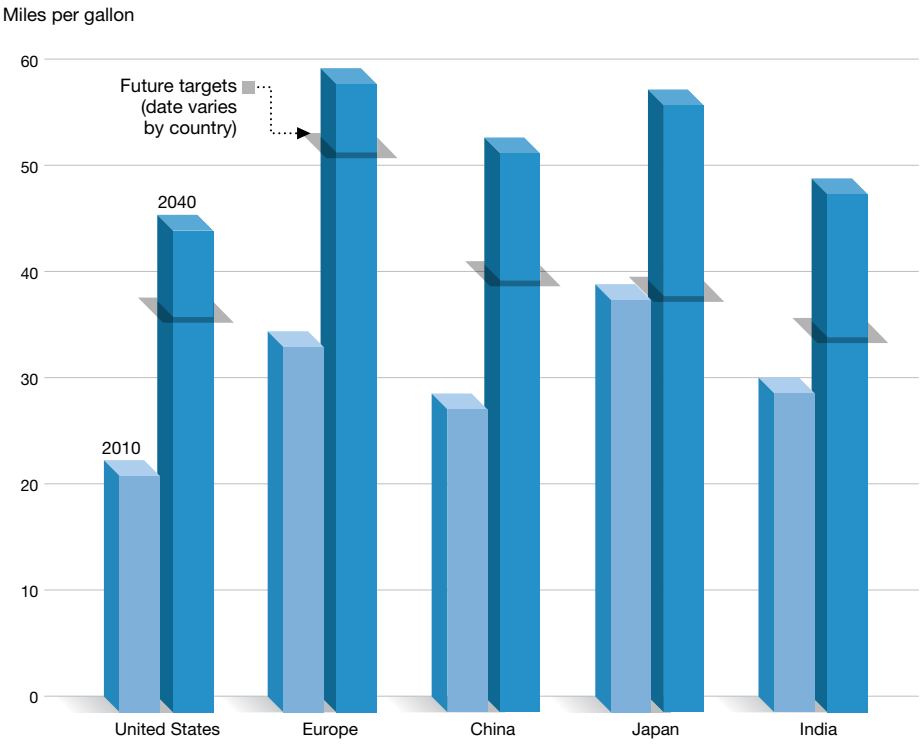
On the other hand, ExxonMobil expects that by 2040, **hybrids and other advanced vehicles will account for nearly 50 percent of light duty vehicles on the road, compared to only about 1 percent today.** The vast majority will be hybrids that use mainly gasoline plus a small amount of battery power; these will make up more than 40 percent of the global fleet by 2040. Globally, ExxonMobil expects to see growth in plug-in hybrids and electric vehicles, along with compressed natural gas (CNG) and liquefied petroleum gas (LPG) powered vehicles. However, these will account for only about 5 percent of the global fleet in 2040, their growth limited by cost and functionality considerations.

Additionally, to achieve proposed fuel-economy targets, personal vehicles will need to be smaller and lighter than they are today. Vehicle downsizing could account for more than one-third of total projected fuel economy improvements through 2040. Globally, ExxonMobil expects the average new car to get 48 miles per gallon (MPG) in 2040, compared to 27 MPG in 2010.

Light duty vehicle fleet by type



Average on-road new car fuel efficiency



Vehicle efficiency:
Costs influence consumer choices

When consumers set out to buy a new vehicle, cost and functionality are top concerns. Buyers consider not only purchase cost, but also the cost of fuel for the vehicle over its lifetime. So while making cars and other light duty vehicles more efficient – and reducing vehicle emissions – is a shared global goal, consumers generally will choose vehicles that meet that goal at the lowest cost to them. Through 2040, ExxonMobil sees most consumers gravitating to three options.

- **Technologies that make conventional vehicles more efficient.** Because it is relatively inexpensive to improve the efficiency of today's vehicles, this is the only option in which consumers' fuel savings over the first five years of ownership equal or exceed their added costs. Technologies such as turbocharging, higher-speed automatic transmissions, improved aerodynamics and reduced weight can improve fuel economy and reduce CO_2 emissions by more than 30 percent. We expect automakers will make increased use of these technologies as they seek to meet government fuel-efficiency mandates.

- **Hybrid vehicles.** Of all advanced-vehicle technologies, hybrids will offer by far the best value for consumers. By 2030, ExxonMobil expects that, on average, hybrid vehicles (like the Toyota Prius) will cost about $1,500 more than a similar-sized conventional vehicle, whereas a compressed-natural-gas (CNG) vehicle will be nearly $4,000 more, and an electric vehicle (like Nissan's Leaf) will be $12,000 more. In the case of the electric vehicle, consumers would not recoup that higher purchase cost within five years unless gasoline prices were more than $10 a gallon; with gasoline at $4 a gallon, it would take more than 15 years to recoup those upfront purchase costs. Additionally, the CO_2 emissions of plug-in hybrids and electric vehicles vary significantly based on the fuel source used to generate their electricity.

- **Smaller vehicles.** Whether they drive conventional or advanced vehicles, consumers can improve fuel economy – up to 35 percent – by switching to smaller, lighter vehicles.

These economics of consumer decisions will change as the prices of various fuels – gasoline, diesel, natural gas, electricity – rise and fall. Consumers also must consider other factors, such as driving range. Because gasoline and diesel are "energy dense," they contain more energy per fill-up than ethanol, CNG or electric vehicle batteries; this enhances consumer convenience by reducing the need for refueling stops. Ultimately, the choices made by consumers will determine how the global vehicle fleet and related energy demand evolve in the coming decades.

Industrial

A source of economic activity and jobs, the industrial sector uses energy to produce the materials and goods that are the building blocks of modern life. Over the next 30 years, industrial energy demand will continue to rise, as an expected leveling-off of demand in China is more than offset by rising industrial activity in India, Africa and other Non OECD countries.

25%

Today, China accounts for one-quarter of global industrial energy demand. By 2040, however, its growth will have leveled off, while India and other Asia Pacific nations – as well as Africa and Latin America – accelerate.

Manufacturing, chemicals to lead growth in industrial energy demand

Industrial demand rises 30 percent, led by growth in Non OECD countries

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 nearly as much energy and electricity as the transportation and residential/commercial sectors combined.

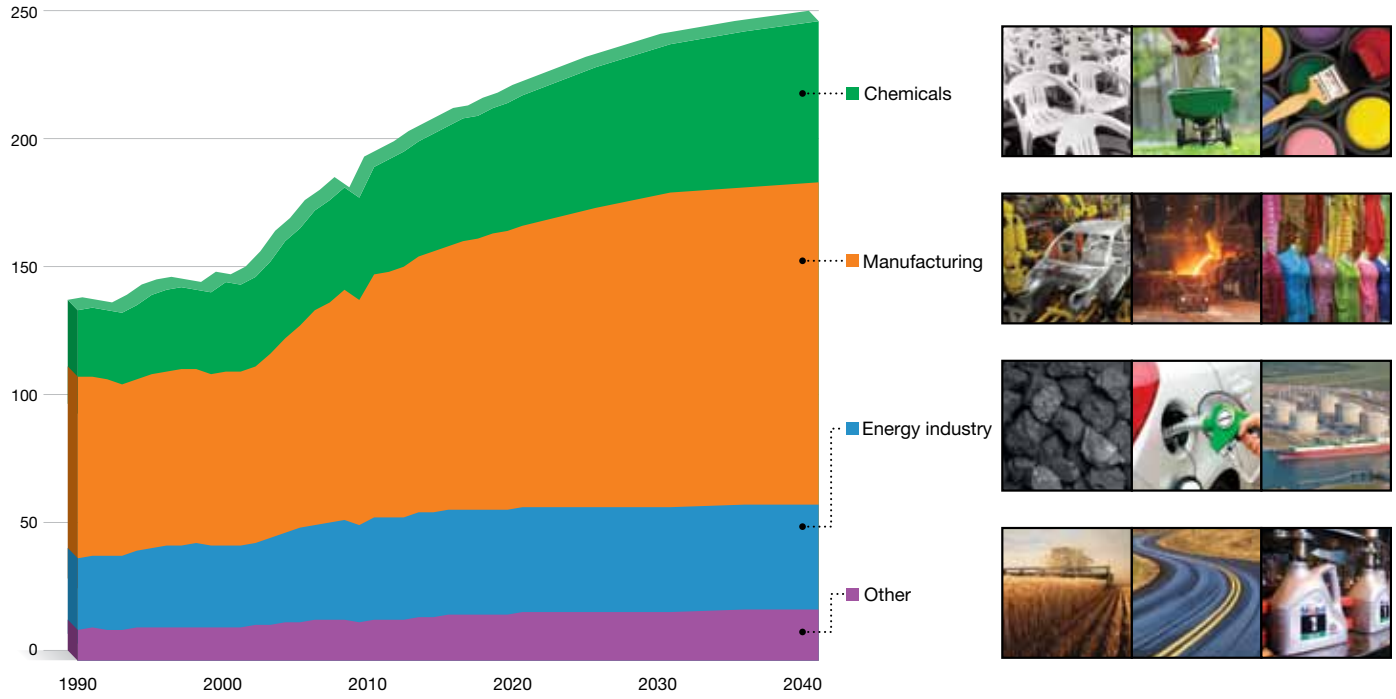
Globally, industrial demand for energy, including electricity, is expected to grow by about 30 percent from 2010 to 2040, as Non OECD countries lead a global rise in economic activity. However, that rate of growth is about half the rate seen during the previous 30 years, largely because of enhanced efficiency and a projected flattening of China's industrial demand *(see page 25)*.

About 90 percent of the increase in industrial energy demand will come from two subsectors: manufacturing and chemicals. Factors driving demand include the production of steel, iron and cement, which is likely to more than double by 2040.

As in other sectors, industrial energy demand would rise much faster without gains in energy efficiency. In fact, 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 demand by sector

Quadrillion BTUs



Recycled steel makes up about 35 percent of current global steel production, yet requires about 60 percent less energy per ton to manufacture than new steel.

World Steel Association, IEA

As China's industrial demand flattens, other Non OECD nations will lead growth

As it has for many years, growth in industrial energy demand will continue to come from Non OECD countries. However, by extending *The Outlook for Energy* to 2040 this year, we can spot some important trends emerging within the Non OECD: a flattening of industrial demand in China, and a pickup in growth in places like India and Africa.

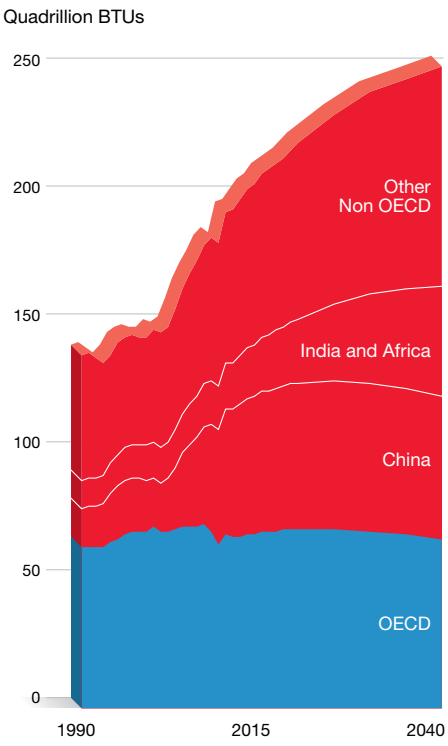
Because of its rapid economic growth and infrastructure improvements over the past three decades, China today is the single largest user of energy for industrial purposes. China's industrial energy demand continues to grow; over the next two decades, it will rise by about another 20 percent.

However, **starting around 2030, ExxonMobil expects China's industrial energy demand to peak** as the country's population reaches a plateau *(see page 6)*, its economy matures and its infrastructure expands at a more measured pace.

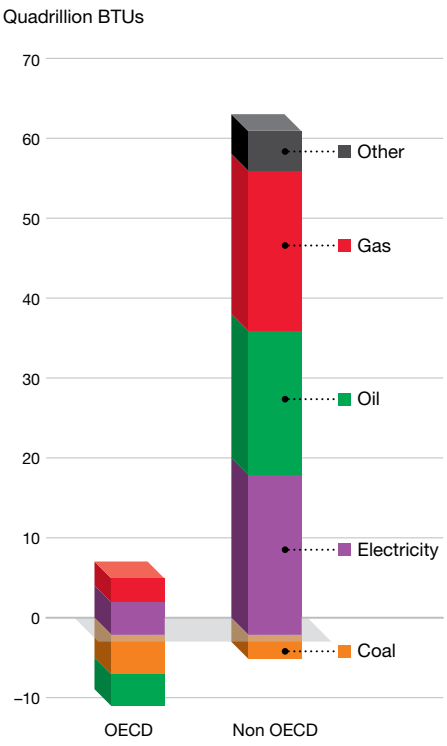
At the same time, India and Africa – and other Non OECD regions, including Latin America, the Middle East and other Asian nations such as Indonesia, Thailand and Vietnam – will become the growth leaders in the industrial sector. India's industrial energy demand will nearly triple from 2010 to 2040.

In the OECD, industrial energy demand is expected to remain largely unchanged through 2040. This does not necessarily mean that industrial *activity* will decline in the OECD during this period, only that any increases in demand will be more than offset by improvements to energy efficiency and a shift toward less energy-intensive industries.

Industrial demand by region



Industrial fuel growth from 2010 to 2040



75%

NON OECD SHARE OF GLOBAL INDUSTRIAL DEMAND IN 2040

By 2040, Non OECD countries will account for almost 75 percent of global industrial demand, up from 65 percent today. In these countries, growth is met mostly by electricity, oil and natural gas; coal will decline. Global industrial demand for electricity will rise by almost 80 percent through 2040. Strong growth also is seen in oil (up about 25 percent, driven by the need for chemical feedstock) and natural gas, whose industrial demand grows by about 50 percent through 2040.

Electricity generation

The electricity generation sector is essential to meeting modern energy needs. Utilities and other electricity producers transform different types of primary energy – everything from natural gas to coal to wind and hydroelectric power – into electricity to be used in homes and businesses. Through 2040, global demand for electricity will continue to rise steeply, as the fuels used for electricity generation continue to shift to lower-carbon sources, such as natural gas, nuclear and renewables.

80%

By 2040, worldwide electricity demand will be 80 percent higher than it was in 2010.

Electricity demand continues to surge

Industrial, residential/commercial sectors will lead a steady rise in electricity demand

Electricity generation is the largest and fastest-growing source of global energy demand – bigger than the amount of primary energy used in the transportation and residential/commercial sectors *combined*.

Demand for electricity continues to rise in all parts of the world. Population and economic growth are two main reasons, just as they are for the projected demand growth in other fuels. But with electricity there is an extra factor at work: the switch to electricity from other forms of energy, such as oil or biomass for lighting and heating in the home *(see page 14)*, or coal in the industrial sector *(see page 25)*.

However, we also expect **the electricity generation sector to become far more efficient than it is today.** Today, it takes about three units of primary energy to produce one unit of electricity. But the increasing penetration of new, highly efficient natural gas plants, plus increased use of wind and solar power, will help improve the efficiency of electricity production. By 2040, only two units of primary energy will be needed to produce a unit of electricity. We also expect a reduction in the amount of electricity that is lost in transit from power plants to end-users *(see page 15)*.

As a result, **even though global demand for electricity will rise by more than 80 percent from 2010 to 2040, demand for fuels to *make* that electricity will rise by only about 45 percent.** More than 90 percent of this fuel demand growth through 2040 will come from China and the other Non OECD countries.

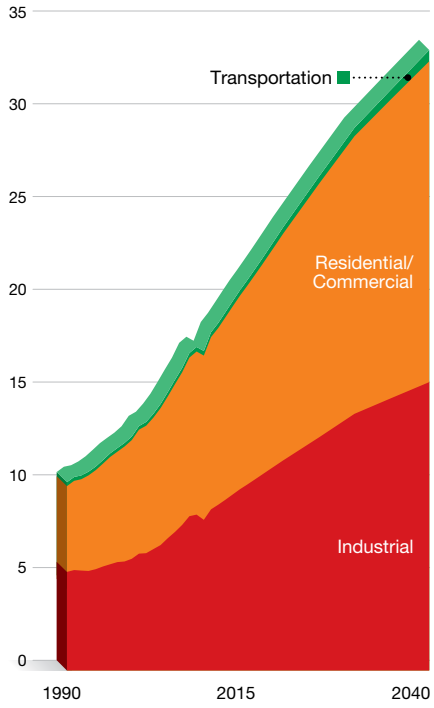
80%

RISE IN GLOBAL ELECTRICITY DEMAND

By 2040, global electricity demand will be about 80 percent higher than today. Broken down by sector, this growth will come from industrial (45 percent), residential (30 percent) and commercial (20 percent). The use of electricity for transportation, while growing, will remain limited. Meanwhile, the fuels used to generate electricity will continue to shift away from coal and toward lower-carbon sources like natural gas, nuclear and renewables.

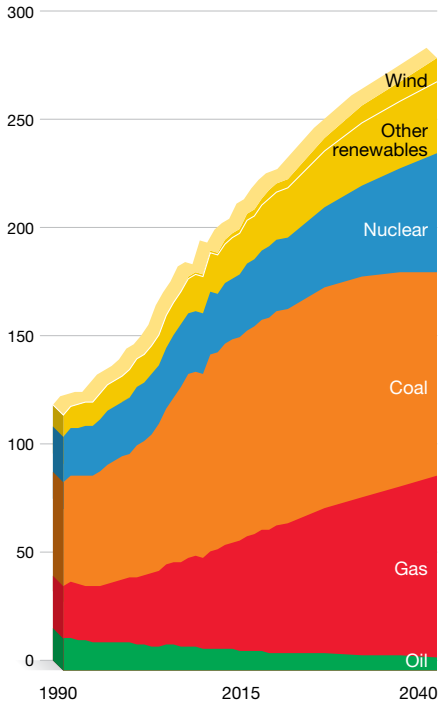
Electricity demand by sector

Thousands of terawatt hours



Fuel into electricity generation

Quadrillion BTUs



"The impact of increased energy consumption can be reduced through energy efficiency and a transition to a stronger reliance on cleaner sources of energy, including renewable energy and low-GHG [greenhouse gas] emitting fossil fuel technologies, such as a shift from coal to natural gas."

"Energy for a Sustainable Future"
UN Secretary General's Advisory Group
on Energy and Climate Change

Natural gas, nuclear and renewables will see strong growth through 2040 as generators shift to lower-carbon sources

Because electricity can be produced from many sources, and because the economics of electricity generation are influenced by a range of factors – including technology, environmental policies, capital investment costs and fuel prices – **the mix of fuels used for electricity generation represents one of the biggest variables in the energy landscape in coming decades** *(see page 31)*.

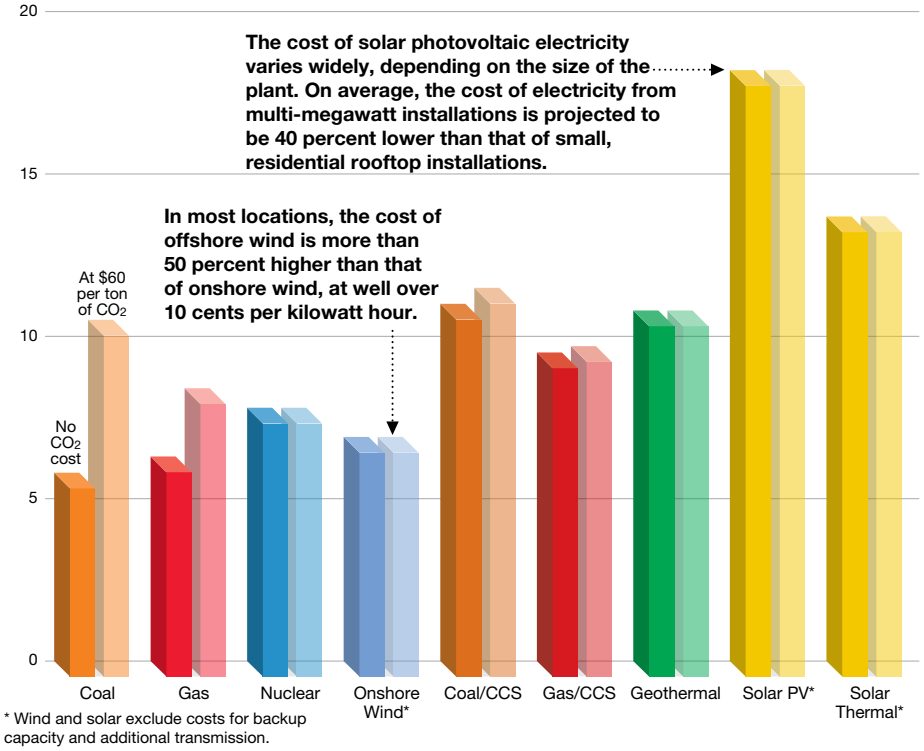
In many nations, coal historically has been the fuel of choice for electricity generation. But largely because of environmental policies that will encourage a shift to cleaner fuels, by 2030 **global coal demand will begin a long-term decline for the first time in modern history** *(see page 8)*.

On the other hand, lower-carbon sources will gain share. **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. Renewable fuels also will grow significantly, led by wind. Although wind's potential is limited by its intermittency and – in the case of offshore wind, its cost – the quantity of electricity generated by wind power will grow more than tenfold through 2040.

Also significant will be growth in nuclear power. ExxonMobil sees global nuclear capacity growing by more than 80 percent through 2040, rising by 2 percent a year on average. However, that rate is about half a percentage point lower than our previous estimates, in order to account for closures and slowdowns in nuclear development programs following the Fukushima incident in Japan.

Average U.S. cost of electricity generation in 2030

Cost per kilowatt hour in 2011 cents



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

30%

BY 2040, LESS THAN 30% OF THE WORLD'S ELECTRICITY WILL BE GENERATED FROM COAL, DOWN FROM ABOUT 40% TODAY

Government policies that impose a cost on CO_2 emissions – in the form of taxes, caps, mandates, subsidies or other measures – are accelerating the shift away from coal, particularly in developed nations. This chart helps explain why. Coal is normally one of the most economic ways to generate electricity. But with a cost of CO_2 – either direct or indirect – at $60 per ton (what ExxonMobil expects to see in OECD countries by 2030), coal would be more expensive than natural gas, nuclear and wind power. These three fuels all will grow sharply through 2040.

Electricity generation fuels vary by region

U.S. and Europe continue to shift to lower-carbon sources for electricity; China's coal usage shrinks after 2030

Although the fuels used for electricity generation vary greatly by region, all regions are shifting toward less carbon-intensive sources. Europe already is a leader in this regard. **Today, Europe gets about half its electricity from nuclear and renewable fuels.** This percentage will rise to nearly 65 percent by 2040, mostly because of strong growth in wind power, which will account for 20 percent of Europe's power by then, up from 5 percent currently.

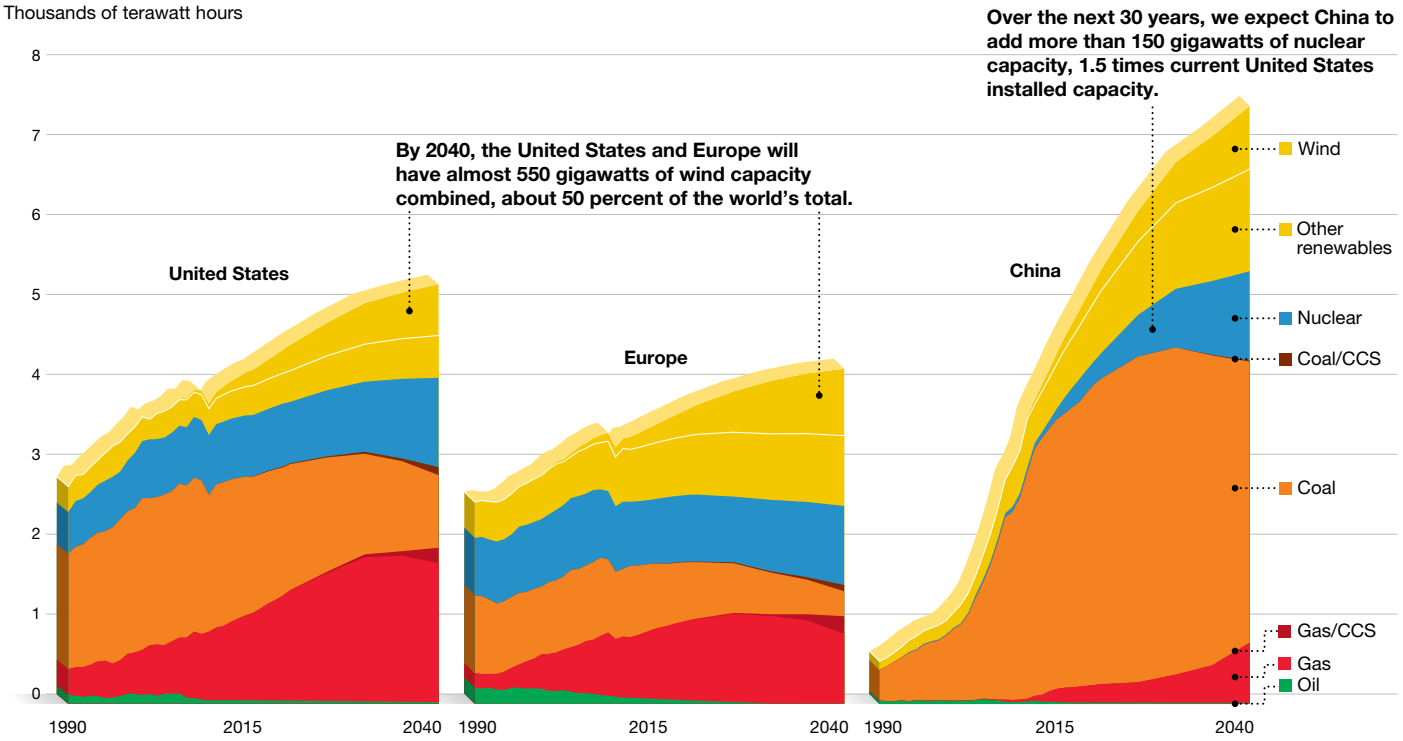
The United States exhibits similar trends, although **the U.S. will see much steeper growth in natural gas,** partly because of enormous growth in its domestic unconventional gas resource *(see page 45)*.

China, at first glance, might seem like a much different picture, because its electricity demand is rising so much faster; in fact, China's electricity demand will more than double by 2040. However, we expect **China will do what the United States and Europe have been doing, which is to shift its electricity generation *away* from coal.**

Integral to these forecasts is an expectation that governments will set policies that will impose a cost on CO_2 emissions *(see page 29)*. ExxonMobil sees **OECD CO_2 costs reaching about $80/ton by 2040. Non OECD countries also will begin adding CO_2 costs around 2030.** By 2040, we see China reaching $30/ton and many other Non OECD nations approaching $20/ton.

Globally, ExxonMobil expects **geothermal and solar power to make limited contributions**, because they will remain relatively expensive, even with CO_2 costs of $60 per ton and higher. Another emissions-saving technology – carbon capture and storage (CCS) – may become economic in the OECD toward 2040.

Electricity generation by fuel



Electricity generation:
Choosing the right fuels

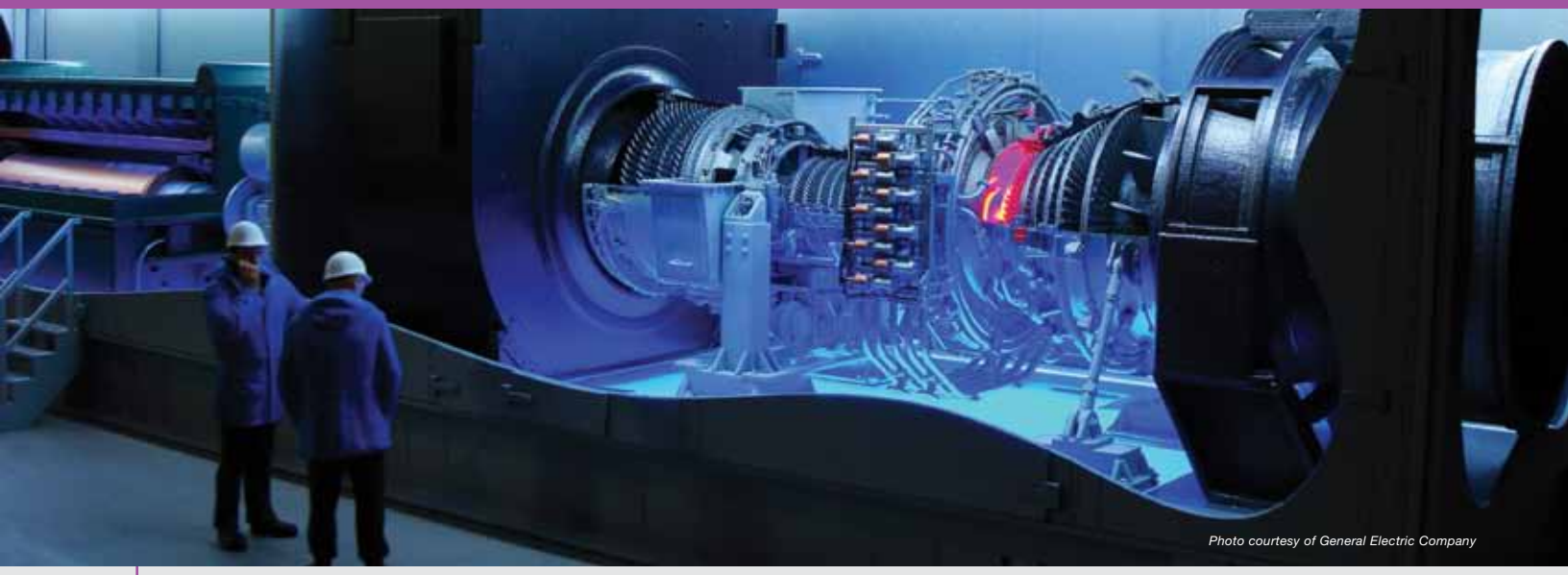


Photo courtesy of General Electric Company

Imagine you are the CEO of an electric utility that is building a new power plant. What type of fuel would you design the plant to use to generate its electricity? Your choice would depend on a number of factors, with the goal of providing reliable, affordable electricity to your customers over decades of operation. When ExxonMobil prepares The Outlook for Energy, *in order to estimate fuel demand, we also must consider these same factors on a country-by-country basis:*

- **Cost, availability and diversity of fuels.** Today, in most countries, natural gas and coal are the most economic options for new power plants, followed by nuclear and wind. Economics also are influenced by utilization rates, because while a nuclear plant uses about 90 percent of its capacity to make electricity, utilization rates are much lower for wind and solar because they are intermittent sources. Availability and diversity of supplies also matter, as countries seek to enhance energy security.

- **Policies to reduce CO_2 and other emissions.** ExxonMobil expects that by 2040, OECD countries will – directly or indirectly – have a cost of CO_2 of $80 a ton. China will introduce more modest measures around 2030, followed by other Non OECD nations. The desire to improve local air quality will also encourage use of natural gas, nuclear and renewables in the Non OECD.

- **Construction cost and timelines.** It costs a billion dollars or more to build a new 1-gigawatt power plant. Coal and nuclear plants can take more than five years for permitting and construction, but in Non OECD nations with low labor costs, these options are very cost-competitive. In contrast, most natural gas and renewable plants can be permitted and erected in less than two years.

- **Technologies and consumer attitudes.** New technologies can lower costs, as unconventional production has done for natural gas in the United States. Public sentiment also matters. For example, Japan's Fukushima disaster is expected to slow global growth in nuclear capacity.

Taken together, these factors point to **a continued shift to lower-carbon fuels, particularly natural gas.** Gas emits up to 60 percent less CO_2 emissions than coal when used for electricity generation. It is flexible, reliable, affordable and available on a scale large enough to meet the world's enormous – and growing – need for electricity. Also, unlike some zero-emission options, gas-fired generation plants are based on proven technology, can be built quickly and are cost effective today.

Emissions

ExxonMobil expects global energy-related CO_2 emissions to level off around the year 2030, even as overall energy use continues to increase to support economic development and human progress around the world.

This global emissions trend is the result of significant improvements in energy efficiency, plus shifts toward natural gas and other less carbon-intensive fuels, as efforts continue to manage the risks posed by rising greenhouse gas emissions.

20%

CO_2 emissions already are declining in the United States, Europe and other OECD countries. By 2040, OECD emissions will be 20 percent lower than in 2010.

Global energy-related CO_2 emissions reach a plateau in coming decades

Decades-long climb in emissions is projected to crest around 2030; OECD emissions decline 20 percent

Concerns about the risks posed by rising greenhouse gas (GHG) emissions have prompted many countries to seek to curb their energy-related CO_2 emissions. Emissions growth is already slowing on a global level, and emissions are falling in North America, Europe and other OECD regions. But from now to 2040, several factors will combine to produce an important milestone: ExxonMobil expects that **global energy-related CO_2 emissions will reach a plateau around 2030,** and will remain essentially unchanged from 2030 through 2040.

What will cause global CO_2 emissions to level off? In the OECD, emissions are expected to decline by 20 percent over the *Outlook* period. Another important factor is China, which today accounts for one-quarter of global emissions. **China's emissions are expected to begin declining after about 2025,** ending decades of very large increases associated with rapid economic development and industrial activity.

China's drop in emissions will be brought about by many of the same trends at work today in the OECD. **The biggest factor is improved efficiency:** vehicles with better fuel economy, more efficient power plants and new technologies and practices that save energy across all end-use sectors. **A shift toward less carbon-intensive fuels, particularly in the electricity generation sector,** also will play a role. In China, as in the OECD, demographic trends also are moderating energy demand and emissions *(see page 6)*.

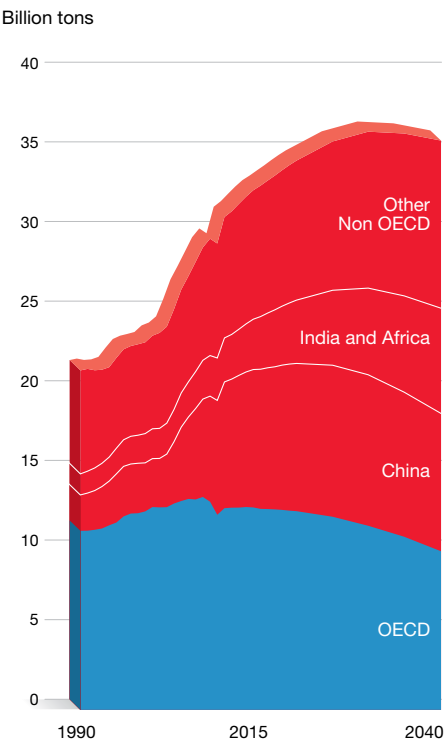
Because of efficiency and a shift to lower-carbon fuels, from 2010 to 2040, the rate of increase in global CO_2 emissions will be about *half* the rate of growth in global energy demand. **However, the projected downturns in emissions in the OECD and China will be offset by continued increases from other Non OECD nations, such as India.**

70%

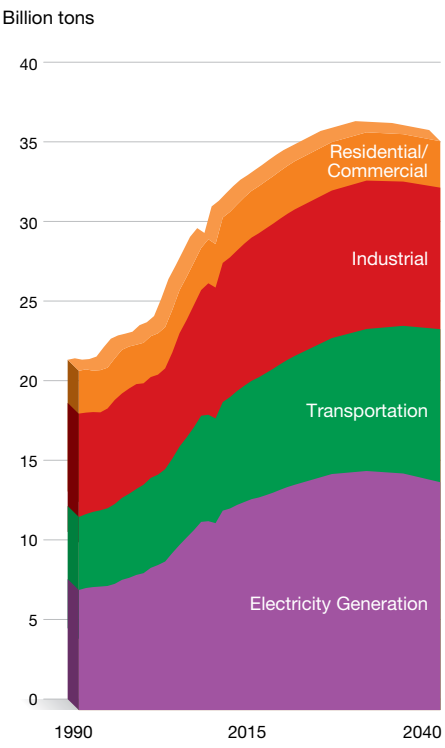
NON OECD SHARE OF CO_2 EMISSIONS BY 2040

Rapid growth in economies and energy demand will continue to push energy-related CO_2 emissions higher in most Non OECD countries. A notable exception is China, where emissions are expected to decline around 2025 after decades of steep increases. By 2040, the Non OECD will account for more than 70 percent of global CO_2 emissions, compared to 60 percent in 2010.

Energy-related CO_2 emissions by region



Energy-related CO_2 emissions by sector



Everything has a carbon footprint. A gallon of milk has produced almost **7 pounds** of carbon dioxide – and 17 pounds of total GHG emissions – in its journey from farm to table.

University of Arkansas and Michigan Technological University

Per-capita emissions trends shift through 2040 as the OECD declines, China peaks and other countries rise

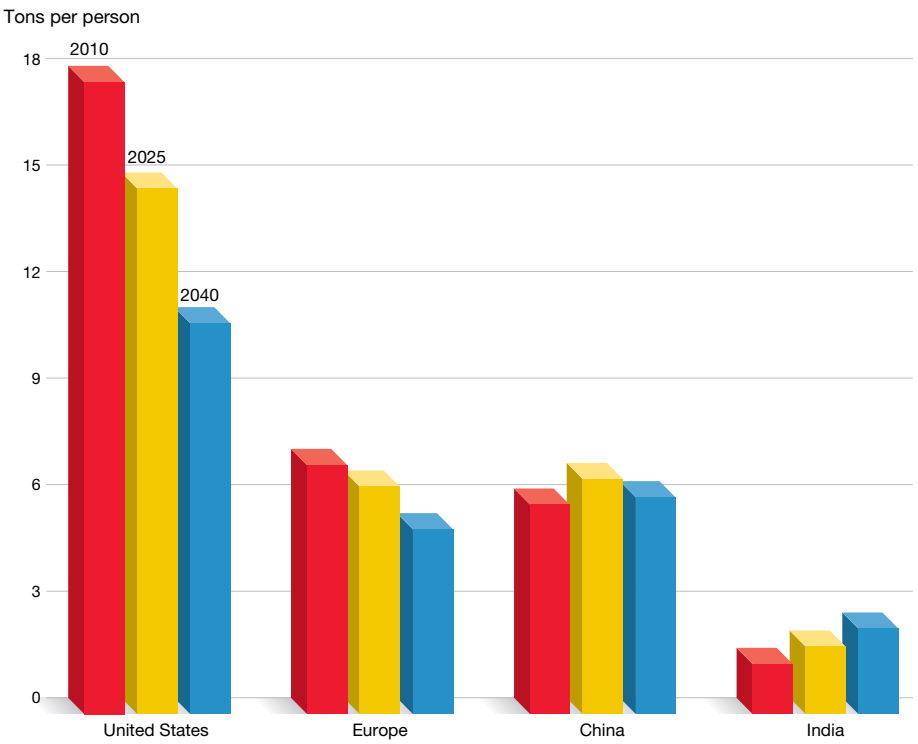
Throughout *The Outlook for Energy*, we see countries with different levels of energy usage depending on their stage of economic development. People who live in more affluent regions tend to have higher per-capita energy use, as they are more likely to use a personal vehicle, live in a relatively large house, use substantial amounts of electricity, and have significant energy-dependent industrial sectors and commercial services including education and advanced medical care.

These trends also are reflected in energy-related CO_2 emissions patterns. However, per-capita CO_2 emissions patterns are shifting.

While the United States' per-capita emissions remain the highest in the world, they are expected to decline significantly by 2040. Europe, whose per-capita emissions today are less than half the level seen in the United States, also will see declines. China's per-capita emissions, which have risen sharply in recent decades, will reach a par with the levels seen in Europe, but then begin declining after 2030.

On the other hand, many countries that today have very low per-capita emissions will see steep increases through 2040 as economic growth more than offsets the effect of improved efficiency. **India, for example, will see its per-capita emissions rise by nearly 70 percent.** However, even by 2040, India's per-capita emissions will still be less than half the level seen in China. Large increases in per-capita emissions also will be seen in Africa and Latin America.

Energy-related CO_2 emissions per capita



40%

DECLINE IN U.S. PER-CAPITA CO_2 EMISSIONS 2010-2040

Reflecting its high level of economic development, the United States has the highest level of CO_2 emissions per capita – three times higher than China's and more than 10 times higher than India's. But the United States is expected to make significant progress in this area, with per-capita emissions falling by 40 percent over the next 30 years, mostly due to improvements to efficiency in all sectors of the economy.

Supply and technology

For people and economies to advance, energy supplies must grow to meet their needs. Through 2040, improvements in technology will further expand supplies of oil and keep pace with expected strong growth in demand for natural gas. A global drive toward lower-carbon energy sources also will support strong growth in nuclear and renewable fuels, and the first-ever extended global decline in coal usage.

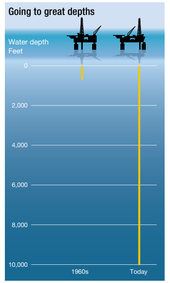
Delivering energy requires a long-term commitment to investment and technology

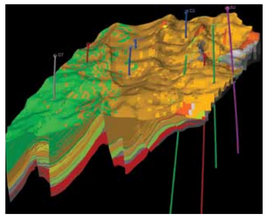
A decade or more before energy reaches consumers, teams of scientists and engineers begin by discovering and evaluating oil and natural gas reserves.

Exploration and Appraisal

3-D seismic imaging measures the reflection of sound waves miles underground to identify hydrocarbon-bearing reservoirs.

Deepwater technology allows wells to be drilled in water depths of more than 10,000 feet, a tenfold increase since the 1960s.





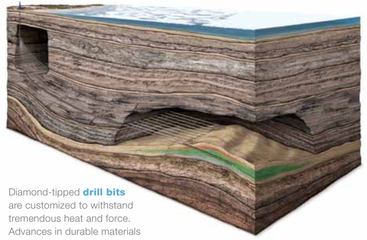
Using the results of appraisal wells and 3-D seismic, engineers and geoscientists build **computer simulations** of reservoirs to maximize recovery of oil and natural gas by better understanding the best locations to drill wells.

After oil and natural gas are discovered and appraised, it then takes several more years to define the scope of the project and determine the technology and investments required.

The time required to develop and start up a new field varies widely. Typically, it takes three years or more to obtain permits, construct new facilities and drill wells for initial production.

Development and Drilling

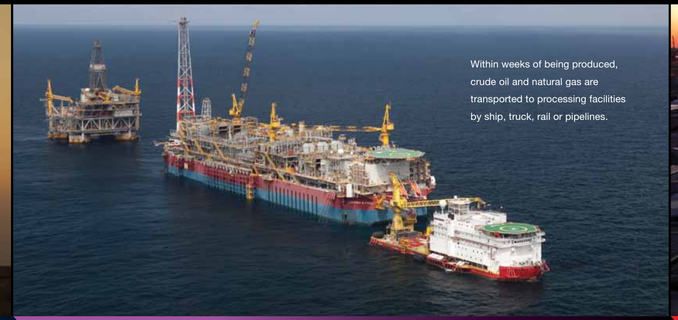
Directional drilling allows wells to be drilled horizontally, targeting resources miles from the drilling site. The longest of these wells, completed in 2011, was almost 8 miles in total length and extended more than 7 miles horizontally.



Diamond-tipped **drill bits** are customized to withstand tremendous heat and force. Advances in durable materials enable faster drilling to greater depths.

Liquefied natural gas processing facilities condense natural gas for transport to global markets. The facilities constructed today are more than 20 times larger than the first ones built in the 1960s.

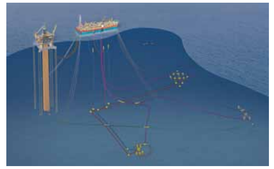
Hydraulic fracturing and horizontal drilling enable production of oil and natural gas from reservoir rocks as dense as concrete.



Within weeks of being produced, crude oil and natural gas are transported to processing facilities by ship, truck, rail or pipelines.

Production and Transportation

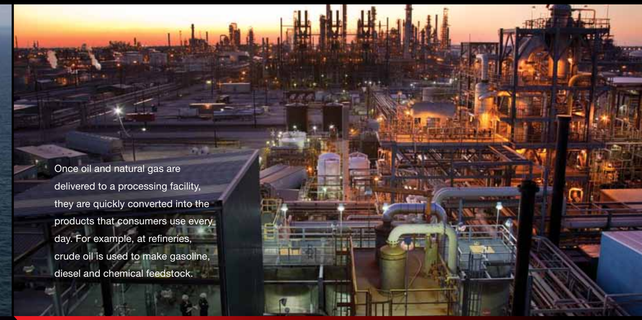
At many deepwater projects, **a floating vessel for production, storage and offloading (FPSO)** can process up to 250,000 barrels per day and store oil on location, eliminating the need to construct a pipeline to shore. FPSOs often are built from recycled tanker hulls.



Together, the **world's pipelines** for oil, gas and petroleum products would be long enough to stretch to the moon and back five times.

Advanced technologies have enabled energy production in some of the **harshest environments on earth** – in subzero temperatures or hundreds of miles from shore.

Double-hulled ships transport liquefied natural gas to global markets. The largest of these, Q-Max carriers, use one-third less fuel and can carry enough natural gas to meet the energy needs of 70,000 homes for one year.

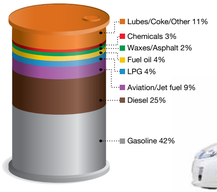


Once oil and natural gas are delivered to a processing facility, they are quickly converted into the products that consumers use every day. For example, at refineries, crude oil is used to make gasoline, diesel and chemical feedstock.

Refining, Processing and Manufacturing

Finished products from a refinery

Percent



Cogeneration facilities are a more efficient way to produce electricity and steam for industry and consumers, by capturing wasted heat.

New **synthetic motor oil** extends engine life, improves performance and only requires an oil change every 15,000 miles, therefore reducing waste oil.

Butyl rubber technology has improved the life of tires and increased air retention, resulting in better performance, safety and fuel efficiency.

The development of better **metallocene catalysts** has resulted in stronger and lighter packaging for food and consumer goods.

Bumpers, fuel tanks and other car parts made from **recyclable, impact-resistant plastics** help to reduce vehicle weight by 10 percent and improve fuel efficiency.

Technology will continue to enable liquid fuel supplies to grow and diversify

Conventional crude production holds steady, while deepwater and unconventional expand

Oil and other liquid fuels will remain the world's largest energy source in 2040, meeting about one-third of demand. Globally, demand for liquid fuels will rise by almost 30 percent over the next 30 years. Close to 80 percent of this increase is tied to transportation *(see page 16)*.

Advances in technology will be key to expanding liquid fuel supplies. As conventional crude oil production holds relatively flat through 2040, demand growth will be met by newer sources. The biggest gains will come from global **deepwater production,** which more than doubles through 2040. This growth illustrates the power of new technologies. Deepwater production was in its infancy just 10 years ago; by 2025, it will provide 10 percent of global liquid fuels supplies.

In addition to deepwater, there also will be tremendous growth in production from **oil sands,** in both Canada and Venezuela. By 2040, oil sands will account for 25 percent of total liquids supply in North and South America.

Tight oil and natural gas liquids (NGLs) also will see significant growth through 2040. Each of these fuels is benefiting from new application of established techniques that have enabled the extraction of oil and gas from shale and other challenging rock formations. These technologies already have delivered tremendous production growth in the United States and are beginning to be applied globally. **Biofuels** also will gain share, rising to around 5 percent of total liquids supply, while coal-to-liquids, gas-to-liquids and volume gains resulting from refinery processes grow to provide just under 5 percent of supply.

As a result of the growth in these newer resources, by 2040, conventional crude will account for only about 60 percent of liquid fuels supply, down from 80 percent in 2010.

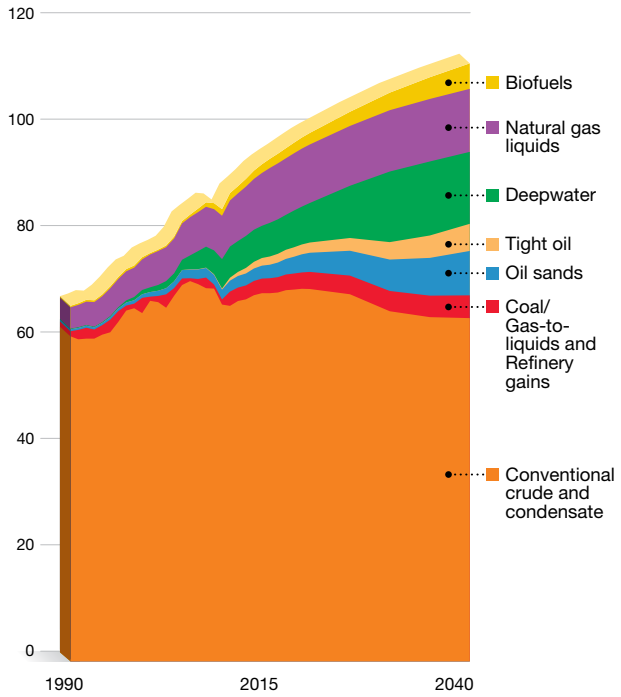
55%

OF THE WORLD'S OIL RESOURCES REMAIN UNPRODUCED IN 2040

The composition of liquid fuels is changing, but one fact is not: the world continues to hold significant oil resources. Even by 2040, ExxonMobil estimates that **less than half** of the world's oil will have been produced. And it is important to note that as new technologies are developed, estimates of the amount of remaining global resources continue to be revised upward.

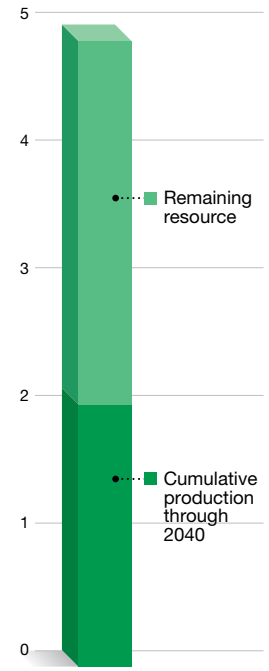
Liquids supply by type

Millions of oil-equivalent barrels per day



Global crude and condensate resource

Trillions of barrels



Source: Total resource from IHS Inc. The use of this content was authorized by IHS.

Since the year 2000, for every barrel of oil that was produced globally, more than 2.5 barrels of new reserves were discovered.

Oil and Gas Journal

Today's new oil discoveries join together with fields that have been producing for generations

Much attention is paid to new energy technologies, with good reason. But it also is important to know that most of today's liquid fuels come from fields that have been producing for decades. **More than 95 percent of the crude oil produced today was discovered before the year 2000.** About 75 percent was discovered before 1980.

Many large fields can hold decades of supply. For instance, the Ghawar field in Saudi Arabia was discovered in 1948, began production in 1951 and still is producing nearly 5 million barrels a day.

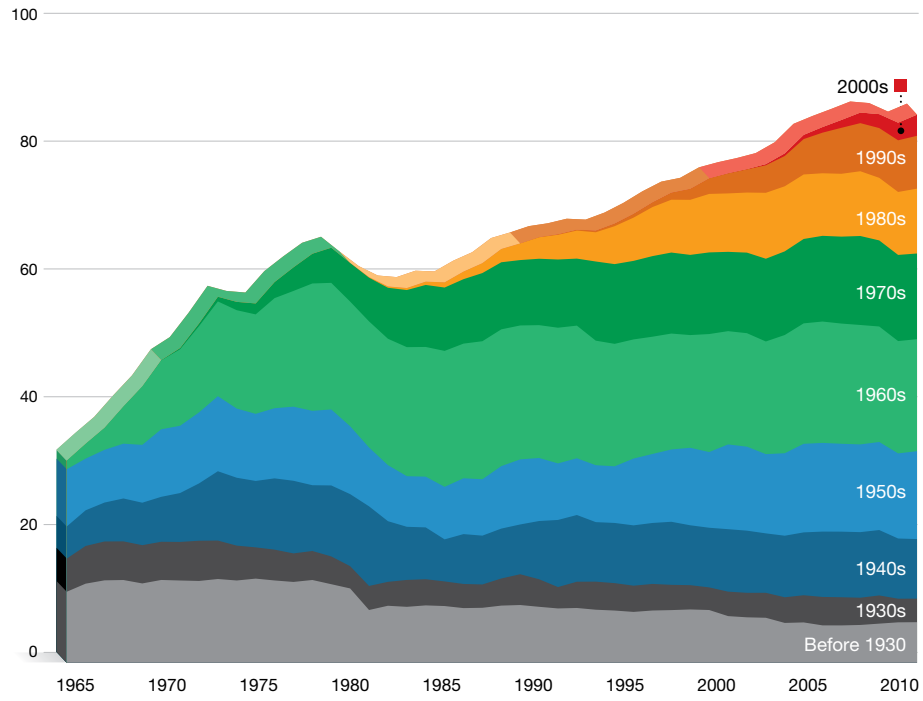
New technologies also can help revive aging fields. In West Texas, ExxonMobil is using enhanced oil recovery methods to retrieve millions of barrels of additional oil from the Means Field. That field, discovered in the 1930s, already has produced more than 300 million barrels.

As demand rises, advances in technology continue to layer on new sources of supply. For example, the first offshore well drilled out of sight of land was completed in 1947; today, wells can be drilled in nearly 10,000 feet of water. Additionally, new technologies are recovering tight oil, Arctic reserves and oil sands – and exploring potential breakthroughs such as making liquid fuels from non-food crops and algae.

Ever since the first oil well was drilled in Pennsylvania in 1859, energy has proven to be a long-term business. **Decisions made decades ago to invest in technology, exploration and development are critical to meeting today's energy demand.** And decisions made today will help meet demand for generations to come.

Global oil production by discovery date

Millions of oil-equivalent barrels per day



Source: ExxonMobil estimates based on Wood Mackenzie Limited & Nehring Associates data.

75%

OF TODAY'S OIL WAS DISCOVERED BEFORE 1980

Meeting energy needs over time – safely and with minimal environmental impact – is vital, and technology advances are a big part of those efforts. For example, 3-D seismic mapping enables exploring for prospective oil and gas deposits without the need for drilling a well, and extended horizontal drilling enables resource areas to be developed from a single location. In many ways, technology is minimizing environmental footprints associated with providing energy for human progress.

Natural gas rises sharply through 2040

Efforts to reduce emissions will help gas become the world's number-two fuel

Natural gas will be the fastest-growing major fuel to 2040, with demand rising by more than 60 percent. Much of this growth will come from electric utilities and other consumers shifting away from coal in order to reduce CO_2 emissions. By 2025, natural gas – which emits up to 60 percent less CO_2 emissions than coal when used for electricity generation – will have overtaken coal as the second most popular fuel, after oil.

Demand is expected to grow in every part of the world, but especially in the Non OECD countries in the Asia Pacific region, where demand for natural gas is expected to triple over the next 30 years. The Middle East also will see significant growth, while Russia/Caspian demand flattens.

Natural gas is a versatile fuel that can be used for many purposes, and so the factors driving these increases in demand vary by region. In North America, natural gas provides a competitive alternative to coal for electricity generation, especially under policies that impose costs on higher-carbon fuels *(see page 30)*. Also, advances in unconventional U.S. natural gas production are expected to keep domestic supplies ample for the foreseeable future.

China's natural gas demand growth will be split between the industrial sector and the residential/commercial sector, where distribution lines are being rapidly expanded and gas is very competitive versus liquefied petroleum gas (LPG). In India, about half of the growth in natural gas demand through 2040 will come from the industrial sector. And, in the Middle East, gas demand is being driven by the need for electricity generation as well as industrial demand.

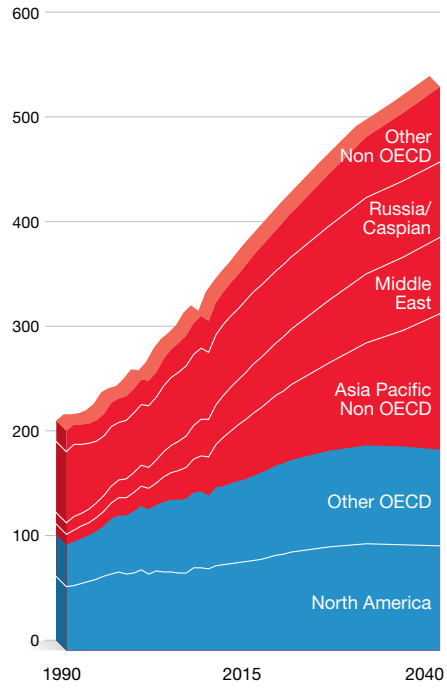
30%

UNCONVENTIONAL GAS MARKET SHARE, 2040

A rising share of global natural gas demand will be met by supplies produced from shale and other rock formations – commonly referred to as unconventional gas. By 2040, unconventional gas will account for 30 percent of global production, up from 10 percent in 2010. The application of existing technologies to these unconventional supplies has helped unlock up to 250 years of global gas supply at current demand levels.

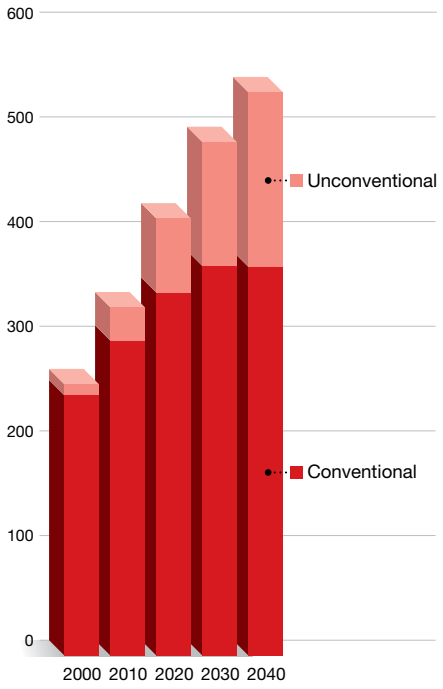
Natural gas demand by region

Billions of cubic feet per day



Natural gas production by type

Billions of cubic feet per day



"We know from centuries of history that reliable and affordable energy is essential to human progress. To sustain progress, we must continue to safely expand the world's energy supplies, improve the ways in which we consume energy sources and address attendant environmental challenges."

Rex Tillerson, ExxonMobil Chairman and CEO

Unconventional gas development will expand worldwide, while LNG helps meet demand in Asia and Europe

Natural gas produced via conventional methods is growing in many regions, but declining in Europe and the United States. In the United States, this decline will be offset by growth in unconventional gas – the natural gas found in shale and other rock formations that was once considered uneconomic to produce.

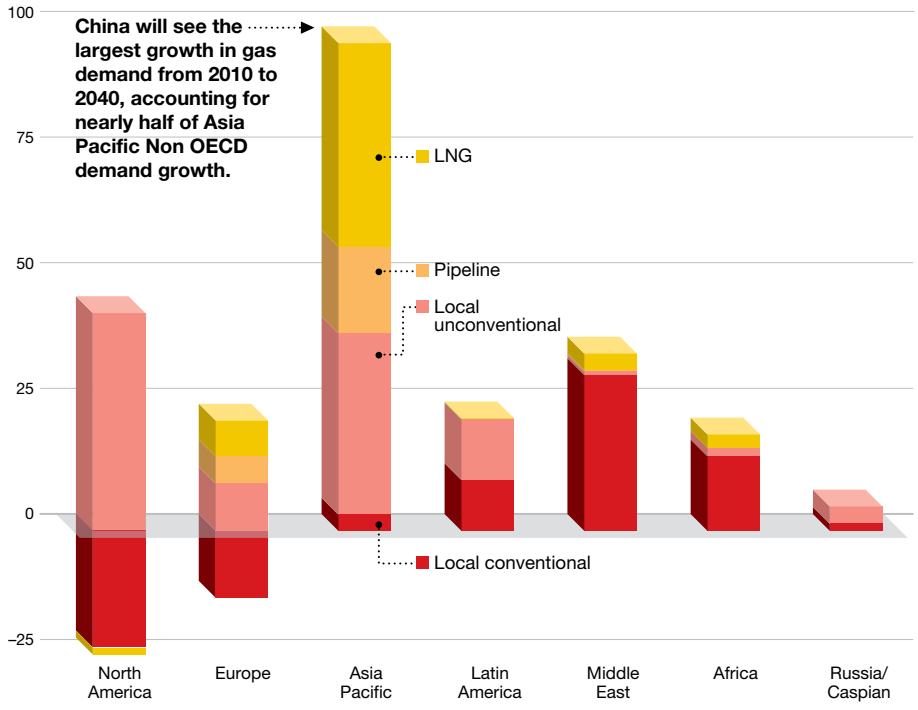
In recent years, a combination of horizontal drilling and hydraulic fracturing has enabled the energy industry to economically access and produce this gas. In hydraulic fracturing, a solution – primarily water and sand, mixed with a small amount of chemicals – is injected into the rock to open very thin cracks, allowing trapped natural gas to migrate up to the well.

These technologies have been in use for decades. But by combining them, the United States has seen a turnaround in domestic gas production. Because these production methods are being applied in new ways – and also because shale resources can be located in areas that are not traditional oil and gas producers – the pace of future development will depend on industry, government and local communities working together to build understanding of the potential benefits of unconventional gas production, as well as proven practices used to protect groundwater and air quality, and minimize other environmental impacts.

The same will be true in other countries. While it is less certain that unconventional gas production techniques will be applied as successfully outside the United States, **ExxonMobil expects to see unconventional gas become more of a factor in Asia Pacific, Latin America and Europe in the coming decades.** Rising unconventional production will limit the need for imports in some regions, but Asia Pacific and Europe will need significant imports – both via pipelines and via liquefied natural gas (LNG) tankers – to meet demand.

Gas supply growth by region from 2010 to 2040

Billions of cubic feet per day



15%

OF GLOBAL GAS DEMAND WILL BE MET BY LNG IN 2040

Different countries rely on a different mix of sources to meet their natural gas needs. In the chart at left, each bar shows the net growth – or loss – for each source of natural gas in major world regions from 2010 to 2040. The largest increase in demand will be seen in the Asia Pacific region, which will continue to draw the largest share of global LNG exports, followed by Europe. Unconventional gas is expected to play a larger role in meeting demand growth in North America, Asia Pacific, Latin America and Europe.

Energy supplies evolve over time

As technologies advance, the global energy mix will grow more diverse and less carbon-intensive

Considering that 100 years ago, most of the world's energy came from wood and coal, it is clear that energy supplies can change dramatically over time. While government policies and consumer preferences each play a role in this evolution, **the biggest factor is advancements in technology,** which shape both demand for energy and the supplies used to meet that demand. Economics and affordability are key factors that enable a fuel to reach the scale needed to penetrate the market.

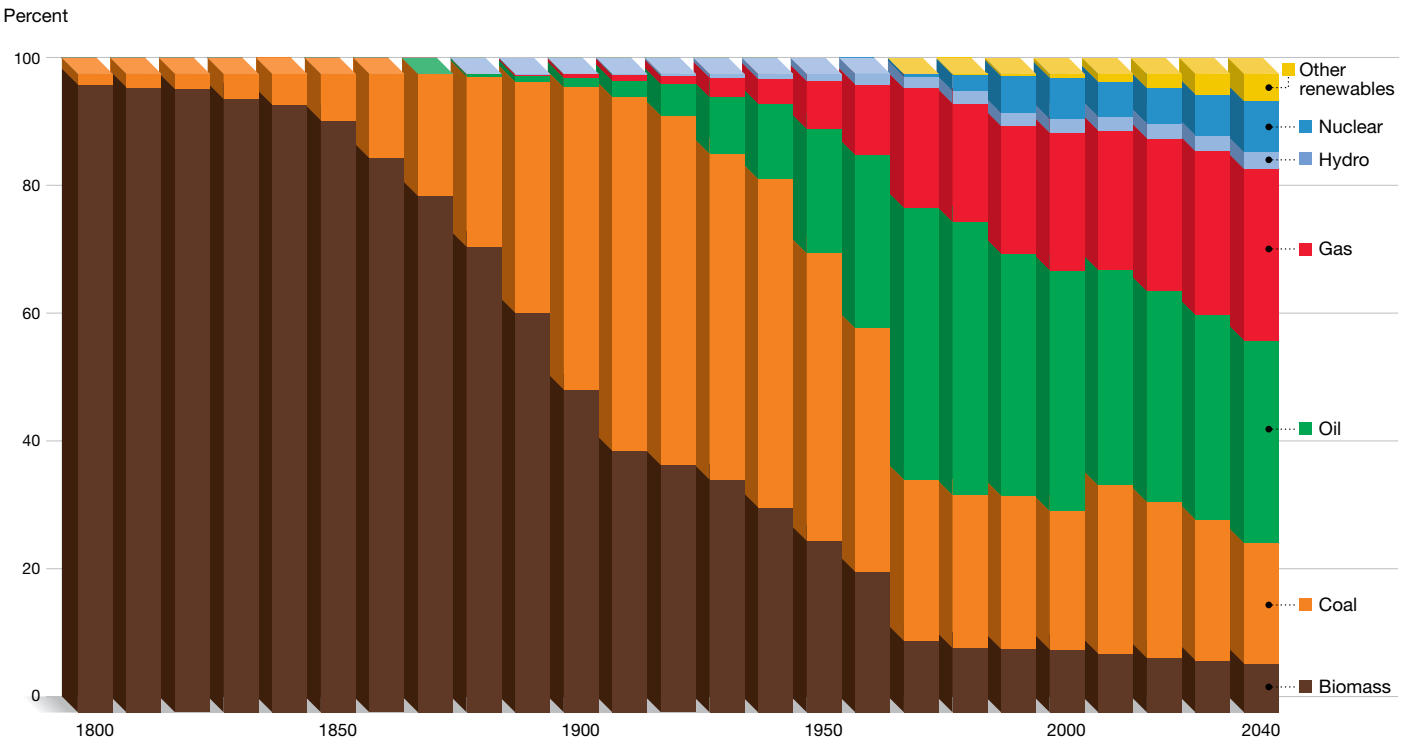
Over the next 30 years, advances in technology will continue to remake the world's energy landscape. Fuels will continue to grow less carbon-intensive and more diverse.

Global supplies of two of the world's most essential fuels – oil and natural gas – will be expanded through the ongoing application of new technologies, including advancements in unconventional and deepwater production. **By 2040, oil, gas and coal will continue to account for about 80 percent of the world's energy demand.** The scale and affordability of these fuels position them to be the major long-term supplies over the next several decades.

Nuclear energy, one of the most significant energy breakthroughs of the last century, also will see strong growth through 2040. The expansion of nuclear energy will be encouraged by a desire to reduce emissions, but also by new technologies that can strengthen confidence in the safety of nuclear power.

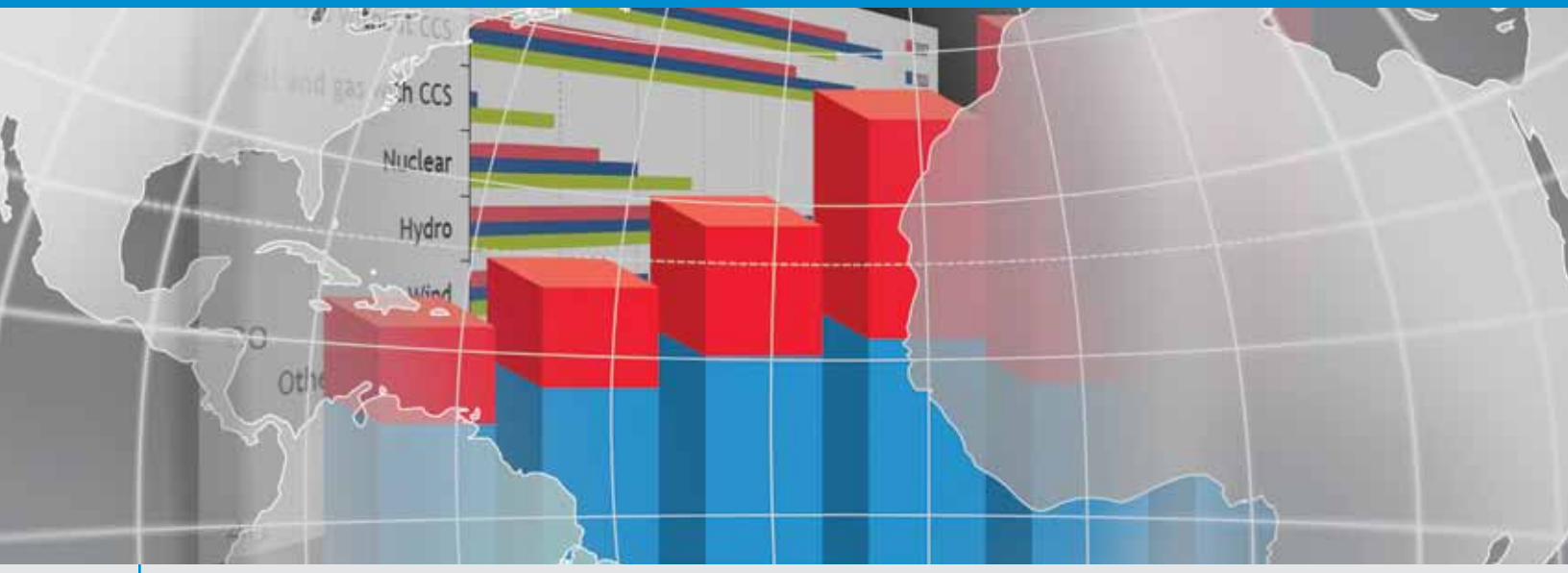
At the same time, **the world will see meaningful growth in renewable fuels.** The largest contribution will be from wind, but growth also will be seen in solar, biofuels and geothermal energy. **Advances in technology will be necessary to make these fuels more practical and economic,** increasing their penetration in consumer markets. By 2040, modern renewable fuels are expected to account for about 7 percent of global energy demand, compared to 3 percent in 2010.

Global fuel mix by decade



Source: Smil, Energy Transitions (1800-1960)

The Outlook for Energy: How we compare to scenarios of the IEA



ExxonMobil often is asked how our *Outlook for Energy* compares to other forecasts. While we use the *Outlook* as a foundation for our business strategies and investments, many other organizations also develop their own long-term energy projections. One of the most prominent is the *World Energy Outlook*[1] published each year by the International Energy Agency (IEA).

A comparison of ExxonMobil's *Outlook* and the IEA's *World Energy Outlook 2011* reveals many similarities. The IEA utilizes three scenarios to cover a wide range of possible outcomes: its central scenario ("New Policies Scenario") foresees – as ExxonMobil does – significant energy-demand growth, even with substantial efficiency gains. IEA sees global energy demand rising by 40 percent between 2009 and 2035; ExxonMobil sees energy growth of 35 percent for that same period. Both outlooks acknowledge that the vast majority of the global increase in demand will be in Non OECD countries.

IEA also expects demand for oil to grow, while remaining the most widely used energy source in coming decades, even as lower-carbon choices such as natural gas, nuclear and renewable fuels see significant growth. **Another important aspect relates to natural gas.** ExxonMobil sees global gas demand rising by 1.9 percent a year on average from 2009 to 2035; IEA's New Policies Scenario sees a slightly less robust rate of 1.7 percent. Both outlooks recognize natural gas as an increasingly important energy source to help meet rising electricity demand as well as needs for a variety of other applications.

In some areas, the outlooks differ. For example, ExxonMobil sees coal's market share declining faster than IEA does. This contributes to ExxonMobil's slightly lower growth for global energy-related CO_2 emissions of 0.8 percent a year on average from 2009 through 2035 – compared with IEA's projection of 0.9 percent.

Variations are to be expected between The *Outlook for Energy* and the scenarios of the IEA, because each contains judgments about market factors, technology improvements and government policies over the decades ahead. But perhaps more important is the fact that **both forecasts share many similar core findings, including the fundamental need to expand and diversify supplies of energy, the need to improve efficiency, and the ongoing challenge in addressing environmental risks.** Success in meeting these challenges will require a wide array of human innovations and tremendous investments in the decades ahead.

[1] Full report available at www.worldenergyoutlook.org

Conclusion

The energy forecasts contained in *The Outlook for Energy* are developed by a team of experts within ExxonMobil, and seek to reflect as best we can an informed view of what the energy future will actually look like through 2040. The nature of this exercise is obviously challenging – something we appreciate after having developed the *Outlook* for more than 50 years. Our analysis must consider the many factors that influence energy supply and demand on a global, regional and national level. These include:

- Expanding prosperity across a growing world population.
- The cost and likely availability of various forms of energy.
- The development and deployment of new technologies.
- Government policies and public preferences.

Naturally, the future is subject to any number of developments that we cannot predict with precision.

For one, the cost-of-CO_2 policies that we expect will exert such a strong influence on energy trends through 2040 are, in many countries, not finalized; their details will have a critical impact on the economics of energy consumption and the future fuel mix. Unexpected economic or geopolitical events might also have significant impacts on energy supply and demand.

Technology also can be unpredictable. For example, a breakthrough in low-cost, large-scale storage of electricity would greatly improve the prospect for wind and solar for electricity generation. Faster-than-expected drops in battery costs would likely make electric cars more of a factor through 2040 than we expect them to be. And, of course, new combinations of existing technologies can result in significant changes, such as we are seeing today with unconventional gas production.

Considering all aspects of the energy future is not an academic exercise for ExxonMobil. We invest billions of dollars in projects each year based on the forecasts found in *The Outlook for Energy*, so on behalf of our shareholders, as well as our employees, our operating partners, and the countries and communities in which we operate, we have a huge stake in getting it right.

When it comes to energy, the future is not predetermined. How much and what types of energy the world will use through 2040 – and beyond – will depend on the actions taken not just by companies like ExxonMobil, but by everyone – including policymakers and consumers. ExxonMobil hopes that by sharing *The Outlook for Energy* publicly, we can all make informed decisions about our energy future.

> *"Modern energy services help reduce poverty, improve educational opportunities for children, and promote gender equality."*
>
> Nobuo Tanaka
> Former Executive Director
> International Energy Agency

Data table

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**	**415**	**525**	**633**	**692**	**1.3%**	**0.6%**	**0.9%**	**21%**	**9%**	**32%**	**100%**	**100%**	**100%**
OECD	189	224	227	234	224	0.2%	-0.3%	-0.1%	3%	-4%	-2%	43%	37%	32%
Non OECD	171	191	298	400	469	2.0%	1.1%	1.5%	34%	17%	57%	57%	63%	68%
Africa	17	22	29	44	62	2.9%	2.2%	2.6%	55%	39%	115%	5%	7%	9%
Asia Pacific	91	125	205	267	301	1.8%	0.8%	1.3%	30%	12%	47%	39%	42%	43%
China	33	44	102	132	138	1.7%	0.3%	1.0%	29%	4%	35%	19%	21%	20%
India	13	19	28	45	61	3.3%	2.1%	2.7%	62%	37%	122%	5%	7%	9%
Europe	74	79	81	82	78	0.1%	-0.3%	-0.1%	2%	-4%	-3%	15%	13%	11%
European Union	68	72	73	73	69	0.0%	-0.4%	-0.2%	0%	-6%	-6%	14%	12%	10%
Latin America	15	20	26	36	45	2.2%	1.5%	1.8%	39%	24%	73%	5%	6%	7%
Middle East	11	18	30	42	51	2.3%	1.3%	1.8%	41%	21%	71%	6%	7%	7%
North America	95	114	113	118	112	0.3%	-0.3%	0.0%	4%	-4%	-1%	22%	19%	16%
United States	81	96	94	96	90	0.1%	-0.4%	-0.2%	2%	-6%	-5%	18%	15%	13%
Russia/Caspian	57	38	42	43	43	0.3%	0.0%	0.1%	4%	-1%	3%	8%	7%	6%
Energy by Type - World														
Primary	**360**	**415**	**525**	**633**	**692**	**1.3%**	**0.6%**	**0.9%**	**21%**	**9%**	**32%**	**100%**	**100%**	**100%**
Oil	136	156	177	206	220	1.0%	0.4%	0.7%	16%	7%	24%	34%	32%	32%
Gas	72	89	115	157	186	2.1%	1.1%	1.6%	37%	18%	62%	22%	25%	27%
Coal	86	90	138	148	130	0.5%	-0.8%	-0.2%	7%	-12%	-6%	26%	23%	19%
Nuclear	21	27	29	37	55	1.7%	2.7%	2.2%	29%	50%	94%	5%	6%	8%
Biomass/Waste	36	41	48	53	53	0.6%	0.0%	0.3%	10%	0%	10%	9%	8%	8%
Hydro	7	9	12	15	18	1.9%	1.2%	1.5%	32%	20%	58%	2%	2%	3%
Other Renewables	1	3	7	17	30	6.4%	3.7%	5.0%	154%	73%	338%	1%	3%	4%
End Use Sectors - World														
Residential/Commercial														
Total	**87**	**98**	**116**	**136**	**145**	**1.1%**	**0.4%**	**0.7%**	**17%**	**6%**	**25%**	**100%**	**100%**	**100%**
Oil	13	16	15	16	16	0.3%	-0.3%	0.0%	5%	-4%	1%	13%	12%	11%
Gas	16	21	25	30	32	1.3%	0.4%	0.9%	21%	7%	29%	22%	22%	22%
Coal	8	4	5	4	2	-1.7%	-4.0%	-2.8%	-23%	-46%	-58%	4%	3%	1%
Electricity	16	23	32	47	59	2.6%	1.6%	2.1%	47%	26%	86%	27%	34%	41%
Other	33	35	39	39	36	0.0%	-0.6%	-0.3%	0%	-9%	-9%	34%	29%	25%
Transportation														
Total	**65**	**80**	**97**	**122**	**139**	**1.5%**	**0.9%**	**1.2%**	**25%**	**14%**	**43%**	**100%**	**100%**	**100%**
Oil	64	79	93	114	124	1.3%	0.6%	1.0%	22%	10%	34%	95%	93%	89%
Other	1	1	4	8	15	4.4%	3.8%	4.1%	92%	75%	236%	5%	7%	11%
Industrial														
Total	**138**	**148**	**193**	**232**	**251**	**1.2%**	**0.5%**	**0.9%**	**20%**	**8%**	**30%**	**100%**	**100%**	**100%**
Oil	45	50	59	68	74	0.9%	0.5%	0.7%	15%	8%	24%	31%	29%	29%
Gas	31	37	44	58	67	1.8%	1.0%	1.4%	31%	16%	51%	23%	25%	27%
Biomass/Waste	8	9	11	14	16	1.7%	0.8%	1.2%	29%	12%	45%	6%	6%	6%
Electricity	18	21	30	43	53	2.5%	1.4%	2.0%	45%	24%	79%	15%	19%	21%
Other	37	30	49	49	41	0.0%	-1.1%	-0.6%	0%	-15%	-15%	25%	21%	17%
Electricity Generation - World														
Primary	**118**	**144**	**193**	**247**	**283**	**1.6%**	**0.9%**	**1.3%**	**28%**	**15%**	**47%**	**100%**	**100%**	**100%**
Oil	15	12	10	8	6	-1.3%	-1.4%	-1.4%	-18%	-19%	-34%	5%	3%	2%
Gas	24	31	45	67	84	2.8%	1.5%	2.1%	50%	24%	87%	23%	27%	30%
Coal	48	61	91	102	94	0.8%	-0.6%	0.1%	13%	-8%	3%	47%	42%	33%
Nuclear	21	27	29	37	55	1.7%	2.7%	2.2%	29%	50%	94%	15%	15%	20%
Hydro	7	9	12	15	18	1.9%	1.2%	1.5%	32%	20%	58%	6%	6%	6%
Wind	0	0	1	6	11	12.2%	4.1%	8.1%	460%	82%	921%	1%	2%	4%
Other Renewables	3	4	6	11	15	3.5%	2.2%	2.9%	68%	40%	135%	3%	4%	5%
	Electricity Demand (Terawatt Hours)													
World	**10147**	**13175**	**18233**	**26651**	**33446**	**2.6%**	**1.5%**	**2.0%**	**46%**	**25%**	**83%**	**100%**	**100%**	**100%**
OECD	6630	8560	9488	11402	12399	1.2%	0.6%	0.9%	20%	9%	31%	52%	43%	37%
Non OECD	3517	4616	8745	15249	21047	3.8%	2.2%	3.0%	74%	38%	141%	48%	57%	63%
	Energy-Related CO_2 Emissions (Billion Tons)													
World	**21.3**	**23.5**	**30.9**	**35.7**	**35.7**	**1.0%**	**0.0%**	**0.5%**	**15%**	**0%**	**16%**	**100%**	**100%**	**100%**
OECD	11.2	12.7	12.7	12.1	10.0	-0.3%	-1.3%	-0.8%	-4%	-18%	-21%	41%	34%	28%
Non OECD	10.1	10.8	18.3	23.6	25.8	1.7%	0.6%	1.2%	29%	9%	41%	59%	66%	72%
	GDP (2005$, Trillions)													
World	**30**	**40**	**51**	**81**	**119**	**3.1%**	**2.6%**	**2.9%**	**58%**	**47%**	**133%**	**100%**	**100%**	**100%**
OECD	25	32	38	53	70	2.3%	1.9%	2.1%	40%	33%	87%	73%	65%	59%
Non OECD	6	8	14	28	49	5.0%	3.8%	4.4%	108%	74%	263%	27%	35%	41%
Africa	1	1	1	2	4	4.2%	3.8%	4.0%	85%	74%	223%	2%	3%	3%
Asia Pacific	6	9	14	26	43	4.3%	3.4%	3.8%	89%	64%	210%	27%	32%	36%
China	1	1	4	10	19	6.7%	4.2%	5.4%	163%	85%	387%	7%	12%	16%
India	0	1	1	3	6	6.1%	5.0%	5.6%	145%	109%	410%	2%	4%	5%
Europe	11	14	16	21	27	2.0%	1.7%	1.9%	35%	29%	74%	31%	26%	23%
European Union	10	13	14	19	24	1.9%	1.6%	1.8%	33%	27%	69%	28%	23%	20%
Latin America	1	2	2	4	6	3.6%	2.9%	3.3%	71%	54%	163%	5%	5%	5%
Middle East	1	1	1	2	4	4.1%	3.1%	3.6%	83%	58%	188%	3%	3%	3%
North America	9	13	15	23	32	2.7%	2.3%	2.5%	48%	40%	108%	30%	28%	27%
United States	8	11	13	19	27	2.6%	2.2%	2.4%	47%	39%	105%	26%	24%	23%
Russia/Caspian	1	1	1	2	3	3.6%	2.8%	3.2%	71%	52%	159%	2%	3%	3%
	Energy Intensity (Thousand BTU per $)													
World	**11.9**	**10.4**	**10.3**	**7.8**	**5.8**	**-1.8%**	**-2.0%**	**-1.9%**	**-24%**	**-26%**	**-44%**			
OECD	7.6	7.0	6.1	4.4	3.2	-2.1%	-2.2%	-2.1%	-27%	-28%	-47%			
Non OECD	30.7	25.3	22.0	14.2	9.5	-2.9%	-2.6%	-2.7%	-36%	-33%	-57%			

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

Data table

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	62	2.9%	2.2%	2.6%	55%	39%	115%	100%	100%	100%
Oil	4	5	7	12	17	3.6%	2.4%	3.0%	71%	42%	142%	25%	27%	28%
Gas	2	4	4	7	11	3.5%	2.7%	3.1%	66%	50%	149%	15%	17%	18%
Coal	3	3	4	8	13	5.2%	3.3%	4.3%	114%	64%	250%	13%	18%	21%
Nuclear	0	0	0	0	1	3.1%	9.0%	6.0%	58%	266%	476%	0%	0%	1%
Biomass/Waste	8	10	13	16	18	1.2%	0.8%	1.0%	20%	13%	36%	45%	35%	29%
Hydro	0	0	0	1	1	6.3%	3.2%	4.7%	149%	59%	297%	1%	2%	2%
Other Renewables	0	0	0	0	1	13.2%	5.9%	9.5%	539%	136%	1410%	0%	1%	1%
End-Use Demand (including electricity)														
Total End-Use	15	20	25	37	49	2.5%	2.0%	2.2%	44%	34%	93%	100%	100%	100%
Residential/Commercial	7	9	13	18	22	2.2%	1.7%	1.9%	38%	28%	77%	50%	48%	46%
Transportation	2	3	4	6	9	3.3%	2.6%	3.0%	63%	48%	141%	15%	17%	19%
Industrial	6	8	9	13	17	2.4%	2.1%	2.3%	43%	37%	96%	35%	35%	35%
Memo: Electricity Demand	1	1	2	5	9	6.6%	4.2%	5.4%	160%	85%	380%	8%	14%	19%
Electricity Generation Fuel	3	4	5	13	22	6.1%	3.6%	4.9%	144%	70%	316%	18%	29%	35%
CO_2 Emissions, Billion Tons	0.7	0.9	1.1	2.0	3.1	4.1%	2.7%	3.4%	83%	50%	175%			
ASIA PACIFIC														
Primary	91	125	205	267	301	1.8%	0.8%	1.3%	30%	12%	47%	100%	100%	100%
Oil	28	43	56	74	87	1.9%	1.1%	1.5%	33%	18%	56%	27%	28%	29%
Gas	7	12	21	38	55	4.0%	2.5%	3.2%	81%	44%	160%	10%	14%	18%
Coal	32	42	94	108	97	1.0%	-0.8%	0.1%	15%	-11%	3%	46%	41%	32%
Nuclear	3	5	6	13	23	5.1%	4.1%	4.6%	110%	83%	283%	3%	5%	8%
Biomass/Waste	19	21	23	23	21	0.1%	-0.6%	-0.3%	1%	-9%	-8%	11%	9%	7%
Hydro	1	2	4	5	7	2.6%	1.7%	2.1%	46%	29%	88%	2%	2%	2%
Other Renewables	0	1	2	6	11	7.6%	4.2%	5.9%	200%	86%	459%	1%	2%	4%
End-Use Demand (including electricity)														
Total End-Use	76	98	151	199	222	1.8%	0.7%	1.3%	32%	12%	47%	100%	100%	100%
Residential/Commercial	29	33	42	52	55	1.4%	0.4%	0.9%	24%	5%	31%	28%	26%	25%
Transportation	11	18	25	40	51	3.0%	1.6%	2.3%	56%	28%	100%	17%	20%	23%
Industrial	36	47	84	108	117	1.6%	0.6%	1.1%	28%	9%	39%	56%	54%	53%
Memo: Electricity Demand	7	12	24	39	50	3.3%	1.7%	2.5%	63%	30%	111%	16%	19%	22%
Electricity Generation Fuel	23	40	80	111	132	2.2%	1.2%	1.7%	38%	19%	65%	39%	41%	44%
CO_2 Emissions, Billion Tons	5.3	7.3	13.7	17.0	17.3	1.4%	0.1%	0.8%	24%	2%	26%			
EUROPE														
Primary	74	79	81	82	78	0.1%	-0.3%	-0.1%	2%	-4%	-3%	100%	100%	100%
Oil	30	32	30	29	26	-0.4%	-0.7%	-0.6%	-6%	-10%	-16%	38%	35%	33%
Gas	13	17	20	24	23	1.2%	-0.3%	0.5%	19%	-4%	15%	25%	29%	29%
Coal	19	14	12	9	5	-2.3%	-3.7%	-3.0%	-30%	-43%	-60%	15%	11%	6%
Nuclear	8	10	10	9	11	-0.2%	1.3%	0.5%	-3%	21%	18%	12%	12%	15%
Biomass/Waste	2	3	4	5	5	1.0%	-0.8%	0.1%	17%	-11%	3%	6%	6%	6%
Hydro	2	2	2	2	2	0.4%	0.3%	0.4%	7%	5%	13%	2%	3%	3%
Other Renewables	0	0	2	4	7	5.9%	3.3%	4.6%	137%	63%	285%	2%	5%	8%
End-Use Demand (including electricity)														
Total End-Use	57	61	63	65	63	0.2%	-0.2%	0.0%	3%	-3%	-1%	100%	100%	100%
Residential/Commercial	17	18	20	21	20	0.2%	-0.2%	0.0%	3%	-4%	0%	32%	32%	32%
Transportation	14	17	19	19	19	0.3%	0.0%	0.2%	4%	1%	5%	29%	30%	31%
Industrial	26	25	24	24	23	0.0%	-0.4%	-0.2%	0%	-6%	-5%	39%	38%	37%
Memo: Electricity Demand	9	10	11	13	14	1.1%	0.5%	0.8%	18%	7%	26%	18%	21%	23%
Electricity Generation Fuel	27	29	31	33	32	0.4%	-0.2%	0.1%	6%	-3%	3%	39%	40%	41%
CO_2 Emissions, Billion Tons	4.5	4.4	4.3	4.0	3.3	-0.4%	-1.4%	-0.9%	-6%	-19%	-23%			
LATIN AMERICA														
Primary	15	20	26	36	45	2.2%	1.5%	1.8%	39%	24%	73%	100%	100%	100%
Oil	7	10	12	16	18	1.8%	0.9%	1.3%	30%	14%	48%	47%	44%	40%
Gas	3	4	5	9	13	3.4%	2.7%	3.0%	64%	49%	145%	21%	24%	29%
Coal	1	1	1	1	1	2.1%	0.6%	1.4%	38%	10%	51%	3%	3%	3%
Nuclear	0	0	0	0	0	2.9%	1.7%	2.3%	53%	29%	97%	1%	1%	1%
Biomass/Waste	3	3	4	5	5	1.0%	0.4%	0.7%	16%	5%	22%	16%	14%	11%
Hydro	1	2	2	3	4	2.5%	1.1%	1.7%	44%	17%	68%	9%	9%	9%
Other Renewables	0	0	1	2	3	5.1%	3.9%	4.5%	112%	77%	275%	3%	4%	6%
End-Use Demand (including electricity)														
Total End-Use	14	18	23	32	40	2.2%	1.5%	1.8%	38%	24%	71%	100%	100%	100%
Residential/Commercial	3	3	4	5	6	1.8%	1.0%	1.4%	30%	16%	50%	18%	17%	16%
Transportation	4	5	7	10	13	2.4%	1.4%	1.9%	43%	24%	77%	31%	32%	32%
Industrial	7	9	12	16	21	2.1%	1.7%	1.9%	37%	28%	75%	51%	51%	52%
Memo: Electricity Demand	1	2	3	5	7	3.3%	2.3%	2.8%	63%	41%	130%	13%	16%	18%
Electricity Generation Fuel	3	4	6	9	12	3.0%	1.9%	2.5%	57%	33%	109%	23%	26%	27%
CO_2 Emissions, Billion Tons	0.7	0.9	1.2	1.6	2.0	2.2%	1.4%	1.8%	39%	23%	71%			

Data table

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	42	51	2.3%	1.3%	1.8%	41%	21%	71%	100%	100%	100%
Oil	7	11	16	20	23	1.5%	0.9%	1.2%	26%	14%	43%	54%	48%	45%
Gas	4	7	13	21	25	3.1%	1.4%	2.2%	57%	23%	93%	44%	49%	50%
Coal	0	0	0	0	0	0.2%	0.4%	0.3%	3%	6%	10%	1%	1%	1%
Nuclear	0	0	0	0	1	–	9.4%	–	–	283%	–	0%	1%	3%
Biomass/Waste	0	0	0	0	0	5.4%	5.9%	5.6%	119%	135%	416%	0%	0%	1%
Hydro	0	0	0	0	0	5.1%	3.4%	4.2%	111%	65%	248%	0%	0%	0%
Other Renewables	0	0	0	0	0	3.4%	4.7%	4.0%	66%	98%	228%	0%	0%	0%
End-Use Demand (including electricity)														
Total End-Use	9	15	24	33	41	2.3%	1.3%	1.8%	41%	21%	72%	100%	100%	100%
Residential/Commercial	1	3	5	7	9	3.0%	1.7%	2.4%	55%	30%	101%	19%	21%	23%
Transportation	3	4	6	9	11	2.3%	1.4%	1.8%	40%	22%	71%	27%	27%	27%
Industrial	5	8	13	17	20	2.1%	1.1%	1.6%	37%	18%	61%	53%	52%	50%
Memo: Electricity Demand	1	1	2	4	6	4.0%	2.2%	3.1%	80%	39%	151%	10%	13%	15%
Electricity Generation Fuel	3	5	9	13	16	2.8%	1.6%	2.2%	51%	26%	91%	29%	31%	32%
CO_2 Emissions, Billion Tons	0.7	1.1	1.8	2.3	2.6	1.7%	0.9%	1.3%	30%	14%	48%			
NORTH AMERICA														
Primary	95	114	113	118	112	0.3%	-0.3%	0.0%	4%	-4%	-1%	100%	100%	100%
Oil	42	48	47	46	40	-0.2%	-0.9%	-0.5%	-3%	-13%	-15%	42%	39%	36%
Gas	21	26	28	34	34	1.3%	0.1%	0.7%	22%	1%	23%	24%	29%	30%
Coal	20	23	21	16	10	-1.6%	-3.2%	-2.4%	-21%	-38%	-51%	18%	14%	9%
Nuclear	7	9	10	10	14	0.5%	2.1%	1.3%	8%	37%	48%	9%	9%	13%
Biomass/Waste	3	4	3	4	3	0.9%	-0.5%	0.2%	15%	-7%	6%	3%	3%	3%
Hydro	2	2	2	2	2	0.5%	0.2%	0.4%	7%	4%	11%	2%	2%	2%
Other Renewables	1	1	2	5	8	5.7%	3.0%	4.4%	131%	57%	262%	2%	4%	7%
End-Use Demand (including electricity)														
Total End-Use	73	86	87	90	87	0.3%	-0.3%	0.0%	4%	-4%	0%	100%	100%	100%
Residential/Commercial	18	22	23	24	24	0.4%	-0.1%	0.1%	5%	-1%	4%	27%	27%	28%
Transportation	25	31	32	33	31	0.2%	-0.3%	-0.1%	3%	-5%	-3%	37%	36%	36%
Industrial	30	34	32	33	32	0.3%	-0.3%	0.0%	5%	-5%	0%	36%	37%	36%
Memo: Electricity Demand	11	15	16	20	22	1.4%	0.7%	1.1%	24%	11%	37%	18%	22%	25%
Electricity Generation Fuel	33	42	43	47	48	0.7%	0.1%	0.4%	11%	1%	12%	38%	40%	42%
CO_2 Emissions, Billion Tons	5.6	6.6	6.5	6.3	5.2	-0.2%	-1.2%	-0.7%	-3%	-17%	-20%			
RUSSIA/CASPIAN														
Primary	57	38	42	43	43	0.3%	0.0%	0.1%	4%	-1%	3%	100%	100%	100%
Oil	18	8	9	9	9	0.2%	-0.1%	0.1%	3%	-1%	2%	21%	20%	20%
Gas	23	20	23	25	25	0.4%	0.1%	0.2%	6%	1%	7%	55%	57%	58%
Coal	13	7	6	5	4	-1.3%	-1.8%	-1.5%	-17%	-23%	-37%	15%	12%	9%
Nuclear	2	2	3	3	4	1.5%	0.5%	1.0%	25%	7%	34%	7%	8%	8%
Biomass/Waste	1	0	0	0	1	1.8%	2.4%	2.1%	30%	44%	87%	1%	1%	2%
Hydro	1	1	1	1	1	0.7%	0.6%	0.6%	11%	9%	21%	2%	2%	2%
Other Renewables	0	0	0	0	0	11.3%	8.1%	9.7%	402%	221%	1508%	0%	0%	1%
End-Use Demand (including electricity)														
Total End-Use	46	29	33	34	33	0.2%	-0.1%	0.0%	2%	-2%	1%	100%	100%	100%
Residential/Commercial	12	9	9	9	8	-0.4%	-0.8%	-0.6%	-5%	-11%	-16%	28%	26%	23%
Transportation	6	3	4	5	5	0.9%	0.2%	0.6%	15%	3%	18%	12%	14%	14%
Industrial	28	17	20	20	21	0.2%	0.1%	0.2%	3%	2%	5%	60%	60%	62%
Memo: Electricity Demand	5	3	4	5	6	1.7%	0.9%	1.3%	30%	14%	48%	12%	16%	18%
Electricity Generation Fuel	27	19	19	20	21	0.4%	0.0%	0.2%	6%	0%	6%	46%	47%	48%
CO_2 Emissions, Billion Tons	3.9	2.3	2.4	2.4	2.3	-0.1%	-0.4%	-0.2%	-1%	-6%	-7%			

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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